ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

B. Tech (Electronics and Communication Engineering)

Course Structure

Academic Year 2024 - 25

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE UNIVERSITY

To be an internationally recognized university through excellence in inter-disciplinary education, research and innovation, preparing socially responsible well-grounded individuals contributing to nation building.

MISSION STATEMENTS OF THE UNIVERSITY

M.S 01: Improve employability through futuristic curriculum and progressive pedagogy with cutting-edge technology

M.S 02: Foster outcomes-based education system for continuous improvement in education, research and all allied activities

M.S 03: Instill the notion of lifelong learning through culture of research and innovation

M.S 04: Collaborate with industries, research centers and professional bodies to stay relevant and up-to-date

M.S 05: Inculcate ethical principles and develop understanding of environmental and social realities

CHANCELLOR / VICE CHANCELLOR

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE SCHOOL

To develop well-grounded, socially responsible engineers and technocrats in a way to create a transformative impact on Indian society through continual innovation in education, research, creativity and entrepreneurship.

MISSION STATEMENTS OF THE SCHOOL

M.S 01: Build a transformative educational experience through disciplinary and inter-disciplinary knowledge, problem solving, communication and leadership skills.

M.S 02: Develop a collaborative environment open to the free exchange of ideas, where research, creativity, innovation and entrepreneurship can flourish among individual students.

M.S 03: Impact society in a transformative way – regionally and nationally - by engaging with partners outside the borders of the university campus.

M.S 04: Promote outreach programs which strives to inculcate ethical standards and good character in the minds of young professionals

DEAN / SCHOOL CONCERNED

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE DEPARTMENT

To create high-quality professionals in the area of Electronics and Communication Engineering through research, innovation and teamwork for fulfilling the social and industrial demands.

MISSION STATEMENTS OF THE DEPARTMENT

M.S 01: Impart high quality technical education and knowledge through industry based flexible curriculum

M.S 02: Boost overall personality development which includes communication skills, innovative and group work exercises, employability, and skills of entrepreneurship.

M.S 03: To provide education for life by focusing on inculcation on professional ethics and social responsibility through scientific approach.

HOD **DEAN / SCHOOL CONCERNED**

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
ELECTRONICS AND COMMUNICATION ENGINEERING

Name of the Programme: B. Tech (Electronics and Communication Engineering) Hons. in IoT and Embedded System

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 01: Enhance the skill and contemporary knowledge in the fields of Electronics and Communication Engineering specially in IoT and Embedded System and professional excellence toward successful employment, advance learning and innovation.

PEO 02: Apply the engineering knowledge to analyse the real-life problem and design economically feasible and socially acceptable solution.

PEO 03: Engage in professional development, lifelong learning and participation in innovative activities to integrate engineering issues to the broader social contexts.

PEO 04: Build-up personality skills, teamwork and leadership skills toward professionalism and ethical practice in organization and society.

HOD **DEAN / SCHOOL CONCERNED**

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
ELECTRONICS AND COMMUNICATION ENGINEERING

Name of the Programme: B. Tech (Electronics and Communication Engineering) Hons. in IoT and Embedded System.

GRADUATE ATTRIBUTE / PROGRAMME OUTCOME (PO)

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering

PO7: Environment and Sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project Management and Finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

HOD **DEAN / SCHOOL CONCERNED**

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
ELECTRONICS AND COMMUNICATION ENGINEERING

Name of the Programme: B. Tech (Electronics and Communication Engineering) Hons. in IoT and Embedded System

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO 01: An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems

PSO 02: An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.

PSO 03: An ability to apply in-depth knowledge in IoT and embedded systems to evaluate, analyze and synthesize existing and novel system designs.

HOD **DEAN / SCHOOL CONCERNED**

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
B. Tech (Electronics and Communication Engineering)
Course Structure

FIRST YEAR

SEMESTER I

S. No	Type	Course Code	Course Title	L	T	P	Contact Hrs/wk	Credits
1	Theory (BSC)	MTH11501	Engineering Mathematics-I	3	1	0	4	4
2	Theory (BSC)	PHY11201	Applied Science	2	0	0	2	2
3	Theory (ESC)	MEE11002	Engineering Mechanics	2	1	0	3	3
		GEE11001	Electrical and Electronics Technology	2	1	0	3	3
4	Theory (HSSM)	ENG11053	English Communication	1	0	2	3	2
	Theory	GEE11012	Disruptive Technology Innovations	1	0	2	3	
5	Theory (BSC)	BIT11003	Life Sciences	2	0	0	2	2
6	Theory (Mandatory)	DGS11001	Design Thinking	1	0	2	3	2
	Theory (ESC)	CSE11001	Introduction to Programming	2	0	0	2	2
7	Practical (BSC)	PHY12202	Applied Science Lab	0	0	4	4	2
8	Practical (ESC)	CSE12002	Programming Lab	0	0	4	4	2
		GEE12002	Electrical and Electronics Technology Lab	0	0	2	2	1
9	Practical (ESC)	CEE12001	Engineering Drawing and CAD	0	0	4	4	2
		MEE12001	Engineering Workshop	0	0	4	4	
			Total	11/12	2	16/18		

SEMESTER II								
S. No	**Type**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	Theory (BSC)	MTH11502	Engineering Mathematics– II	3	1	0	4	4
2.	Theory (ESC)	MEE11002	Engineering Mechanics	2	1	0	3	3
	Theory (ESC)	GEE11001	Electrical and Electronics Technology	2	1	0	3	3
3.	Theory (BSC)	EVS11107	Environmental Studies	2	0	2	4	3
4.	Theory (Mandatory)	DGS11001	Design Thinking	1	0	2	3	2
	Theory (ESC)	CSE11001	Introduction to Programming	2	0	0	2	2
5.	Theory	GEE11012	Disruptive Technology Innovations	1	0	2	3	2
	Theory (HSSM)	ENG11053	English Communication	1	0	2	3	
6.	Theory (Mandatory)	EIC11001	Venture Ideation	2	0	0	2	2
7.	Practical (ESC)	GEE12002	Electrical and Electronics Technology Lab	0	0	2	2	1
		CSE12002	Programming Lab	0	0	4	4	2
8	Practical (ESC)	MEE12001	Engineering Workshop	0	0	4	4	2
		CEE12001	Engineering Drawing and CAD	0	0	4	4	
			Total	11/12	2	12	25/23	

SECOND YEAR

Semester-III								
S. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	Theory (BSC)	MTH11535	Engineering Mathematics– III B (Z Transform, Laplace Transform, Special function etc)	3	1	0	4	4
2.	Theory (ESC)	ECE11001	Prof. Core- I (Electronic Devices)	3	0	0	3	3
3.	Theory (PCC)	ECE11002	Prof. Core- II (Analog Electronics)	3	1	0	4	4
4.	Theory (PCC)	ECE11003	Prof. Core- III (Signals and Networks)	3	1	0	4	4
5.	Theory (PCC)	CSE11104	Data Structure & Algorithm	3	0	0	3	3
6.	Practical (PCC)	ECE12004	Prof. Core-II Lab (Analog Electronics Lab)	0	0	2	2	1
7.	Practical (PCC)	ECE12005	Prof. Core-III Lab (Signals and Networks Lab)	0	0	2	2	1
8.	Practical (PCC)	CSE12107	Data Structure Algorithm Lab	0	0	2	2	1
9.	Practical (Mandatory)	IDP14001	Interdisciplinary Project	0	0	5	5	3
10.	Practical (Mandatory)	SOC14100	Community Service	0	0	2	2	1
			Total	**15**	**3**	**13**	**31**	**25**

 # Community Service will be taken up during the summer vacation of II Semester and evaluated in

SEMESTER-IV								
S. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	Theory (PCC)	ECE11006	Prof. Core- IV (Electromagnetic Fields)	3	1	0	4	4
2.	Theory (PCC)	ECE11007	Prof. Core- V (Digital Electronics)	3	0	0	3	3
3.	Theory (PCC)	ECE11008	Prof. Core- VI (Communication Systems-I)	3	1	0	4	4
4.	Theory (PCC)	ECE11009	Prof. Core- VII (Digital Signal Processing)	3	1	0	4	4
5.	Theory (PCC)	PSG11021	Human Values and Professional Ethics	2	0	0	2	2
6.	Theory (PCC)	ECE12010	Prof. Core- IV Lab (Communication Systems-I Lab)	0	0	2	2	1
7.	Practical (PCC)	ECE12011	Prof. Core- V Lab (Digital Electronics Lab)	0	0	2	2	1
8.	Practical (PCC)	ECE12012	Prof. Core- VII Lab (Digital Signal Processing Lab)	0	0	2	2	1
			Total	**14**	**3**	**6**	**23**	**20**

III Semester.

<u>THIRD YEAR</u>

SEMESTER –V								
S. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs /week**	**Credits**
1.	Theory (PCC)	ECE11013	Prof. Core – VIII (Microcontrollers & Interfacing)	3	1	0	4	4
2.	Theory (PCC)	ECE11014	Prof. Core – IX (Communication Systems-II)	3	1	0	4	4
3.	Theory (PCC)	ECE11015	Prof. Core – X (VLSI System Design)	3	1	0	4	4
4.	Theory (PEC)	1.ECE11016 2.ECE11017… 3.ECE11018	**Prof. Elective – I** 1. Antenna and Wave Propagation 2.Foundation on Artificial Intelligence and Machine Learning 3. Data Communication and Computer Networks	3	0	0	3	3
5.	Theory (PEC)	1.ECE11019 2.ECE11020 3.ECE11021	**Prof. Elective – II** 1. Optical Fiber Communication 2. Introduction to Machine Learning 3. Introduction to IoT	3	0	0	3	3
6.	Theory (HSSM)	ECO11505	Economics for Engineers	3	0	0	3	3
7.	Practical (PCC)	ECE12022	Prof. Core – VIII Lab (Communication Systems-II Lab)	0	0	2	2	1
8.	Practical (PCC)	ECE12023	Prof. Core – IX Lab (VLSI Design Lab)	0	0	2	2	1
9.	Practical (PCC)	ECE12024	Prof. Core – X Lab (Microcontrollers & Interfacing Lab)	0	0	2	2	1
10.	Seminar (P/S/I)	ECE15033	Technical Seminar	0	0	2	2	1
			Total	**18**	**3**	**8**	**29**	**25**

SEMESTER –VI								
S. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	Theory (PCC)	ECE11025	Prof. Core – XI (Embedded Systems Design)	3	1	0	4	4
2.	Theory (PCC)	ECE11026	Prof. Core – XII (Control Systems)	3	1	0	4	4
3.	Theory (PCC)	ECE11027	Prof. Core – XIII (Microwave Engineering)	3	1	0	4	4
4.	Theory (PEC)	1.ECE11028 2.ECE11029 3.ECE11030	**Prof. Elective – III** 1.Sensors and Actuators for IOT 2.Introduction to Artificial Intelligence 3. Wireless Communication	3	0	0	3	3
5.	Theory (PEC)	1.ECE11031 2. ECE11032 3.ECE11033	**Prof. Elective – IV** 1. Data Acquisition 2.Advanced Machine Learning	3	0	0	3	3

			3. Information Theory and Coding					
6.	Theory (OEC)	1.CSE11251 2. CEE11030 3.SDS11511 4. CSE11136 5.CSE11138	**Open Elective – I** 1.Object Oriented Programming 2.Dream House Construction 3.Probability and Statistics 4. Virtualization and Applied Cloud Computing 5.Application Development with Python	3	0	0	3	3
7.	Practical (PCC)	ECE12034	Prof. Core – XI Lab (Embedded Systems Design Lab)	0	0	2	2	1
8.	Practical (Sessional) (PCC)	ECE12035	Prof. Core – XII Lab (Control Systems Lab)	0	0	2	2	1
9.	Practical (PCC)	ECE12036	Prof. Core – XIII Lab (Microwave Engineering Lab)	0	0	2	2	1
10.	Practical (PEC)	1.ECE12037 2.ECE12038 3.ECE12039	**Prof. Elective – III Lab** 1. Sensors and Actuators for IOT Lab 2.Introduction to Machine Learning Lab 3. Wireless Communication Lab	0	0	2	2	1`
			Total	**18**	**3**	**8**	**29**	**25**

FOURTH YEAR

	SEMESTER-VII							
S. No	**Type**	**Course CODE**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/week**	**Credits**
1.	Theory (HSSM)	MGT11402	HSSM –V (Industrial Management)	3	0	0	3	3
3.	Theory (PEC)	1.ECE11040 2.ECE11041 3.ECE11042	**Prof. Elective – V** 1. Applications of IOT 2. AI for Robotics 3. Advanced Communication	3	0	0	3	3

4.	Theory (OEC)	1.CSE11253 2.CSE11254 3.CSE11255 4.CSE11256 5.CSE11150 6.CSE11151	**Open Elective – II** 1.Data Base Management Systems 2.Big Data tools and Techniques 3.Python for Data Analysis 4.Android Development 5. Operating Systems 6. Advanced Web Technologies	3	0	0	3	3
5.	Theory (OEC)	1.CSE11257 2.CSE11258 3.CSE11259 4.CSE11152 5.CSE11154	**Open Elective – III** 1.Cyber Security 2.Neural Network and Deep Learning 3.Web Technology 4. Applied Machine Intelligence 5. Cloud Architecture and Deployment	3	0	0	3	3
7.	Practical (PEC)	1.ECE12043 2.ECE12044 3.ECE12045	**Prof. Elective V Lab** 1. Application of IOT Lab 2. Introduction to Artificial Intelligence Lab 3. Advanced Communication Lab	0	0	2	2	1
8.	Practical (PCC)	ECE14040	Summer Internship#	-	-	-	-	2
9.	Practical (PCC)	ECE14041	Minor Project	0	0	6	6	3
			Total	**12**	**0**	**8**	**20**	**18**

 # Summer Internship for 30 days will be taken at the end of 6th semester and will be evaluated in the 7th semester.

Semester-VIII								
S. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/week**	**Credits**
1.	Practical (PCC)	ECE14042/ ECE14043/ ECE14044	Industry Work Experience / SIRE* / Major Project	0	0	12	12 (For Major Project only)	6
2.	Practical (PCC)	ECE15045	Comprehensive Viva Voce	------			------	2
			Total	**0**	**0**	**12**	**12**	**8**

***SIRE: Scientific Investigation & Research Experience**

Total Credits Distribution Semester wise: (B. Tech)

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**Total Credits**
Credits	**20**	**20**	**25**	**20**	**25**	**25**	**18**	**08**	**161**

MTH11501	**Engineering Mathematics-I**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	1	0	4
Pre-requisites/Exposure	12th level Mathematics				
Co-requisites	--				

Course Objectives

1. To help the student to understand basic concept of abstract and vector algebra with its uses in engineering science.
2. To give emphasis about concepts of differential calculus and enable students to apply these topics in real life problems.
3. To give the students a perspective to learn integral calculus and its importance in advanced study in engineering science.
4. To enable students, acquire fundamental concept of ordinary differential equation and its applications in engineering science.

Course Outcomes

On completion of this course, the students will be able to

CO1	**Develop** the idea of basic concepts of abstract algebra and geometrical idea of vector analysis with real world applications.
CO2	**Find** the fundamental concepts of differential calculus and apply these topics in real life problems
CO3	**Find** the fundamental concepts of Integral Calculus and apply these topics in real life problems.
CO4	**Apply** the various solution procedures of Ordinary Differential equations in engineering problems.

Catalog Description

For engineering course, Mathematics is the backbone. Students will be having good engineering skills if their idea for Mathematics is clear. In this course the focus will be to learn Mathematics in depth which will motivate students to grow their thinking ability for Engineering also. By knowing the theory student will be able to apply that successfully to all kind of problems of Engineering and science. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities (Problem solving, presentation etc.).

Course Content

Unit I: Differential Calculus [20L]

Introduction to limit, continuity, derivative for function of one variable; Successive differentiation, Leibnitz's theorem; Rolle's theorem, Lagrange's mean value theorem, Taylor's and Maclaurin's theorems with remainders; Indeterminate forms; Concavity and convexity of a curve, Points of inflexion, Maxima and Minima

Limit, continuity, and differentiability of a functions of several variables; partial derivatives and their geometrical interpretation; chain rule, total derivative, derivatives of composite and implicit functions; homogeneous function, Euler's theorem on homogeneous functions; Jacobian of variable transformation; maxima and minima of functions of several variables, Lagrange's method of multipliers

Unit II: Integral Calculus [15L]

Review of definite integrals, Reduction formulae, Improper integral, Beta and Gamma functions, elementary properties, Rectification, double and triple integrals, computations of area, surfaces and volumes, change of variables in double integrals, applications

Unit III: Linear Algebra [18L]

Basics of real and complex matrices, Determinant and its properties, Orthogonal matrices, Hermitian and skew-Hermitian matrices, Unitary matrices, Elementary row and column operations on a matrix, Rank, echelon form, Inverse of a matrix using elementary operations, Solution of system of linear equations, Consistency, Characteristic equation, Caley-Hamillton theorem, eigenvalues and eigenvectors, algebraic and geometric multiplicity, diagonalization

Unit IV: Vector Algebra [7L]

Scalar and vector fields, Vector product, Scalar triple product and their interpretation, directional derivative, gradient, Curl, divergence

Text Book:

1. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House

Reference Book:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications
2. G. B. Thomas Jr., M. D. Weir, J. R. Hass, Thomas Calculus Early Transcendentals, 12th Edition
3. James Stewart, Calculus: Concepts and Contexts, 4th Edition, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**

CO1	**Develop** the idea of basic concepts of abstract algebra and geometrical idea of vector analysis with real world applications.	**PO2, PO3, PO4, PO12**
CO2	**Find** the fundamental concepts of differential calculus and apply these topics in real life problems	**PO2, PO3, PO4, PO12**
CO3	**Find** the fundamental concepts of Integral Calculus and apply these topics in real life problems.	**PO2, PO3, PO4, PO12**
CO4	**Apply** the various solution procedures of Ordinary Differential equations in engineering problems.	**PO2, PO3, PO4, PO12**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
MTH11 501	Engineeri ng Mathemat ics-I		3	3	3								3		

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 20-- – 20--)		
Name of the Program:	B.Tech	**Semester:**	I
Paper Title:	Engineering mathematics I	**Paper Code:**	MTH11501
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	What is the value of y_n if $y = e^{5x}$	**U**	**CO1**
2	Demonstrate Beta function.	**Ap**	**CO2**
3	Define basis of a vector space.	**Ap**	**CO3**
4	What is Cayley-Hamilton theorem?	**Ap**	**CO3**
5	If $\vec{c}$ is a constant vector and $\vec{r} = x\hat{\imath} + y\hat{\jmath} + z\hat{k}$, then what is the value of $grad\ (\vec{c}.\vec{r})$?	**R**	**CO4**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	Find the Jacobian $J\left(\frac{u,v}{x,y}\right)$ if $u = x - y, v = x^2 - y^2$	**U**	**CO1**
	(OR)		
6 b)	Find the value of $\lim_{x\to 0} \frac{e^x - x - 1}{x^2}$ using L'Hospital rule.	**U**	**CO1**
7 a)	Define the reduction formula of $\int sin^n x\, dx$	**Ap**	**CO2**
	(OR)		
7 b)	Find the value of $\int_0^{\pi/4} tan^n x\, dx$	**Ap**	**CO2**
8 a)	What is the value of a for which the following system of equations has unique solution? $x + y + z = 1$ $x + 2y - z = 2$ $5x + 7y + az = 4$	**Ap**	**CO3**
	(OR)		
8 b)	Show that the following vectors are linearly independent: $(1, 2, 0), (2, 3, 4)$ and $(1, 5, -2)$	**Ap**	**CO3**
9 a)	Find whether the following two matrices are similar or not: $A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$	**Ap**	**CO3**
	(OR)		
9 b)	Let the vector addition in $\mathbb{R}^2 = \{(x, y) \mid x, y \in \mathbb{R}\}$ be defined by $(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2)$. Show that the first five conditions of the vector space related to vector addition are satisfied.	**Ap**	**CO3**

10 a)	Show that $\nabla(f_1 - f_2) = \nabla\varphi_1 - \nabla\varphi_2$.	**R**	**CO4**
	(OR)		
10 b)	Show that $div(\vec{A} - \vec{B}) = div\vec{A} - div\vec{B}$.	**R**	**CO4**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	(i) Show that $[\vec{a}+\vec{b}\ \ \vec{b}+\vec{c}\ \ \vec{c}+\vec{a}] = 2[\vec{a}\ \ \vec{b}\ \ \vec{c}]$ where $\vec{a}, \vec{b},$ and $\vec{c}$ are any three vectors (ii) Find the value of m for which the vectors $4\hat{\imath} - 2\hat{\jmath} + 2\hat{k},\ 2\hat{\imath} + 4\hat{\jmath} - 6\hat{k}$ and $3\hat{\imath} + m\hat{\jmath} + 5\hat{k}$ are coplanar. **3+2**	**R**	**CO4**
	(OR)		
11 b)	Find $div(\vec{F})$ and $curl\ (\vec{F})$ where $\vec{F} = grad(x^3 + y^3 + z^3 - 3xyz)$	**R**	**CO4**
12 a)	If $u = \cos^{-1}\left(\frac{x+y}{\sqrt{x}-\sqrt{y}}\right)$, show that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + \frac{1}{2}\cot u = 0$	**U**	**CO1**
	(OR)		
12 b)	If $y = e^{m\sin^{-1}x}$, show that $(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+m^2)y_n = 0$	**U**	**CO1**
13 a)	If $\vec{r} = (acost)\hat{\imath} + (asint)\hat{\jmath} + (a\ t\ tan\alpha)\hat{k}$, then show that $\left[\frac{d\vec{r}}{dt}\ \frac{d^2\vec{r}}{dt^2}\ \frac{d^3\vec{r}}{dt^3}\right] = a^3\tan\alpha$.	**R**	**CO4**
	(OR)		
13 b)	Show that a proper vector $\vec{r}$ has constant length if $\vec{r}.\frac{d\vec{r}}{dt} = 0$.	**R**	**CO4**
14 a)	Find maxima or minima of $f(x,y) = x^3 + y^3 - 3x - 12y + 20$.	**U**	**CO1**
	(OR)		
14 b)	Evaluate $\int_0^a \int_0^{\sqrt{a^2-y^2}} (x^2+y^2)dxdy$ by changing to polar coordinates.	**Ap**	**CO2**
15 a)	Find the volume generated by revolving the parabola $y^2 = 2ax$ about X-axis bounded by $x = a$.	**Ap**	**CO2**
	(OR)		
15 b)	Find the area of the surface generated by revolving the parabola $y^2 = 2ax$ about X-axis bounded by $x = a$.	**Ap**	**CO2**
16 a)	Express (4,3,10) as linear combination of the vectors $(1,2,0), (2,3,4)$ and $(1,5,-2)$.	**Ap**	**CO3**
	(OR)		
16 b)	Show that the following set of vectors constitute a basis for the vector space $\mathbb{R}^3$with usual vector addition and scaler multiplication: $S = \{(1,1,0),(1,0,1),(0,1,1)\}$	**Ap**	**CO3**
17 a)	Find the eigen values and eigen vectors of the following matrix: $A = \begin{pmatrix} 1 & 1 & 1 \\ -1 & -1 & -1 \\ 0 & 0 & 1 \end{pmatrix}$	**Ap**	**CO3**
	(OR)		
17 b)	Use Cayley-Hamilton theorem to find inverse of the following matrix (if exist): $A = \begin{pmatrix} 1 & 0 & 0 \\ 1 & 2 & 1 \\ 2 & 3 & 2 \end{pmatrix}$	**Ap**	**CO3**

		L	T	P	C
PHY11201	**Applied Science**	L	T	P	C
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	12^{th} level Physics, Chemistry, and Mathematics				
Co-requisites	--				

Course Objectives

1. To develop the capability of the students for understanding fundamental aspects of physics.
2. To give students theoretical background, the key prerequisite for performing laboratory experiments.
3. To build up the foundations for further studies in physics and engineering.
4. Learn to analyze and evaluate various thermodynamic cycles used for energy production - work and heat, within the natural limits of conversion
5. To impart the knowledge of measurement of the rate of a chemical reaction and to gain knowledge of electrochemical procedure

Course Outcomes

At the end of the course, the student will be able to:

CO1	**Illustrate** the basics of vector calculus, its application in mechanics, and different harmonic motions.
CO2	**Build** the knowledge of physical optics and related application.
CO3	**Develop** the basic concepts of electromagnetic theory and em wave.
CO4	**Apply** fundamental concepts of thermodynamics to engineering applications, estimate thermodynamic properties of substances in gas and liquid states, and determine thermodynamic feasibility and efficiency of various energy related processes.
CO5	**Determine** the rate law, effect of temperature on the rate of a chemical reaction and determine the activation energy and assess the role of a catalyst on the rate of a chemical reaction, calculate the cell potential for a nonstandard cell.

Catalog Description

Applied science is a discipline that is used to apply existing scientific knowledge to develop more practical applications, for example: technology or inventions. In applied science different aspects of Mathematical Physics is used to develop information to explain phenomena in the natural world. This information is then put to use for practical endeavors through a controlled Laboratory environment. Applied science is generally engineering, which develops technology, although there might be dialogue between basic science and applied science (research and development).In this course the focus will be on improving the logical learning moved into a physical environment. Classroom activities will be designed to encourage students to play an active role in the construction of their own knowledge and in the design of their own learning strategies. We will combine traditional lectures with other active teaching methodologies, such as group discussions, cooperative group solving problems, analysis of video scenes and debates. Class participation is a fundamental aspect of this course.

Basic knowledge in chemistry is essential for understanding various energy-work relationships. Student will be able to develop engine. They will be able to increase the efficiency of an engine. Student will understand the different processes in chemical and physical science and their feasibility. The basic knowledge of the molecular structure and their bonding will impart the knowledge of the reactivity and the application of different molecules. The knowledge of electrochemistry will impart a deep sense in preparing different electrochemical cells and their applications. Students will be encouraged to develop new models. We will apply different methodologies to inspire our students combining traditional classes with modern techniques. They will also take part in different project work in fundamental as well as in practical fields.

Course Content

Module 1: Mechanics **[10 lecture hours]**

Basic ideas of Vector Calculus Potential energy function, Conservative and non-conservative forces. Conservation laws of energy & momentum. Central and non-central forces, Gravitation, Kepler's Laws, Angular Velocity and Torque, Moment of Inertia, SHM, Damped, Undamped and forced Oscillations (no derivations).

Module 2: Optics **[5 lecture hours]**

Principle of Superposition and Interference from parallel thin films, Single slit and Double slit diffraction, Diffraction grating, dispersive power of Grating, resolving power of prism and grating. production of plane polarized light by different methods, Brewster and Malus Laws. Double refraction, Nicol prism, specific rotation.

Module 3: Electromagnetic Theory **[10 lecture hours]**

Gauss's Law in Electrostatics, Boundary Value problems, Dielectrics, Motion of Charged Particles in crossed electric & magnetic fields, Velocity Selector & Magnetic focussing, Gauss law, continuity equation, Biot-Savart Law and its applications, inconsistency in Ampere's Law, Maxwell's equations (differential and integral forms), Poynting vector, Poynting Theorem (Statement only).

Module 4: Thermodynamics **[10 lecture hours]**

Importance and scope, definition of system and surroundings: type of systems (isolated, closed and open); extensive and intensive properties; steady state versus equilibrium state; concept of thermal equilibrium and the zeroth law of thermodynamics; thermodynamic coordinates, state of a system, equation of state, state functions and path functions; concept of heat and work (IUPAC convention); first law of thermodynamics, internal energy (U) as a state function; enthalpy as a state function; energy conservation in the living organism; heat changes at constant volume and constant pressure; relation between C_p and C_v using ideal gas; Thermodynamics of Chemical Processes, Concept of entropy, 2^{nd} law of thermodynamics, Idea of Chemical potential, Equilibrium conditions for closed systems.

Module 5: Reaction Kinetics, Catalysis & Electrochemistry [10 lecture hours]

Rate laws, 1st Order reaction & 2nd order reaction, Arrhenius equation, Mechanism and Theories of reaction rates, kinetic and thermodynamic control of reaction; idea of rate determining step; steady-state approximation; Characteristics and types of Catalyst, Theories of Catalysis, Electrode potential, Redox reaction & Nernst Equation.

Text Books

1.	Principles of Engineering Physics by S. P. Kuila, (Volume I) New Central Book Agency (P) Ltd.
2.	Principles of Engineering Physics by S. P. Kuila, (Volume II) New Central Book Agency (P) Ltd.
3.	Engineering Physics by Partha Pratim Das and Abhishek Chakraborty
4.	Engineering Physics I by S. K. Bhattacharya and Soumen Pal
5.	Engineering Physics II by S. K. Bhattacharya and Soumen Pal
6.	Engineering Chemistry (Cambridge University Press-Ist Edition) –Shikha Agarwal
7.	P. W. Atkins, Physical Chemistry, ELBS/Oxford, 10th Edition, 2014

Reference Books

1.	Optics by Ajoy Ghatak, Mc-graw Hill
2.	Introduction to Electrodynamics, David J. Griffiths, Pearson Education Limited
3.	Engineering Chemistry (Pearson Ed.)- K. Sesha Maheswaramma and MridulaChugh
4.	Physical Chemistry (Sarat Book House)- P. C. Rakshit

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the basics of vector calculus, its application in mechanics, and different harmonic motions.	**PO1, PO4**
CO2	**Build** the knowledge of physical optics and related application.	**PO1, PO4**
CO3	**Develop** the basic concepts of electromagnetic theory and em wave.	**PO1, PO5, PO6**

CO4	**Apply** fundamental concepts of thermodynamics to engineering applications, estimate thermodynamic properties of substances in gas and liquid states, and determine thermodynamic feasibility and efficiency of various energy related processes.	**PO1, PO2, PO4, PO5**
CO5	**Determine** the rate law, effect of temperature on the rate of a chemical reaction and determine the activation energy and assess the role of a catalyst on the rate of a chemical reaction, calculate the cell potential for a nonstandard cell.	**PO1, PO2, PO4, PO6**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
PHY11 201	Applied Science	3	2		3	2	2								

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2021 – 2022)		
Name of the Program:	B.Tech	**Semester:**	I
Paper Title:	Applied Science	**Paper Code:**	PHY11201
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

4. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
5. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
6. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A
Answer All the Questions (5 x 1 = 5)

1	**Define** polarization of light.	**R**	**CO2**
2	**State** Faraday's law of Electromagnetic induction.	**R**	**CO3**
3	**Define** Gauss's divergence theorem.	**R**	**CO1**
4	**Define** internal energy of a thermodynamics system	**R**	**CO4**
5	**State** Arrheniusrelation between rate constant and temperature	**R**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	A cubical block of side L and density d is floating in a water of density ρ(ρ>d). The block is slightly depressed and released. **Show that** it will execute simple harmonic motion and hence **determine** the frequency of oscillation.	**Ap**	**CO1**
(OR)			
6 b)	**Explain** Maxwell's modification on Ampere's law.	**Evaluate**	**CO3**
7 a)	Show that $C_P - C_V = [p + \left(\frac{\delta U}{\delta V}\right)_T] \left(\frac{\delta V}{\delta T}\right)_P$. Hence find the value for an ideal gas. Comment on the value of (C_P-C_V) for a solid or a liquid.	**Ap**	**CO4**
(OR)			
7 b)	(a)When order and molecularity of reaction can be same? (b) Why does order can be fractional but molecularity cannot? (c) Write the units of rate constants for zero and second order reaction.	**U**	**CO5**
8 a)	What is the value of a for which the following system of equations has unique solution? $x + y + z = 1$ $x + 2y - z = 2$ $5x + 7y + az = 4$	**Ap**	**CO3**
(OR)			

8 b)	In an interference experiment,'d' is the distance between the two coherent sources of light with wavelength λ and D is the distance between source to screen. **Show** that the separation between the two consecutive dark bands is given by β=λD/d	**Ap**	**CO3**
9 a)	Find whether the following two matrices are similar or not: $$A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}, \quad B = \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$$	**Ap**	**CO3**
(OR)			
9 b)	Let the vector addition in $\mathbb{R}^2 = \{(x,y) \| x, y \in \mathbb{R}\}$ be defined by $(x_1, y_1) + (x_2, y_2) = (x_1 + x_2, y_1 + y_2)$. Show that the first five conditions of the vector space related to vector addition are satisfied.	**Ap**	**CO3**
10 a)	Show that $\nabla(f_1 - f_2) = \nabla\varphi_1 - \nabla\varphi_2$.	**R**	**CO4**
(OR)			
10 b)	Show that $div(\vec{A} - \vec{B}) = div\vec{A} - div\vec{B}$.	**R**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Show that $C_P - C_V = [p + \left(\frac{\delta U}{\delta V}\right)_T] \left(\frac{\delta V}{\delta T}\right)_P$. Hence find the value for an ideal gas. Comment on the value of (C_P-C_V) for a solid or a liquid.	**U**	**CO2**
(OR)			
11 b)	a)When order and molecularity of reaction can be same? (b) Why does order can be fractional but molecularity cannot? (c) Write the units of rate constants for zero and second order reaction	**R**	**CO4**
12 a)	In Newton's Rings experiment the diameter of the 5th dark ring is 0.336 cm. and the diameter of the 15th dark ring is 0.590 cm. **Find** the radius of the plano-convex lens if the wavelength of the light used is 5890 A.	**U**	**CO1**
(OR)			
12 b)	In an interference experiment,'d' is the distance between the two coherent sources of light with wavelength λ and D is the distance between source to screen. **Show** that the separation between the two consecutive dark bands is given by β=λD/d.	**U**	**CO1**
13 a)	**Find** out the condition for maximum and minimum intensity in Young's Double slit experiment for Interference of Light. **Show** that Energy remains constant in this phenomenon.	**R**	**CO4**
(OR)			
13 b)	Five equal charges of 40 nC each are placed at five vertices of a regular hexagon of 6 cm side. The sixth vertex is free. **Determine** the electric field at the centre of the hexagon due to the distribution.[	**R**	**CO4**
14 a)	**Compare** the electrostatic force and Gravitational force between a proton and electron in a hydrogen atom. Given $e = 1.6 \times 10^{-19} c, m_e = 9.1 \times 10^{-31} kg, m_p = 1.7 \times 10^{-27} kg \text{ and } G = 6.67 \times 10^{-11} Nm^2kg^{-2}$.	**U**	**CO1**
(OR)			
14 b)	**Derive** equation of continuity for current. **Show** that for steady current it reduces to $\nabla.\vec{J}$=0.	**Ap**	**CO2**
15 a)	I mole of an ideal gas is allowed to expand freely under adiabatic condition to	**Evaluate**	**CO2**

	double of its volume. The initial temperature of the gas is 300 K and the initial pressure is 1 atm. Find the final temperature, final pressure of the gas. Also calculate □U+□H for the process.		
	(OR)		
15 b)	Show that $PV^{\square}$= constant for an adiabatic process of a gas. State all the assumptions.	**U**	**CO2**
16 a)	$dU=C_V\,dT$ Is this valid for all systems? State the conditions under which the equation is valid.	**U**	**CO3**
	(OR)		
16 b)	What is the significance of activation energy?	**U**	**CO3**
17 a)	Initial rate of a first order reaction increases three-fold when temperature changes from 400 K to 420 K. If the half-life period of the reaction at 400 K is 10 min, calculate the time required for 20 % conversion of the reactant at 420 K and the activation energy.	**Evaluate**	**CO-4**
	(OR)		
17 b)	What effect does temperature has on the rate of chemical reactions? Explain it on the basis of Arrhenius equation.	**U**	**CO-5**

CSE11001	**Introduction to Programming**	L	T	P	C
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	10+2 Level Mathematics, Knowledge of Basics of Computer				
Co-requisites	Knowledge of Logical Reasoning and Analysis				

Course Objectives

1. To understand the nature of programming as human activity.
2. To practice the programming construct to solve multi-dimensional problems.
3. To relate and implement mathematical concepts through programming in order to solve computational problems.
4. To enable students to acquire structure and written expression required for their profession.
5. To understand the principles of data storage and manipulation.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Define** basics concepts of programming structure and implement the basics concepts of Programming.
CO2. **Solve** and execute various problems using programming language and select the best solution.
CO3. **Apply** modularized solution and design such programs to appraise the solution
CO4. **Illustrate** the basic usage of memory and construct such memory in terms of array in a program. Students will also be able to define user defined data types using structure and Union. Create and manipulate permanent storage access through File Handling.
CO5. **Define** and construct different data structures for various collection of data.

Catalog Description

Programming skills are mandatory for designing or solving problems through digital device. It is the language through which computational/digital devices are communicated rather interfaced. To develop any software programming language is a must. In present era almost all aspect of life is somehow largely related to virtualization and digital data/information. Devices from smartphones to other handheld devices, drones, cameras, medical instruments etc. all needs programming at some part. In engineering it has become quintessential for the students/research scholars to learn programming. In this course, students will learn how to solve problems in various domains through a programming language. This course enables students with the basic skills of C Programming Language. Five Different related modules comprise this course. First Unit familiarizes students with basics of computers, algorithmic method to solve problem, introduction to generic programming construct. Basics of C Programming is upto iterative structure is depicted in Unit II. In Unit III students will learn about modularization using functions and one advance concept of C Programming, Pointers. Unit IV will cover one of the most important concepts in C Programming, Array and Strings. Unit V will accomplish this course with the advance concept like Structure, Union and File Handling. After this course students will grow their analytical ability to solve problem and logical skill. Also, this course effectively creates the ability to grasp any other Programming Language in easier manner.

Course Content

Unit I: **4 lecture hours**

Basic Concepts of Programming: Introduction to components of a Computer System (disks, memory, processor, where a program is stored and executed, operating systems, compilers, etc.), Idea of Algorithm: steps to solve logical and numerical problems, Representation of Algorithms: Flowchart/Pseudo code with examples, From Algorithms to Programs; source code, variables and memory locations, Syntax and Logical Errors in compilation, Object and Executable code

Unit II: **10 lecture hours**

Basics of C Programming : Characters used in C, Identifiers, Keywords, Data type & sizes, Constants &Variables, Various Operators used such as Arithmetic Operators, Relational & Logical Operators, Increment & Decrement Operators, Assignment Operators, Conditional or Ternary Operators, Bitwise Operators & Expressions; Standard Input & Output, formatted input scanf( ), formatted output printf( ); Flow of Control, if-else, switch-case, Loop Control Statements, for loop, while loop, do-while loop, nested loop, break, continue, goto, label and exit( ) function

Unit III: **10 lecture hours**

Functions and Pointers: Definition of Function, Declaration or Prototype of Function, Various types of Functions, Call by Value, Call by Reference, Recursion, Tail Recursion, Definition of Pointer, Declaration of Pointer, Operators used in Pointer, Pointer Arithmetic, Functions with Pointer

Unit IV **17 lecture hours**

Arrays and String: Definition, Single and Multidimensional Arrays, Representation of Arrays - Row Major Order, and Column Major Order, Application of arrays – searching and sorting, Sparse Matrices and their representations. Definition of a String, Declaration of a String, Initialization of a String, Various String Handling Functions with example

Structures and Unions: Definition of a Structure, Declaration of a Structure & Structure Variable, Initialization of a Structure, Operators used in Structure, Structure within Structures, Union, Difference between a Structure and a Union

Files: Types of File, File Processing, Handling Characters, Handling Integers, Random File Accessing, Errors During File Processing

Unit V **4 lecture hours**

Overview of Stacks and Queues: Introduction to Stack, Primitive operations on Stack, Real-life applications of Stack, Introduction to Queues, Primitive operations on Queues, Real-life applications of Queues.

Text Books

1. Balagurusamy, E., n.d. Programming In ANSI C. 5th ed. Bangalore: mcgraw-hill.
2. Gotfreid (196) *Schaum's Outline of Programming with C*, 2 edn., USA: McGraw-Hill
3. Brian W. Kernighan, Dennis Ritchie (1988) *C Programming Language*, 2 edn., : Prentice Hall.

Reference Books

1. Al Kelley, Ira Pohl (1988) *A Book on C*, 4 edn., : Addision Wesley Longman**.**

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Define** basics concepts of programming structure and implement the basics concepts of Programming.	**PO4, PO5**
CO2	**Solve** and execute various problems using programming language and select the best solution.	**PO1**
CO3	**Apply** modularized solution and design such programs to appraise the solution	**PO1, PO4**
CO4	**Illustrate** the basic usage of memory and construct such memory in terms of array in a program. Students will also be able to define user defined data types using structure and Union. Create and manipulate permanent storage access through File Handling.	**PO1, PO5**
CO5	**Define** and construct different data structures for various collection of data.	**PO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
CSE11 001	Introduction to Programming	3			2	2									

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 20-- – 20--)		
Name of the Program:	B.Tech	**Semester:**	I
Paper Title:	INTRODUCTION TO PROGRAMMING	**Paper Code:**	**CSE11001**
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

7. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
8. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
9. Assumptions made if any, should be stated clearly at the beginning of your answer.

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**What** do you understand data types?	**U**	**CO1**
2	**Define** array?	**U**	**CO4**
3	**How** user defined function reduces the no. of lines in a large program?	**R**	**CO2**
4	**Why** pointer is advantageous than array?	**U**	**CO5**
5	**What** is the size of an integer variable?	**R**	**CO1**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**What** is dimension of an array?**How** many types of array are there?	**U**	**CO1**
	(OR)		
6 b)	Can you store integer values and float type values in a single array, if not **why**?	**U**	**CO1**
7 a)	**What** you need to do to store such different types of values in an single array?	**R**	**CO2**
	(OR)		
7 b)	**Find** an user defined function in c that would return multiple values in main() function	**Ap**	**CO2**
8 a)	State the types of data types and memory occupies.	**U**	**CO3**
	(OR)		
8 b)	Show that the following vectors are linearly independent: $(1, 2, 0), (2, 3, 4)$ and $(1, 5, -2)$	**Ap**	**CO3**
9 a)	**What** are the ways to convert from one data type to another data type with suitable example?	**U**	**CO2**
	(OR)		
9 b)	**What is the use of FOR…NEXT Loop?**	**R**	**CO3**
10 a)	**Define String constants.**	**R**	**CO4**
	(OR)		
10 b)	How many statements are there in this line of code: print("If I am 17, I can drive a car")?	**R**	**CO4**
	Group C **Answer All the Questions (7 x 5 = 35)**		

11 a)	**Design** a program to create a pointer to an integer. Allocate memories for 60 elements into that pointer using both malloc() and calloc() function. Display the significance difference of using those two functions to allocate memory. Also state the specific needs of these two functions.	**R**	**CO4**
(OR)			
11 b)	Suppose a paragraph is stored in a 2-D character array. **Find** a specific sentence in that paragraph using a c program.	**U**	**CO4**
12 a)	**How** is it possible to take input in a 2-D array using a single for loop? Make it possible using a suitable program in c.	**U**	**CO4**
(OR)			
12 b)	**Design** a program in c to determine that a text is written in English or in any other language. If the text is written in any other language convert every character in its nearest English alphabets.	**Ap**	**CO5**
13 a)	**Using** pointer write a function that will calculate maximum and minimum of a given set of numbers.	**R**	**CO4**
(OR)			
13 b)	Write a program to arrange a group of numbers into positive & negative numbers.	**R**	**CO4**
14 a)	What is loop ? Discuss the different types of loops with syntax and appropriate examples. Write a program to print the summation of the following series : ! 1 + 1 22 + 1 32 + 1 42 + ... + 1 N2 .	**AP**	**CO5**
(OR)			
14 b)	Explain strcat ( ), strcmp ( ), strrev ( ), strlen ( ) and Write a recursive function that will calculate HCF of two numbers.	**Ap**	**CO2**
15 a)	What is structure ? How does a structure differ from any array ? What do you mean by call by value and call by reference ? Write a C program, which accepts an integer numbers and prints the multiplication of the digits.	**U**	**CO2**
(OR)			
15 b)	Write a program to check whether a given string palindrome or not. What do you mean by scope of a variable ? Explain the storage classes available in C.	**Ap**	**CO2**
16 a)	Explain the difference between structure & union with examples. 4 b) What is Pointer ? Using pointer write a program to find out length of the given string without using strlen ( ) function.	**R**	**CO3**
(OR)			
16 b)	What do you mean by Recursion ? Give example. What are strings ? Explain with example. Explain the difference between structure & union with examples. What is Pointer ?	**Ap**	**CO3**
17 a)	What is a function ? What do you mean by the following : i) Function declaration ii) Function calling iii) Function definition.	**U**	**CO3**
(OR)			
17 b)	**Design** a program to create a pointer to an integer. Allocate memories for 50 elements into that pointer using both malloc() and calloc() function. Display the significance difference of using those two functions to allocate memory. Also state the specific needs of these two functions.	**Ap**	**CO4**

ENG11053	**English Communication**	L	T	P	C
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	12th level English				
Co-requisites	--				

Course Objectives

1. To know the importance and techniques of communication skills in order to improve professional skills
2. To enhance the knowledge of the students on vocabulary, syntax, and grammatical skills
3. To improve writing skills by applying writing techniques, tools in practice sessions
4. To achieve an overall enhancement in terms of reading, listening and speaking

Course Outcomes:

On completion of this course, the students will be able to

CO1. **Illustrate** the communication processes and to know the practical implications and its challenges at the workplace
CO2. **Find** the practical uses of English grammar and to use grammar correctly and unambiguously
CO3. **Apply** different formats of business communication like reports, letters, and other technical writings
CO4. **Build** competence in speaking, reading, listening, and writing in English.
CO5. **Apply** English pronunciation and use neutral accent successfully
CO6. **Explain** comprehend different other accents of spoken English

Catalog Description

Effective communication is one of the basic requirements of a successful career. Both verbal and nonverbal communication is important to exchange ideas among the employees within the organisation and outside the organisation as well. In this course, the focus will be on improving LSRW skills, i.e. listening, speaking, reading and writing. Students will learn how to communicate effectively through prescribed syllabus. Classroom activities will be designed to encourage students to play an active role in the construction of their own knowledge and in the design of their own learning strategies. We will combine traditional lectures with other active teaching methodologies, such as group discussions, role play, small skit enactments, analysis of video scenes and debates. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities and to give an oral group presentation. Students will be expected to interact with media resources, such as, web sites, videos, DVDs, and newspapers etc.

Course Content

Module I: **9 lecture hours**
Communication Level 1: Basics of Communication, Means of Communication, Barriers of Communication

Module II: **9 lecture hours**
Grammar and Syntax Level 1: Tense: types and uses, Idioms, One Word Substitutes, Discussion on the use of Articles and related exercises, Discussion on the use of Prepositions and related exercises, Exercises on Sentence –Making (Syntax), Practice exercises on Voice change, Class Exercises on Synonyms and Antonyms.

Module III: **9 lecture hours**
Reading and Listening Skills Level 1: Introduction to listening skills: purposes and practice, Discussion on types of listening: difference between listening and hearing, Active listening: introduction listening exercises, Elementary level listening exercise, Intermediate level listening exercise, Advance level listening exercise, Introduction to Reading Skills, Strategies of reading, Skimming, Scanning and Summarizing, Comprehension exercises.

Module IV: **9 lecture hours**
Speaking Skills Level 1: Introduction to Speaking Skills: Mother tongue influence, Discussion on various kinds of narrative styles and techniques: Welcome speech, Vote of Thanks, Farewell Speech, Debate and Elocution, Class Exercises on Descriptive narration, Practical Exercises on Narration styles, Presentation of small skits, Practicing Extempore in the class, Mock practices of Group discussion, Practicing speaking in pairs, Mock practice of job interviews.

Module V: **9 lecture Hours**
Writing Skills Level 1: Business letters: definition, types and format, Practice exercises, Business reports: definition, types and format, Practice exercises, CV and Application letters: types and formats, Practice exercises, Compositions: Essays, precis paragraph writing

Text Books:
1.Kaul Asha. Effective Business Communication. PHI Learning Pvt Ltd. 2014.
2.Wren and Martin. High School Grammar And Composition. S. Chand, 1995.
3.Gupta, A. English Reading Comprehension. Ramesh Publishing House, 2009.

Reference Book:
1.Lewis, Norman. Word Power Made Easy. Anchor: 2014.
2.Riordan, Daniel G & Pauley Steven A. :Technical Report Writing Today. 2004.
3.Hamp-Lyons and Heasely, B . Study Writing; A Course in Written English. For Academic and Professional Purposes, Cambridge Univ. Press, 2006.
4.Quirk R., Greenbaum S., Leech G., and Svartik, J. A Comprehensive Grammar of the English language, Longman:London, 1985.
5.Balasubramaniam, T. A Textbook of English Phonetics for Indian Students. Macmillan: 2012.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Illustrate** the communication processes and to know the practical implications and its challenges at the workplace	PO2, PO5, PO9, PO10
CO2	**Find** the practical uses of English grammar and to use grammar correctly and unambiguously	PO2, PO9, PO10
CO3	**Apply** different formats of business communication like reports, letters, and other technical writings	PO5, PO6, PO9, PO10
CO4	**Build** competence in speaking, reading, listening, and writing in English.	PO2, PO3, PO9, PO10
CO5	**Apply** English pronunciation and use neutral accent successfully	PO3, PO9, PO10
CO6	**Explain** comprehend different other accents of spoken English	PO3, PO6, PO9, PO10

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
ENG11 053	HSSM –I (English Communication- I)	-	2	2		2	2			3	3	-		-	-

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2021 – 2022)		
Name of the Program:	B.Tech	**Semester:**	I
Paper Title:	**HSSM –I (English Communication- I)**	**Paper Code:**	ENG11053
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

10. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
11. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
12. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A
Answer All the Questions (5 x 1 = 5)

1	**Where** were you ___ 28 February, 2019? (Fill in the blank with appropriate preposition)	**R**	**CO2**
2	**What** is non-verbal communication?	**R**	**CO3**
3	**Find** one word substitute for: “One who loves books”	**R**	**CO1**
4	**What** is the antonym of “Happiness”?	**R**	**CO4**
5	Give example of an idiom.	**R**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**What** are the barriers to communication? **Explain** some physical and psychological barriers of communication	**Ap**	**CO1**
	(OR)		
6 b)	**What** do you understand by communication? Write a note on the importance of effective communication.	**Evaluate**	**CO3**
7 a)	How Communication is important in media and journalism?	**Ap**	**CO4**
	(OR)		
7 b)	Fill in the blanks using suitable article. **Find** a copy the sentences given, while answering: i. He was ____ first man to arrive. ii. Would you like to be ______ teacher? iii. I am going to buy ______ hat.	**U**	**CO5**

	iv. Picasso was _____ famous painter. v. The Ganga is _____ sacred river.		
8 a)	Differentiate active and effective listening.	**R**	**CO3**
(OR)			
8 b)	Discuss Advance level listening exercise	**U**	**CO3**
9 a)	Presentation of small skits.	**R**	**CO4**
(OR)			
9 b)	Let the vector addition in $\mathbb{R}^2 = \{(x,y) \mid x,y \in \mathbb{R}\}$ be defined by $(x_1,y_1) + (x_2,y_2) = (x_1+x_2, y_1+y_2)$. Show that the first five conditions of the vector space related to vector addition are satisfied.	**Ap**	**CO3**
10 a)	Show that $\nabla(f_1 - f_2) = \nabla\varphi_1 - \nabla\varphi_2$.	**R**	**CO4**
(OR)			
10 b)	Show that $div\left(\vec{A} - \vec{B}\right) = div\vec{A} - div\vec{B}$.	**R**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Change** the following sentences from active to passive voice: i. The cat killed a mouse ii. People lined the road iii. He was singing a song yesterday iv. I have read this book. v. Who broke the jug?	**U**	**CO2**
(OR)			
11 b)	**Compose** a paragraph on the impact of COVID 19 in our society.	**R**	**CO4**
12 a)	**Compose** an application to the Vice-Chancellor of your University as the class representative of your respective class requesting permission to organize a science exhibition in your department	**U**	**CO1**
(OR)			
12 b)	Read the following passage and **find** the answer the questions that follow. A few countries already use powerful electromagnets to build high speed trains. These trains are called maglev trains. Maglev is the shortened form of magnetic levitation. Maglev trains work on the principles of magnetism and float over a guideway. The maglev train is different from a conventional train in that it does not have an engine. At least it does not have the kind of engines that pull train cars along steel tracks. It does not consume fossil fuels either. Since maglev trains float in the air, there is no friction between the train and the track. This lack of friction and the aerodynamic design of these trains allow them to	**U**	**CO1**

	reach speeds of over 500 kilometer per hour. Japan and Germany pioneer research in the maglev train technology. They have already built their prototypes and are in the process of testing them. Transrapid is an electromagnetic suspension system developed by German engineers. The idea of maglev transportation has been in existence for over a century. The first commercial maglev train made its debut in Shanghai, China in 2002. This train was developed by a German company. Right now the Shanghai Transrapid line connects Longyang Road station and Pudong airport. China is planning to extend this line to Hangzhou by building a 99 miles guideway. Several other countries are also planning to build their own maglev train system, but right now the Shanghai maglev train is the only commercial maglev line. Complete the sentences: (2×5=10) (a) The two main differences between maglev trains and conventional trains are: ………………………….., ………………………………….. (b) Maglev trains are environment friendly because ……………………… (c) The two nations that lead the research in maglev train technology are …………………………….. (d) The two factors that help maglev trains to achieve high speeds are ……………………………………. (e) A suitable title for the passage would be …………………………………………….		
13 a)	Write a report based on final year project details.	**R**	**CO4**
(OR)			
13 b)	Write a suitable CV while you are applying for a suitable job.	**R**	**CO4**
14 a)	**Change** the following sentences from active to passive voice: i. The mouse killed a snake ii. People lined the road iii. She was singing a song yesterday iv. I have read this book. v. Who broke the mug?	**U**	**CO1**
(OR)			
14 b)	Discuss on the use of Prepositions and Class Exercises	**U**	**CO2**
15 a)	Differentiate listening and hearing	**Evaluate**	**CO2**
(OR)			
15 b)	Explain Intermediate level listening exercise, Advance level listening exercise	**U**	**CO2**
16 a)	Discuss on Class Exercises on Synonyms and Antonyms.	**U**	**CO3**
(OR)			
16 b)	**Compose** a paragraph on the impact digital learning in our Education.	**U**	**CO3**
17 a)	**Compose** an application to the Principal of your University as the class		**CO-**

	representative of your respective class requesting permission to organize a science exhibition in your department	**Evaluate**	**4**
(OR)			
17 b)	Japan and Germany pioneer research in the maglev train technology. They have already built their prototypes and are in the process of testing them. Transrapid is an electromagnetic suspension system developed by German engineers. The idea of maglev transportation has been in existence for over a century. The first commercial maglev train made its debut in Shanghai, China in 2002. This train was developed by a German company. Right now the Shanghai Transrapid line connects Longyang Road station and Pudong airport. China is planning to extend this line to Hangzhou by building a 99 miles guideway. Several other countries are also planning to build their own maglev train system, but right now the Shanghai maglev train is the only commercial maglev line. Complete the sentences: (2×5=10) (a) The two main differences between maglev trains and conventional trains are: ………………………….., …………………………………….. (b) Maglev trains are environment friendly because ………………………	**U**	**CO-5**

GEE11012	**Disruptive Technologies**	**L**	**T**	**P**	**C**
Version 1.0		**2**	**0**	**0**	**2**
Pre-requisite/Exposure					
Co-requisite					

Course Objectives:

1. Understand the fundamentals of Artificial Intelligence (AI) and Machine Learning (ML)
2. Explore the role of data in Machine Learning
3. Introduction to Natural Language Processing (NLP)
4. Examine the impact of AI on various industries.
5. Introduction to Data Analytics

Course Outcomes:

On the completion of this course the student will be able to

CO1: Analyze the role of data in ML, including preprocessing, tokenization, and basic sentiment analysis in
Natural Language Processing (NLP).
CO2: Apply data collection methods and preprocessing techniques to handle missing data and ensure data
quality.
CO3: Evaluate the application of cybersecurity in different sectors and discuss emerging trends.
CO4: Analyze safety considerations, standards, and emerging trends in robotics research
CO5: Apply AM and RP in aerospace, automotive, medical, and consumer goods industries.

Course Description:

The course on Disruptive Technologies aims to provide students with an in-depth understanding of various cutting-edge technologies that are reshaping industries and revolutionizing traditional practices. Through a comprehensive curriculum spanning six units, students will delve into Artificial Intelligence/Machine Learning (AI/ML), Data Analytics, Internet of Things (IoT), Cybersecurity, Robotic Process Automation (RPA), and Additive Manufacturing (AM) and Rapid Prototyping (RP).

Course Content:

Disruptive Technologies

Unit 1: AI/ML Lecture:10

AI/ML: Introduction to Artificial Intelligence; Definition and applications of AI; Importance and impact Of AI in various industries; Machine Learning basics; Distinction between AI and ML; Types of Machine Learning - Supervised, Unsupervised, Reinforcement; Role of data in Machine Learning; Evaluation metrics in ML; Case study of AI implementation in Healthcare and Manufacturing industry; Challenges in AI adoption; Ethics and bias in AI.

NLP: Basics of Natural Language Processing (NLP); Why is NLP required; Text preprocessing and tokenization, Basic sentiment analysis, Applications of NLP in real-world scenarios

Generative AI & Large Language Models: Introduction to generative AI, What are Large Language Models,

Unit 2: Data Analytics with Tools: Lecture:6

Data Analytics: Introduction to Data Analytics; Importance of data in decision-making in industries; Types of Analytics – Descriptive, Prescriptive, Predictive and Preventive; Types of data (Structured / Unstructured); Overview of popular tools MS Excel, R, Tableau & PowerBI

Data collection and preprocessing: Data collection methods; Data cleaning and quality assessment; Dealing with missing data; Data transformation and feature engineering,

Unit 3: IOT Lecture:10

Introduction to IoT: Definition and concept of the Internet Of Things; Significance and impact on various industries; IoT architecture and components overview (Sensors, Actuators, Microcontrollers); Types of sensors (Temperature, Humidity, Motion, Etc.); Sensor characteristics and selection criteria, Actuators and their role in IoT systems; Basics of Arduino and Raspberry Pi.

IoT Applications: Healthcare, Remote Patient Monitoring, Wearable Health Monitoring Devices, Smart Cities, Agriculture and Environmental Monitoring; Basics of Augmented Reality (AR) and Virtual Reality (VR); Digital twins in IoT.

Unit 4: Cyber Security Lecture:9

Introduction to Cybersecurity: Definition and scope; Cyber threats and the need for protection of business data; Overview of common cyber threats (Malware, Phishing, Ransomware, Trojans, Worms); Social engineering as a means for attacks and prevention; Confidentiality, Integrity and Availability (CIA) triad.

Risk Assessment and Management: Security policies and procedures; Best practices.

Security Technologies and Tools: Antivirus software, Firewalls and Intrusion Detection / Prevention Systems (IDS / IPS); Encryption and secure communication; Overview of network security; Steganography and Cryptography.

Unit 5: Robotics and Automation Lecture:6

Robotics and Automation: Types of robots and their applications; Role of automation in various industries; Current trends and future prospects; Robot anatomy and components - DC Motors, Servos, Stepper Motors; Types of robotic end-effectors / Grippers; Pick-and-place operations; Safety considerations and standards.

Applications of Robotics: Cobots (Collaborative Robots), Soft Robotics, Swarm Robotics, Bio-inspired Robotics, Industry 4.0 and Smart Factories.

Unit 6: **Additive Manufacturing (AM) And Rapid Prototyping (RP)** Lecture:6

Basic Principles: Definition and comparison with traditional manufacturing methods; Applications and benefits of AM and RP; Applications - Aerospace and automotive industries, Medical and healthcare applications, Consumer goods and electronics; Challenges of AM and RP

Materials: Plastics, Metals, Ceramics, Composites, Biological Materials

Technologies: Stereolithography (SLA), Fused Deposition Modelling (FDM), Selective Laser Sintering (SLS), Electron Beam Melting (EBM), Polyjet Printing, Binder Jetting, Direct Metal Laser Sintering (DMLS)

BIT11003	**Life Science**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	Class 12 Biology				
Co-requisites	--				

Course Objectives:

1. To acquire the knowledge about the cell structure and interaction with neighboring cells in biological system.
2. To gain the knowledge about the genetic switches and oscillators and evolutionary dynamics.
3. To acquire the knowledge about the transport of molecules in different cellular compartments.
4. To gain the knowledge about dynamics of different systems in human body.

5. To understand the application and significance of different techniques of medical biotechnology.

Course Outcomes for SBT41108

At the end of the course, the student will be able to:

CO1	**Explain** the structure and functions cell organelles and their interrelationship.
CO2	**Analyze** the genetic switches and evolutionary dynamics of living system.
CO3	**Determine** the mode of transport of molecules in biological system numerically.
CO4	**Compare** and contrast between the different networks of human body and other physiological systems and can summarize consequences of physiological disorders.
CO5	**Choose** or identify different techniques of medical biotechnology on human body to analyse the malfunction of different human system during diseased conditions.

Course Description:

Cell is the structural and functional unit of living organism, it is well known throughout the universe, but mystery the molecular mechanism for performing the different kinds of functions of cell organelle (along with their development in both plant and animal system) and their integration into a beneficial outcome for living organism and as well as the outcome of physiological responses is almost unknown. So the course consists of structure function relationship of cell organelles, trafficking of different molecules between different cellular compartments and their secretion, creation of physiological responses and their assessment by several kinds of instrumentation techniques which can create a common platform between science of engineering and biological science.

Course Content:

Unit I: Cell biology & Communication: [7 hours lecture]

Structure, function, and synthesis of cellular membranes and organelles; cell growth and cancer; cytoskeleton and extracellular matrix; cell cycle; transport, receptors, and cell signaling; functions of specialized cell types.

Unit II: Genetics & Systems Biology [4 hours lecture]

Genetic switches and oscillators, cell-to-cell interactions, cellular and genetic networks, and evolutionary dynamics.

Unit III: Transport & Flow in Biological Systems [7 hours lecture]

Diffusion, osmosis, facilitated, and active transport; Heat Conduction and Radiation; Fluid Dynamics; Heat and Mass Transfer. Electromechanical and physicochemical interactions in cells and biomaterials.

Unit IV: Human Physiology & Diseases **[10 hours lecture]**

Anatomical, physiological and pathological features of the cardiovascular, respiratory and renal systems. Identifications of deficiencies and diseases from blood, urine and feces; genetic disorders and gene therapy.

Unit V: Neurophysiology **[10 hours lecture]**

Neuron structure and function; Regeneration of nerve; flow and transport of signals from one neuron to other; Nervous system; Aging and its effect on brain; Behavioral functions of the brain - emotion, memory, learning and consciousness; Disorders of the nervous system and treatment.

Unit VI: Medical Biotechnology **[7 hours lecture]**

Understanding the handling and usefulness of electrocardiograms, ultrasound images, X-ray images, magnetic resonance images (MRI), computerized tomography (CT) or computerized axial tomography (CAT) images, glucose sensors, and other biosensors.

Text Books

1. Biology for Engineers by Arthur T. Johnson. CRC Press, 1 edition, 2010.
2. New Biology for Engineers and Computer Scientists by AydinTozeren and Stephen W. Byers. Pearson, 1 edition, 2003.

Reference Books

1. Applied Cell and Molecular Biology for Engineers by Gabi Nindl Waite and Lee R. Waite. McGraw-Hill Education, 1 edition, 2007.
2. Samson Wright's Applied Physiology.

Modes of Examination: Assignment/Quiz/Project/Presentation/Written Exam

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Explain** the structure and functions cell organelles and their interrelationship.	PO12, PSO2
CO2	**Analyze** the genetic switches and evolutionary dynamics of living system.	PO2, PO5, PO6, PSO2

CO3	**Determine** the mode of transport of molecules in biological system numerically.	**PO2, PO5, PSO1, PSO2**
CO4	**Compare** and contrast between the different networks of human body and other physiological systems and can summarize consequences of physiological disorders.	**PO2, PO5, PO6, PO12, PSO2**
CO5	**Choose** or identify different techniques of medical biotechnology on human body to analyse the malfunction of different human system during diseased conditions.	**PO2, PO5, PO6, PO12, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
BIT11003	Life Science		3		-	3	2	-				-	2	2	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2021 – 2022)		
Name of the Program:	B.Tech	**Semester:**	I
Paper Title:	Life Science	**Paper Code:**	BIT11003
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A
Answer All the Questions (5 x 1 = 5)

1	**Discuss** role of different cell organelles in eukaryotic cells.	**U**	**CO1**
2	**Compare** between Prokaryotic and eukaryotic cells.	**U**	**CO1**
3	**What** are theconsequences of physiological disorders?	**R**	**CO4**
4	If someone is suffering from cancer, **what treatment can be given to treat the cancerous cells?**	**Ap**	**CO3**
5	**Which** of the following cell organelles is called the powerhouse of the cell? (a) Nucleus (b) Lysosomes (c) Chloroplast	**UN**	**CO1**

	(d) Mitochondria		
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Differentiate prokaryotic and Eukaryotic cell. What are mitochondria and explain its function.	**Ap**	**CO1**
(OR)			
6 b)	What is the function and working principle of centrifuge.	**Evaluate**	**CO3**
7 a)	Define active and passive transport with examples. Differentiate between diffusion and osmosis.	**Ap**	**CO4**
(OR)			
7 b)	Explain the causes of destruction of neurons in the brain?	**U**	**CO5**
8 a)	Describe the general steps involved in synaptic transmission	**R**	**CO3**
(OR)			
8 b)	Discuss Advance level listening exercise	**U**	**CO3**
9 a)	Presentation of small skits.	**R**	**CO4**
(OR)			
9 b)	**What** is Michaelis-Menten equation? Explain the significance of Km and Vmax enzyme from the above equation.	**Ap**	**CO3**
10 a)	**Differentiate** between competitive and uncompetitive inhibition of enzyme substrate reaction.	**R**	**CO4**
(OR)			
10 b)	**Compare** between Prokaryotic and eukaryotic cells.	**R**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	a) **What** are the factors influencing living cells and negative as well as positive ways?	**U**	**CO2**
(OR)			
11 b)	What is Michaelis-Menten equation? Explain the significance of Km and Vmax enzyme from the above equation.	**R**	**CO4**
12 a)	Explain the mechanism for digestion of protein in gastrointestinal tract of human.	**U**	**CO1**
(OR)			
12 b)	a) **What** is cell? b) **How** plant cells are different from animal cells? **Explain** any two cell organelles which are considered to be evolved by bacterial cells.	**U** **U**	**CO1**
13 a)	Write a report based on final year project details.	**R**	**CO4**
(OR)			
13 b)	Write a suitable CV while you are applying for a suitable job.	**R**	**CO4**
14 a)	Define active and passive transport with examples. Differentiate between diffusion and osmosis.	**U**	**CO1**
(OR)			
14 b)	**Discuss** role of different cell organelles in eukaryotic cells	**U**	**CO2**
15 a)	**Compare** between Prokaryotic and eukaryotic cells	**Evaluate**	**CO2**
(OR)			

15 b)	If someone is suffering from cancer, **what treatment can be given to treat the cancerous cells?**	**U**	**CO2**
16 a)	**Explain** oncogenes. **How** can they affect the cells**? Is this relates with** Tumor suppressive gene? Discuss in detail.	**U**	**CO3**
(OR)			
16 b)	**Explain** different type of networks in human body.	**U**	**CO3**
17 a)	**What** are the factors influencing living cells and negative as well as positive ways?	**Evaluate**	**CO-4**
(OR)			
17 b)	**Explain** different techniques of medical biotechnology on human body to analyze the malfunction of different human system during diseased conditions.	**U**	**CO-5**

PHY12202	**Applied Science Lab**	L	T	P	C
Version 1.0	**Contact Hours - 30**	0	0	2	2
Pre-requisites/Exposure	Basics of knowledge of higher secondary level physics & Chemistry				
Co-requisites					

Course Objectives

1. To understand the experiments on general properties of matter.
2. To apply the knowledge of physical optics in different practical experiments.
3. To analyse different experiments on electrical and electronic science.
4. To explore different experiments related to fundamental knowledge on quantum mechanics.
5. To impart a scientific approach and to familiarize the applications of chemistry in the field of technology
6. An ability to gain knowledge about different types of qualitative and quantitative estimation

Course Outcomes

On completion of this course, the students will be able to

CO1: **Illustrate** about the elastic and other general properties of matter and their measurements.
CO2: **Acquire** the knowledge of physical optics and experimental techniques to verify them.
CO3: **Develop** the basic concepts related to electrical circuits.
CO4: **Find** the fundamental knowledge of basic quantum mechanics and few experiments related to it.
CO5: **Acquire** the basic information about semiconductor material and devices.

CO6: **Develop** the qualitative idea of thermo-electric currents and technique to measure it.
CO7: **Illustrate** and practice different techniques of quantitative chemical analysis generate experimental skills and apply these skills to various analyses
CO8: **Analyze** the quality of water by determining its hardness & alkalinity.
CO9: **Utilize** the fundamental laboratory techniques for analyses such as titrations

Catalog Description

Applied Science Labis used to apply existing scientific knowledge to develop more practical applications, for example: technology or inventions. In applied Science Labdifferent aspects of basic andmodern physics has been explored. Applied Science Labis generally developing technology, although there might be dialogue between basic science and applied science (research and development). In this course the focus will be on improving the logical learning moved into a physical environment.

Chemistry lab is a place where laboratory sessions is to enable the learners/students to get hands-on experience on the principles discussed in theory sessions and to understand the applications of these concepts in engineering. The course also includes theory on sampling, analyses of real samples, risk assessment of chemical experiments, important steps and procedures in analytical chemistry, and evaluation/interpretation of results.

Course Content

Experiments: Physics

1. Determination of Young's Modulus of a Beam by traveling microscope by FLEXURE method.
2. Carry Foster's Method to Determine Resistance of a Given Coil.
3. Determination of the Coefficient of viscosity of water by Poiseulle's Capillary Flow method.
4. To determine the wavelength of sodium light by forming Newton's Ring.
5. Determination of Rigidity Modulus by dynamical method.
6. Determine the Plank's constant using photocell.
7. To verify Stefan's law by electrical method.
8. To study the temperature dependence of reverse saturation current in a junction diode and hence to determine the Band gap.
9. Determination of specific charge(e/m) of electron by J.J. Thomson's method.
10. Determination of the Rydberg constant by studying hydrogen or helium spectrum.
11. Determination of dielectric constant of a given dielectric material.
12. Determination of Hall coefficient of Semiconductor.
13. Study current – voltage characteristic load response of photovoltaic solar cells.

Experiments: Chemistry (Any Four)

1. Determination of total hardness of water by complexometric titration method
2. Determination of carbonate and bicarbonate in water
3. Estimation of iron (ferrous ion in Mohr salt) by permanganometry.
4. Determination of strength of an unknown HCl solution with standardized NaOH solution by conductometric titration.
5. Dissolved oxygen by Winkler's method

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Illustrate** about the elastic and other general properties of matter and their measurements.	PO1
CO2	**Acquire** the knowledge of physical optics and experimental techniques to verify them.	PO1, PO5
CO3	**Develop** the basic concepts related to electrical circuits.	PO1, PO5
CO4	**Find** the fundamental knowledge of basic quantum mechanics and few experiments related to it.	PO1
CO5	**Acquire** the basic information about semiconductor material and devices.	PO1, PO5
CO6	**Develop** the qualitative idea of thermo-electric currents and technique to measure it.	PO1, PO3
CO7	**Illustrate** and practice different techniques of quantitative chemical analysis generate experimental skills and apply these skills to various analyses	PO1, PO3, PO9
CO8	**Analyze** the quality of water by determining its hardness & alkalinity.	PO3, PO9
CO9	**Utilize** the fundamental laboratory techniques for analyses	PO3, PO9

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO2
PHY12202	Applied Science Lab	3		2	-	2	-	-	-	2	-	-	-	-	-

1=weakly mapped
2=moderately mapped
3=strongly mapped

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: PHY12202 – Applied Science Lab

Program: B.Tech. **Semester: ODD 2020-21**

Time: 03 hrs. **Max. Marks: 50**

SAMPLE QUESTIONS

1.	**Determine** Young's Modulus of a Beam by traveling microscope by FLEXURE method	**Ap**	**CO1**
2.	Carry Foster's Method to **Determine** Resistance of a Given Coil.	**Ap**	**CO1**
3.	**Determine** the Coefficient of viscosity of water by Poiseulle's Capillary Flow method.	**Ap**	**CO1**
4.	**Determine** the wavelength of sodium light by forming Newton's Ring.	**U**	**CO2**
5.	**Determine** Rigidity Modulus by dynamical method.	**Ap**	**CO1**
6.	**Determine** the Plank's constant using photocell.	**U**	**CO2**
7.	**Show** Stefan's law by electrical method.	**Ap**	**CO3**
8.	**Show** the temperature dependence of reverse saturation current in a junction diode and hence to **determine** the Band gap.	**U**	**CO4**
9.	**Determine** specific charge(e/m) of electron by J.J. Thomson's method.	**Ap**	**CO5**
10.	**Determine** the Rydberg constant by studying hydrogen or helium spectrum.	**Ap**	**CO6**
11.	**Determine** dielectric constant of a given dielectric material.	**U**	**CO5**
12.	**Determine** Hall coefficient of Semiconductor.	**U**	**CO5**
13.	**Show** current – voltage characteristic load response of photovoltaic solar cells.	**U**	**CO6**
14.	Experiments: Chemistry (Any Four) 1. **Determine** total hardness of water by complexometric titration method 2. **Determine** carbonate and bicarbonate in water 3. **Estimate** iron (ferrous ion in Mohr salt) by permanganometry. 4. **Determine** strength of an unknown HCl solution with standardized NaOH solution by conductometric titration. 5. Dissolve oxygen by Winkler's method	**Ap** **U** **Ap** **U** **Ap**	**CO7, CO8, CO9**

ENG11043	Communication and Collaboration Skill -I	L	T	P	C
Version 1.0	Contact Hours – 30	0	0	2	1
Pre-requisites/Exposure	12th level English				
Co-requisites	--				

Course Objectives:

1. To learn how to form and maintain a team.
2. To develop skills in collaboration in a project setting.
3. To develop Brainstorm alternatives effectively.
4. To identify the team's strengths and resources.
5. To manage conflict collaboratively by creating a system for dealing with the most common problems that may create conflict.

Course Outcomes:

On completion of this course, the students will be able to

CO1 **Show** the emotions to become highly motivated individuals exercising empathy

CO2 **Find** to form teams and communicate effectively and clearly.
CO3 **Develop** skills like writing, speaking, presentation and exercise time management

Catalog Description:

Through Communication and Collaboration students will learn how to collaboratively work in a group. It is a place where students will engage in active listening, accustomed in diverse and multi-lingual environments, and understanding verbal and non-verbal communication. They will also develop the ability to work in diverse international teams, including learning from and contributing to the learning of others, assuming shared responsibility, cooperating, leading, delegating and compromising to produce new and innovative ideas and solutions.

Course Content

List of Experiments (Any ten)	
1	The students are introduced to Emotional Intelligence and the need for it.
2	Self-evaluation / assessment happens through a peer-peer / group activity.
3	The groups will form a team to make a movie.
4	They will play the roles of director, producer, editor, actors, stuntmen etc.
5	They learn to team up and communicate. A jury will be elected by the students.
6	The jury will select the "AdOSCARS" winners. The winners are required to make the speech accepting the award.
7	3 to 4 groups will be formed who will publish a magazine selecting a specific theme.

8	They will take multiple roles in this game.
9	Every class, the groups will do news broadcast on their chosen theme.
10	Video recording will be done, with follow up discussion on body language, tone etc.

Reference Books

1. Stephen R Covey, Seven Habits of Highly Effective People, Free Press, 1989
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998
3. Daniel Goleman, Emotional Intelligence, Bantam Book, 2006
4. Innovation and Entrepreneurship (1985) by Peter F. Drucker.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Show** the emotions to become highly motivated individuals exercising empathy	**PO2, PO9, PO10, PSO1, PSO2**
CO2	**Find** to form teams and communicate effectively and clearly.	**PO9, PO10, PSO1, PSO2**
CO3	**Develop** skills like writing, speaking, presentation and exercise time management.	**PO2, PO9, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ENG11043	Communication and Collaboration Skill-I		2							3	3			3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B.Tech Semester: I

PAPER TITLE: COMMUNICATION AND COLLABORATION SKILL-I

PAPER CODE: ENG11043
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Section A			
1.	Q1. You have given daily broadcasts in front of the class in magazine module. **What** do you think are the skills that you have developed in this process? (5) Q2.**What** was your approach towards negative criticism/feedback? (5) Q3. **What** is your contribution in this magazine? Please justify your role in regards to your contribution. (5) Q4. **What** is the theme of your magazine? What inspired you to select this theme? (5) Point out the parts of speech of the underlined words. (10) 1. These books __________ (belong/belongs) to me. 2. She __________ (want/wants) to go. 3. We __________ (will like/would like) to visit the museum. 4. He __________ (has finished/have finished) talking. 5. My brother __________ (enjoy/enjoys) playing cricket.	**U**	**CO3**
	SECTION B (Attempt any **One Question)**		
4.	Q1. **Compose** a letter giving an application of 100-200 words for the post of an account's assistant. 120 – 150 words) (20) Q2. **Compose** a letter giving an application of 100-200 words for the post of management trainee in Finance. (20)	**U**	**CO3**

		L	T	P	C
DGS11001	**Design Thinking**	L	T	P	C
Version 1.0	**Contact Hours – 30**	2	0	0	2
Pre-requisites/Exposure	Knowledge of analyzing society problems and product usage problems and a zeal to improve the current situation, in addition to knowing to using laptop/computers, internet, social media interaction, file sharing and uploading, email and communication etiquettes.				
Co-requisites	-				

Course Objectives

1. To enable students to acquire knowledge, imagination and be more assertive on opinions on problems in society.
2. To enable students to learn basics of research, data collection, analysis, brainstorming to find solutions to issues.
3. To make them understand Design Thinking methodologies to problems in field of study and other areas as well.
4. To help students to understand future Engineering positions with scope of understanding dynamics of working between inter departments of a typical OEM.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Examine** design thinking concepts and principles
CO2. **Find** the methods, processes, and tools of design thinking
CO3. **Apply** the Design Thinking approach and model to real world scenarios
CO4. **Analyze** the role of primary and secondary research in the discovery stage of design thinking

Catalog Description

Design thinking course is a completely online course offered to the first year UG programs across all streams. This course is designed to help understand the steps followed in the process of designing a solution to a problem.

Course Content

Unit I: **2 Lecture Hours**

WHAT IS DESIGN THINKING: Designers seek to transform problems into opportunities. Through collaboration, teamwork, and creativity, they investigate user needs and desires on the way to developing human-centered products and/or services. This approach is at the very heart of design thinking.

Unit II: 2 Lecture Hours

THE DESIGN THINKING MODEL: A tool that helps guide you along a design thinking path. The model does this by providing a series of activities that that will help you effectively design a product, service or solution to a user's need. The model presents the approach as a process, allowing us to look at each step – or phase – along the journey to the development of a final design.

Unit III: 4 Lecture Hours

PHASE 1: DISCOVER: Begin the design thinking process with the Discover phase, where you will identify the specific problem your design is intended to solve, as well as important usability aspects from those who will use your design. Discovery can be performed through a variety of different research methods which you will learn in this module.

Unit IV: 4 Lecture Hours

PHASE 2: DEFINE: In the Define phase, you come to understand the problem. We often refer to this as framing the problem. You can do this by using a variety of tools, including storytelling, storyboarding, customer journey maps, personas, scenarios, and more.

Unit V: 4 Lecture Hours

PHASE 3: DEVELOP: Turn your attention to solving the problem. In this phase you brainstorm custom creative solutions to the problems previously identified and framed. To do this, you conceptualize in any way that helps, putting ideas on paper, on a computer, or anywhere whereby they can be considered and discussed.

Unit VI: 4 Lecture Hours

PHASE 4: DELIVER: This phase is all about testing and building concepts. Here you take all of the ideas that have been discussed to this point and bring them a little closer to reality by building a concept; something that makes it easier for a user to experience a design. This concept is referred to as a prototype.

Unit VII: 4 Lecture Hours

PHASE 5: ITERATE: You will test the prototype of your design solution, collecting and acting on feedback received. These actions may mean minor or major revisions to your design, and are repeated as often as necessary until a solution is reached. Tools such as focus groups and questionnaires are used to help you collect feedback that can help with your final design.

Unit VIII: **2 Lecture Hours**

BEYOND DESIGN THINKING: The Design Thinking Model is a tool that helps guide you along a design thinking path. The model does this by providing a series of activities that that will help you effectively design a product, service or solution to a user's need. The model presents the approach as a process, allowing us to look at each step – or phase – along the journey to the development of a final design.

Reference Books

1. Brown, Tim. "What We Can Learn from Barn Raisers." Design Thinking: Thoughts by Tim Brown. Design Thinking, 16 January 2015. Web. 9 July 2015.
2. Knapp, Jake. "The 8 Steps to Creating a Great Storyboard." Co.Design. Fast Company & Inc., 21 Dec. 2013. Web. 9 July 2015.
3. van der Lelie, Corrie. "The Value of Storyboards in the Product Design Process." Journal of Personal and Ubiquitous Computing 10.203 (2006): 159–162. Web. 9 July 2015. [PDF].
4. Millenson, Alisson. "Design Research 101: Prototyping Your Service with a Storyboard." Peer Insight. Peer Insight, 31 May 2013. Web. 9 July 2015.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Examine** design thinking concepts and principles	**PO1, PO11**
CO2	**Find** the methods, processes, and tools of design thinking	**PO1, PO2, PO5**
CO3	**Apply** the Design Thinking approach and model to real world scenarios.	**PO1, PO2, PO11**
CO4	**Analyze** the role of primary and secondary research in the discovery stage of design thinking	**PO1, PO5**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
DGS11001	Design Thinking	3	2	-		2	-	-	-	-	-	2	-	-	-

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech Semester: I Stream: ECE
PAPER TITLE: Design Thinking
PAPER CODE: DGS11001
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

- At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
- All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
- Assumptions made if any, should be stated clearly at the beginning of your answer.

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	**List** the steps involved in Design Thinking.	**U**	**CO1**
2.	**Estimate** the basic elements of Design Thinking.	**U**	**CO2**
3.	**Define** Napkin Pitch.	**R**	**CO3**
4.	**What** is Assumption testing?	**R**	**CO4**
5.	**Define** the principles of Ethnography.	**U**	**CO2**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
4.	Briefly **explain** the importance of ethnography in design thinking?	**U**	**CO2**
5.	**What** are the successive steps for concept development?	**Ap**	**CO3**
6.	**Explain** the different types of concept development strategies.	**Ap**	**CO3**
7.	**Explain** with Example: surface keys for Assumption Testing.	**Evaluate**	**CO4**
	SECTION C (Answer Any Two Questions) (2 x 15 = 30)		
8.	**Explain** in detail about importance of prototyping in Design Thinking.	**U**	**CO4**
9.	**Name** an importance of involving stakeholders in developing new concepts and Plan for conducting experiments within short time and inexpensively.	**Create**	**CO3**
10.	**Distinguish** between design thinking and visualization of a problem.	**An**	**CO1**

CSE12002	**Programming Lab**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	10+2 Level Mathematics, Knowledge of Basics of Computer				
Co-requisites	Knowledge of Logical Reasoning and Analysis				

Course Objectives

1. To comprehend the practical nature of programming by solving through computer systems.
2. To practice the programming construct to solve multi-dimensional problems.
3. To relate and implement mathematical concepts through programming in order to solve computational problems.
4. To enable students to acquire structure and written expression required for their profession.
5. To understand the principles of data storage and manipulation.

Course Outcomes

On completion of this course, the students will be able to

CO1. **List** and memorize various Unix commands. Also, students be able to construct various basic programs and appraise them.
CO2. **Design** and execute iterative statement in a program. Also, students be able to differentiate among different iterative structure.
CO3. **Construct** such programs that used to define user defined functions and to design library functions.
CO4. **Develop** array concept in 1-Dimensional and 2-Dimensional construct. Hence be able to design string functions to cater to various character array related problem.
CO5. **Find** the concept of Stack, Queue, and Linked List and appraise them in different cases.

Catalog Description

Practical Programming skills are mandatory for designing or solving problems through digital device by implementation. To develop any software the behavior of a programming language is a must through problem solving. In present era almost all aspect of life is somehow largely related to virtualization and digital data/information. Devices from smartphones to other handheld devices, drones, cameras, medical instruments etc. all needs programming at some part. In engineering it has become quintessential for the students/research scholars to learn programming. In this course, students will learn how to solve problems in various domains through a programming language. This course enables students with the basic skills of C Programming Language. Five Different related modules comprise this course. First Unit familiarizes students with basics of computers, algorithmic method to solve problem, introduction to generic programming construct. Basics of C Programming is upto iterative structure is depicted in Unit II. In Unit III students will learn about modularization using functions and one advance concept of C Programming, Pointers. Unit IV will cover one of the most important concepts in C Programming, Array and Strings. Unit V will accomplish this course with the advance concept like Structure, Union and File Handling. After this course students will grow their analytical ability to solve problem and logical skill. Also, this course effectively creates the ability to grasp any other Programming Language in easier manner. In all these modules related programming problems are practiced to understand the syntactical and semantical correctness of a program. Gradually students become more comprehensive through the progress of the course.

Course Content

Experiments:

1. Familiarization with LINUX commands and vi editor.
2. Programs to demonstrate Decision Making, Branching and Looping, Use of break and continue statement etc.
3. Implementation involving the use of Arrays with subscript, String operations and pointers.
4. Implementation involving the use Functions and Recursion.
5. Implementation involving the use Structures and Files.
6. Implementation based on Stack Queues and Linked List for example Insertion and Deletion.

Text Books

1. Balagurusamy, E., n.d. Programming In ANSI C. 5th ed. Bangalore: McGraw-hill.
2. Gotfreid (196) *Schaum's Outline of Programming with C*, 2nd ed., USA: McGraw-Hill
3. Brian W. Kernighan, Dennis Ritchie (1988) *C Programming Language*, 2nd ed., : Prentice Hall.
4. Das Sumitabha, UNIX Concepts and Applications, 4th Ed., New Delhi, Tata McGraw-Hill

Reference Books

1. Al Kelley, Ira Pohl (1988) *A Book on C*, 4th ed. Addision Wesley Longman

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**List** and memorize various Unix commands. Also, students be able to construct various basic programs and appraise them.	**PO4**
CO2	**Design** and execute iterative statement in a program. Also, students be able to differentiate among different iterative structure.	**PO1, PO4, PO5**
CO3	**Construct** such programs that used to define user defined functions and to design library functions.	**PO1**
CO4	**Develop** array concept in 1-Dimensional and 2-Dimensional construct. Hence be able to design string functions to cater to various character array related problem.	**PO1**
CO5	**Find** the concept of Stack, Queue, and Linked List and appraise them in different cases.	**PO1, PO5**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2
CSE120 02	Programm ing Lab	3			2	2									

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech Semester: I Stream: ECE
PAPER TITLE: PROGRAMMING LAB PAPER CODE: CSE12002
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

	Section A (attempt any two)		
1.	**What** do you understand data types?	**U**	**CO1**
2.	Define array?	**R**	**CO4**
3.	**How** user defined function reduces the no. of lines in a large program?	**R**	**CO2**
4.	**Why** pointer is advantageous than array?	**R**	**CO5**
5.	**What** is the size of an integer variable?	**R**	**CO1**
	SECTION B (Attempt any **Two Questions)**		
6.	**What** is dimension of an array. How many types of array are there? Can you store integer values and float type values in a single array, if not why? What you need to do to store such different types of values in an single array?	**R**	**CO4**
7.	**Design** an user defined function in c that would return multiple values in main() function.	**Ap**	**CO3**
8.	Suppose a paragraph is stored in a 2-D character array. **Find** a specific sentence in that paragraph using a c program.	**U**	**CO2/ CO4**
9.	State the types of data types and memory occupies. **What** are the ways to convert from one data type to another data type with suitable example	**U**	**CO1**
	SECTION C is Compulsory		
10.	**How** is it possible to take input in a 2-D array using a single for loop? Make it possible using a suitable program in c.	**Ap**	**CO4**
11.	**Design** a program in c to determine that a text is written in English or in any other language. If the text is written in any other language convert every character in its nearest English alphabets.	**U**	**CO4**
12	**Design** a program to create a pointer to an integer. Allocate memories for 50 elements into that pointer using both malloc() and calloc() function. Display the significance difference of using those two functions to allocate memory. Also state the specific needs of these two functions.	**U**	**CO4**

CEE12001	Engineering Drawing & CAD	L	T	P	C
Version1.0		0	0	4	2
Pre-requisites/Exposure					
Co-requisites	--				

Course Objectives

1. To comprehend general projection theory, with an emphasis on the use of orthographic projection to represent three-dimensional objects in two-dimensional views.
2. To understand the application of industry standards and techniques applied in engineering drawing.
3. To apply auxiliary or sectional views to most practically represent engineered parts.
4. To Dimension and explain two-dimensional engineering drawings.
5. To employ freehand 3D pictorial sketching to aid in the visualization process and to efficiently communicate ideas graphically.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Identify** the principle and significance of engineering drawing along with all the possible geometrical shapes.
CO2. **Infer** the principle and concept of projection of Points, Lines and Planes over Auxiliary Planes.
CO3. **Demonstrate** the principle and concept of Projection of Regular Solids.
CO4. **Illustrate** Sections and Sectional Views of Right Angular Solids and Regular Solids.
CO5. **Interpret** Isometric projection.

Catalog Description

In this fundamental course, students will be introduced to the basics of engineering drawing. Terms and definitions used in industries, such as manufacturing and construction, may also be covered. Specific skills introduced in this course may include sketching, geometric construction, auxiliary drawing, computing dimensions and lettering. Students will be also introduced to computer-aided drawing (CAD) software or techniques.

Course Content

Module 1 **Contact Hr. 9**
Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module 2 **Contact Hr. 9**

Orthographic Projections covering, Principles of Orthographic Projections Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes.

Module 3 **Contact Hr. 8**

Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views.

Module 4 **Contact Hr. 9**

Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone –

Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone.

Module 5 **Contact Hr. 10**

Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions

Reference Books

1. Engineering Drawing, N. D. Bhat, Charotar Publishing House (2012).

2. Shah, M.B. & B.C. Rana (2008), Engineering Drawing and Computer Graphics, Pearson Education.

3. Engineering Drawing & Graphics using Autocad, T. Jeyapoovan, Vikas Publishing House Pvt. Ltd.-Noida; Third edition (2010).

4. https://nptel.ac.in/courses/112103019/

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs), Program Outcomes (POs)& PSOs

Mapping between COs, POs and PSOs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Identify** the principle and significance of engineering drawing along with all the possible geometrical shapes.	**PO2, PO3, PO12, PSO2**
CO2	**Infer** the principle and concept of projection of Points, Lines and Planes over Auxiliary Planes.	**PO2, PO9, PO3, PO12**
CO3	**Demonstrate** the principle and concept of Projection of Regular Solids.	**PO3, PO9, PSO2, PO12**
CO4	**Illustrate** Sections and Sectional Views of Right Angular Solids and Regular Solids.	**PO3, PO9, PO12, PSO2**
CO5	**Interpret** Isometric projection.	**PO2, PO9, PO12**

Course Code	Course Title	Engineering Knowledge PO1	Problem analysis PO2	Design/development of solutions PO3	Conduct investigations of complex problems PO4	Modern tool usage PO5	The engineer and society PO6	Environment and sustainability PO7	Ethics PO8	Individual or team work PO9	Communication PO10	Project management and finance PO11	Life-long Learning PO12	Competitive Examination Preparation PSO1	Technical Competency PSO2
CEE12001	Engineering Drawing & CAD	-	3	3	-	-	-	-	-	3	-	-	3	-	3

1=weakly mapped 2= moderately mapped 3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech in CE	**Semester:**	I & II
Paper Title:	Engineering Drawing & CAD	**Paper Code:**	CEE12001
Maximum Marks:	50	**Time Duration:**	3Hrs
Total No. of Questions:	10	**Total No of Pages:**	1
(Any other information for the student may be mentioned here)	**13.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **14.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **15.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Instructions to the Students: Attempt at least 1 Question from each CO.

	Follow the instruction given by Lab Instructor during the exam		
1	A water tank of size 27 m^3 was represented in the drawing by 216 cm^3 size. Construct a vernier scale for the same to measure up to 5 metre. Also show on it the distance of 3.75 m, 0.27 m and 0.04 m.	**CO1**	**U**
2	A rectangular plot of land measuring 2.56 hectors is represented on a map by a similar rectangle of 16 sq. cm. Calculate RF of the scale. Draw a diagonal scale to read single meter. Show a distance of 368 m on it. (1 hector = 10^4 sq. meter)o	**CO1**	**R**
3	A point R is on HP and 35 mm in front of VP. Another point M is on VP and below HP. The line joining their front views make an angle of 30 deg to the reference line, while the line joining their top views makes an angle of 45 deg with the reference line. Find the distance of the point Q from HP.	**CO2**	**U**
4	Two points A and B are on HP. The point A is 35 mm in front of VP, while B is 50 mm behind VP. The line joining their top views makes an angle of 40 deg with XY. Find the horizontal distance between the two projectors.	**CO2**	**App**
5	Draw the projections of a regular hexagon of 25 mm sides, having one of its side in the H.P. and inclined at 60º to the V.P. and its surface making an angle of 45º with the H.P.	**CO3**	**U & App**
6	A cone of 40 mm diameter and 50 mm axis is resting on one generator on HP, which makes 30 deg inclinations with VP. Draw its projections.	**CO3**	**U & App**
7	A cylinder 40 mm diameter and 50 mm axis is resting on one point of a base circle on VP while it's axis makes 45^0 with VP and FV of the axis 35^0 with HP. Draw projections.	**CO4**	**R**
8	A square pyramid 30 mm base side and 50 mm long axis is resting on it's apex on HP, such that it's one slant edge is vertical and a triangular face through it is perpendicular to VP. Draw its projections.	**CO4**	**U & App**
9	A pentagonal pyramid of base side- 30 mm, and axis length- 60 mm is resting on HP on its base with a side of base perpendicular to VP. Draw the isometric projections.	**CO5**	**U & App**
10	A frustum of cone base diameter-50 mm, top diameter- 25 mm and height- 50 mm is placed centrally on a cylindrical slab of diameter-100 mm and thickness-30 mm. HP on its base with a side of base perpendicular to VP. Draw the isometric projection of the combination.	**CO5**	**U & App**

MTH11502	**Engineering Mathematics-II**	L	T	P	C
Version 1.0	**Contact Hours - 60**	3	1	0	4
Pre-requisites/Exposure	12th level Mathematics & Engineering Mathematics-I				
Co-requisites	--				

Course Objectives

1. To help the student to understand the basic concepts of matrix theory with its uses in engineering science.
2. To give emphasis about concepts of Eigen vlue and Eigen vector, vector space and linear transformation and enable students to apply these topics for analysing engineering problems.
3. To help the student to understand the use of vector calculus in engineering.
4. To give the students a perspective to learn about functions of complex variables, pole, and residues and their importance in advanced study of engineering science.
5. To enable students to acquire the knowledge of different transformation techniques and their applications in engineering science.

Course Outcomes

On completion of this course, the students will be able to

CO1 **Apply** the knowledge of matrix theory for finding solution of a related engineering problem

CO2 **Illustrate** the Eigen value(s) and Eigen vector(s) of a matrix

CO3 **Explain** the concept of vector space and linear transformation between the vector spaces

CO4 **Build** the knowledge of vector calculus and apply it for solving related problems

CO5 **Develop** the concept of complex variable and its application

CO6 **Outline** the Fourier series representation of a function

CO7 **Make use of** appropriate transformation technique for solving differential equation or difference equation

Course Description

For any engineering program, Mathematics is the backbone. With a sound knowledge in fundamental mathematics, an engineering student can become a very skillful engineer. In this course, the focus will be on learning Mathematics in depth, which will motivate students to grow their thinking ability in different fields of engineering. Students will be able to apply this knowledge to tackle almost all kinds of problems in engineering and science successfully. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities (Problem solving, presentation etc.).

Course Content

Unit I: Sequences and Series [15L]

Sequences and their limits, convergence of series, Convergence Test (comparison test, Ratio test, Root test), Absolute and conditional convergence, Alternating series, Power series

Periodic functions, Definition of Fourier series, Euler's formulae, Dirichlet conditions, Change of interval, Even and odd functions, half range Fourier Sine & Cosine series

Unit II: Complex Variables [15L]

Limit, continuity, differentiability and analyticity of complex functions, Cauchy-Riemann equations, derivatives of analytic functions, line integrals in complex plane, Cauchy’s integral theorem, independence of path, existence of indefinite integral, Cauchy’s integral formula, Taylor’s series, Laurent’s series, zeros and singularities, Residue theorem

Unit III: Ordinary Differential Equations [20L]

Formation of ODE, order and degree, First order ODE, Method of separation of variables, Exact and non-exact equations, linear and Bernoulli’s form, second order differential equations with constant coefficients, Complementary functions and Particular Integral, D-operator, method of variation of parameters, general linear differential equations with constant coefficients, Cauchy-Euler’s equations, Simultaneous differential equations

UnitIV: Vector Calculus [10L]

Ordinary Integrals of Vectors, Line, surface and volume integrals of Vector fields, Gauss’ divergence theorem, Green’s and Stokes Theorems and their applications

Text Book:

1. B.V. Ramana, Higher Engineering Mathematics, Tata McGraw-Hill
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publishing House

Reference Book:

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications
2. G. B. Thomas Jr., M. D. Weir, J. R. Hass, Thomas Calculus Early Transcendentals, 12th Edition
3. James Stewart, Calculus: Concepts and Contexts, 4th Edition, Cengage Learning

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Apply** the knowledge of matrix theory for finding solution of a related engineering problem	**PO1, PO2, PO3, PO4**
CO2	**Illustrate** the Eigen value(s) and Eigen vector(s) of a matrix	**PO1, PO2, PO3, PO4**
CO3	**Explain** the concept of vector space and linear transformation between the vector spaces	**PO1, PO2, PO3, PO4**
CO4	**Build** the knowledge of vector calculus and apply it for solving related problems	**PO1**
CO5	**Develop** the concept of complex variable and its application	**PO2, , PO5**
CO6	**Outline** the Fourier series representation of a function	**PO1, PO2, PO3, PO4, PO5**
CO7	**Make use of** appropriate transformation technique for solving differential equation or difference equation	**PO1, PO2, PO3, PO5**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
MTH11502	Engineering Mathematics-II	3	3	3	2	2	-		-	-	-	-		-	-

1 = weakly mapped
2 = moderately mapped
3 = strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 20__ – 20__)		
Name of the Program:	B.Tech	**Semester:**	II
Paper Title:	Engineering mathematics II	**Paper Code:**	MTH11502
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

4. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
5. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
6. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A **Answer All the Questions (5 x 1 = 5)**			
1	For which value of p the series $\sum \frac{1}{n^p}$ converge?	**U**	**CO1**
2	Define periodic function with an example.	**U**	**CO1**
3	Define analytic function.	**Ap**	**CO2**
4	What is the order and degree of the differential equation $\left(\frac{d^3y}{dx^3}\right)^2 + 2\left(\frac{dy}{dx}\right)^4 + 3y = 0$?	**U**	**CO3**
5	State Stokes theorem.	**Ap**	**CO4**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Test** the convergence of the following series: $\sum_{n=1}^{\infty} \frac{n!2^n}{n^n}$	**U**	**CO1**
(OR)			
6 b)	Find the range for the values of x so that the following power series converge: $\sum_{n=0}^{\infty}(2x)^n$	**U**	**CO1**
7 a)	Find the Fourier sine transforms of $f(x) = 5e^{-3x} - 7e^{-4x}$.	**U**	**CO1**
(OR)			
7 b)	Construct half-range Cosine series of a function $f(x)$ defined in an interval (0 , T)	**U**	**CO1**
8 a)	Find the singularity of the complex valued function $f(z) = \frac{e^z}{(z-2)^2}$ at $z = 2$.	**Ap**	**CO2**
(OR)			
8 b)	Find the value of the integral $\oint_C \frac{z^2-z+1}{z-1}\, dz$ where C is the circle $\lvert z\rvert = \frac{1}{2}$.	**Ap**	**CO2**
9 a)	Eliminate A and B to find the differential equation from the equation $y = Ae^{2x} + Be^{-2x}$	**U**	**CO3**
(OR)			
9 b)	Find the integrating factor of $(x + 2y^3)\frac{dx}{dx} = y$	**U**	**CO3**

10 a)	If $F = 3xy\hat{\imath} - y^2\hat{\jmath}$, find $\int F \cdot dR$, where C is the curve in the xy plane $y = 2x^2$ from $(0,0)$ to $(1,2)$.	**Ap**	**CO4**
(OR)			
10 b)	Using Green's theorem, find $\int_C [(y - \sin x)dx + \cos x\, dy]$, where C is the plane triangle enclosed by the st. lines $y = 0, x = \frac{\pi}{2}$ and $y = \frac{2}{\pi}x$.	**Ap**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Examine the convergence of the following series, $\sum_{n=1}^{\propto} \frac{n+2}{2(n+1)^2}$	**U**	**CO1**
(OR)			
11 b)	Examine the convergence of the following series, $\frac{1.2}{3} + \frac{2.3}{5} + \frac{3.4}{7} + \cdots$	**U**	**CO1**
12 a)	Find Fourier Series for $\|x\|$ in the interval $[-\pi, \pi]$.	**U**	**CO1**
(OR)			
12 b)	Find half range sine series of $\pi x - x^2$ in $(0, \pi)$ upto first three terms.	**U**	**CO1**
13 a)	Show that the complex valued function $f(z) = \|z\|^2$ is analytic only at $z = 0$.	**Ap**	**CO2**
(OR)			
13 b)	Show that the complex valued function $f(z) = \sqrt{\|xy\|}$ is not differentiable at $z = 0$ but the Cauchy-Riemann equation is satisfied there.	**Ap**	**CO2**
14 a)	Solve $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = e^{3x}$	**U**	**CO3**
(OR)			
14 b)	Solve $x\frac{dy}{dx} + y = y^2 logx$	**U**	**CO3**
15 a)	Verify Stoke's theorem for $F = (2x - y)\hat{i} - yz^2\hat{j} - y^2z\hat{k}$ over the upper half surface of $x^2 + y^2 + z^2 = 1$, bounded by its projection on the xy-plane.	**Ap**	**CO4**
(OR)			
15 b)	Use the line integral to compute work done by the force $F = (2y + 3)\hat{i} + xz\,\hat{j} + (yz - x)\hat{k}$ when it moves a particle from the point $(0,0,0)$ to the point $(2,1,1)$ along the curve $x = 2t^2,\ y = t, z = t^3$	**Ap**	**CO4**
16 a)	Find the value of $\oint_C \frac{sin\pi z^2 + cos\pi z^2}{(z-1)(z-2)}\, dz$ where C is the circle $\|z\| = 3$ by Cauchy's integral formula.	**Ap**	**CO2**
(OR)			
16 b)	Find the value of $\oint_C \frac{3z^2+z}{z^2-1}\, dz$ where C is the circle $\|z - 1\| = 1$ by Cauchy's integral formula.	**Ap**	**CO2**
17 a)	Solve by method of variation of parameters: $\frac{d^2y}{dx^2} + 9y = sec3x$.	**U**	**CO3**
(OR)			
17 b)	Check whether the following differential equation is exact and then solve it. $(x^3 + xy^4)dx + 2y^3dy = 0$	**U**	**CO3**

GEE11001	Electrical and Electronics Technology	L	T	P	C
Version 3.0	Contact Hours - 24	2	0	0	2
Pre-requisites/Exposure	Idea about basic mathematics				
Co-requisites	12^{th} level Physics				

Course Objectives

1. To understand dc network theorems and apply these theorems to calculate the voltage, current, and power for a given circuit.
2. To explain the concept of active power, reactive power, power factor, quality factor, and steady-state sinusoids.
3. To familiarize with passive components, active components, and measuring instruments.
4. To familiarize the working of diodes, transistors, and integrated circuits.
5. To implement mini projects based on the concept of electronics circuit concepts.

Course Outcomes

On completion of this course, the students will be able to

CO1**.** Explain DC network theorems and apply these theorems to calculate the voltage, current and power for a given circuit.

CO2. Describe the concept of active power, reactive power, power factor, quality factor, steady state sinusoids.

CO3. Illustrate three-phase power measurement.

CO4. Apply knowledge about different passive components used in electronic industry for common application.

CO5. Illustrate with the working of different active components to demonstrate basic electronic circuits.

Catalog Description

Electrical and Electronics Engineering is an integrated branch of engineering. This course deals with the technical aspects of electricity, especially the design and application of circuitry and electronic equipment. It also includes the concept of power generation and distribution, communication, and machine control. This engineering branch focuses on the practical application of electricity. It also specializes in the design, construction, and uses of electrical systems in our lives. Electrical and electronics engineering is offered in various professional courses such as Diploma, B.Tech, B.E., and M.Tech. E.E.E. (Electrical and Electronics Engineering) incorporates fundamental knowledge in core disciplines such as control systems, communications, signal processing, microprocessors, radio frequency design, electric machines, and power generation.

Course Content

Unit I: 6 lecture hours

D.C. Circuit Analysis and Network Theorems: Concept of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, source transformation, Kirchoff's Law, mesh analysis and nodal analysis, star-delta transformation, network theorems: Thevenin's theorem, Norton's theorem, maximum power transfer theorem.

Unit II: 6 lecture hours

Steady State Analysis of A.C. Circuits: Sinusoidal, average and effective value, form the peak factors, concept of phasor, phasor representation of sinusoidal voltage and current, analysis of series-parallel RLC circuits. Apparent, active and reactive powers, power factor, resonance in series and parallel circuits, bandwidth and quality factors, necessity and advantages of three phase system, star and delta connections, balanced supply and balanced load, line and phase voltage/current relation, three phase power measurements.

Unit III: 5 lecture hours

Basics of Semi-Conductors and PN Junction: Introduction; Carrier Concentrations- the Fermi Level; Drift and diffusion current; PN Junction Diode in Equilibrium Conditions; Depletion Region formation, PN Junction Diode in Forward Biased and Reverse Biased Condition; Breakdown in PN Junction Diodes.

Unit IV: 4 lecture hours

Bipolar Junction Transistors: Introduction, Types: NPN and PNP; Current Components; Early Effect; Different Configurations of a Transistor and its Characteristics.

Unit V: 4 lecture hours

Field Effect Transistors: Introduction to MOSFET, Characteristics of MOSFETs; Analysis of MOS structure; Calculation of threshold voltage; I-V characteristics of MOSFETs.

Text Books

1. Electronic Devices & Circuit Theory: Boyelstad & Nashelsky
2. Electronics Fundamental and application: D.Chattopadhyay and P C Rakshit
3. Electronic Principle: Albert PaulMalvino
4. Digital circuits and design by S Salivahanan and SArivazhagan
5. V. N. Mittal and A. Mittal, *Basic Electrical Engineering*, Tata McGraw-Hill Publishing Company Ltd,2006.

Reference Books

1. Electronic Circuits, Discrete and Integrated- Charles Belove and Donald L.Schilling
2. Principles of Electrical Engineering and Electronics-VK Mehta, Rohit Mehta, SChand and Company, New Delhi

3. Solid State Electronic Devices- Ben G. Streetman and Sanjay Kumar Banerjee, PHI.
4. Fundamental of Digital Circuits by Anand Kumar 2nd Eddition, PHI Learning Pal, Rajendra and Korlahalli, J.S. (2011) Essentials of Business Communication. Sultan Chand & Sons. ISBN: 9788180547294.
5. Theodore Wildi,*ElectricMachines, Drives and Power Systems*, Pearson,2005.
6. Vincent Del Toro, *Electrical Engineering Fundamentals*, 2nd Ed., Prentice Hall India Learning Pvt. Ltd.,1989.
7. J. Millman, C. Halkias and C. D. Parikh, *Millman's Integrated Electronics: Analog and Digital Circuits and Systems*, 2nd Ed., McGraw Hill Education,2017.
8. D.P.Leach,A.P.MalvinoandG.Saha,*DigitalPrinciplesandApplications*,8thEd.,McGraw Hill Education,2014.

Modes of Evaluation: Quiz/Assignment/ Written Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

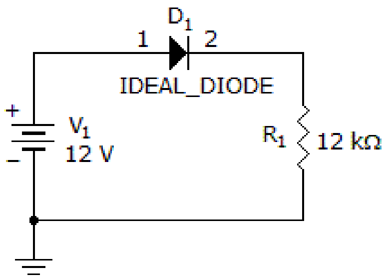
Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Explain DC network theorems and apply these theorems to calculate the voltage, current and power for a given circuit.	**PO1, PO2**
CO2	Describe the concept of active power, reactive power, power factor, quality factor, steady state sinusoids.	**PO2, PO3**
CO3	Illustrate three-phase power measurement.	**PO2, PO6**
CO4	**Apply** knowledge about different passive components used in electronic industry for common application.	**PO1, PO3, PO6**
CO5	**Illustrate** with the working of different active components to demonstrate basic electronic circuits.	**PO1, PO3, PO6, PO12**

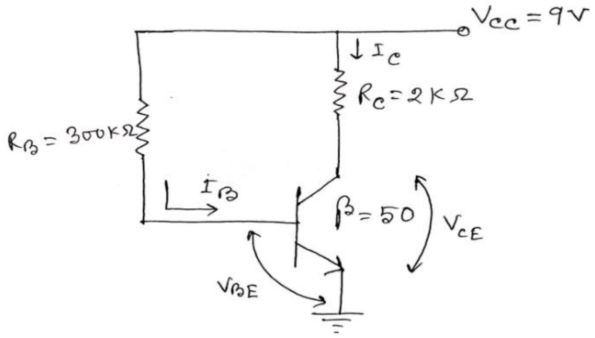
Course Code	Course Title	Engineering Knowledge PO1	Problem analysis PO2	Design/development of solutions PO3	Conduct investigations of complex problems PO4	Modern tool usage PO5	The engineer and society PO6	Environment and sustainability PO7	Ethics PO8	Individual or team work PO9	Communication PO10	Project management and finance PO11	Life-long Learning PO12
GEE11001	Electrical and Electronics Technology	3	3	3	1	-	2	-	-	-	-	-	2

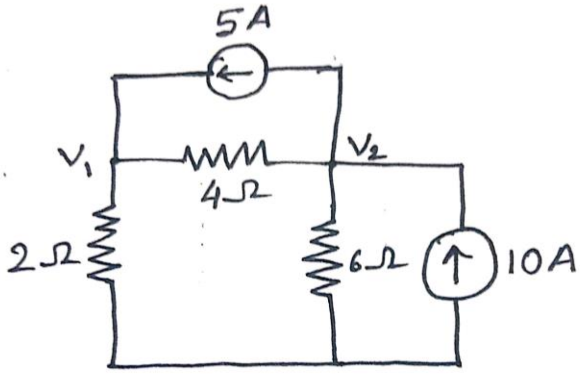
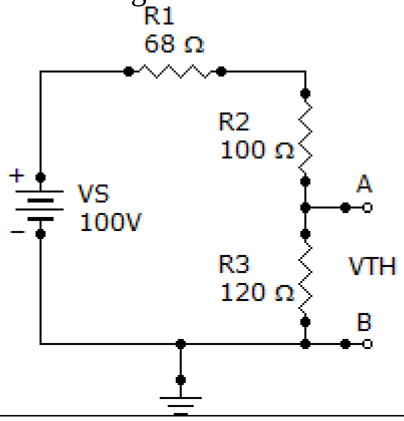
1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B. TECH	**Semester:**	II
Paper Title:	Electrical & Electronics Technology	**Paper Code:**	GEE11001
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	03
(Any other information for the student may be mentioned here)	**7.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **8.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **9.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**What** is the current through the diode?  **a)** 1 mA **b)** 0.975 mA **c)** 0.942 mA **d)** 0.5 mA	**R**	**CO4**
2	The active region of a BJT the emitter junction is in ....bias and collector junction is in ....bias. **a)** Forward, Reverse **b)** Forward, Forward **c)** Reverse, Forward **d)** Reverse, Reverse	**R**	**CO5**
3	**Find** the decimal equivalent of hex number 1A53. **a)** 6793 **b)** 6739 **c)** 6973 **d)** 6379	**R**	**CO6**
4	Power factor of electric bulb is **a)** Unity **b)** Lagging **c)** Leading **d)** Zero	**R**	**CO3**
5	The active power drawn by a capacitor **a)** 0 **b)** 1 **c)** 0.5 **d)** 2	**R**	**CO1**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**Why** does a pure semiconductor behave like an insulator at	**R**	**CO4**

	absolute zero temperature?		
(OR)			
6 b)	**Define** the following: **a)** Power factor, **b)** Quality factor.	**R**	**CO3**
7 a)	In a BJT, the emitter current (I_E) is 12 mA. If I_E is 1.02 times of the collector current, then **find** the base current.	**R**	**CO5**
(OR)			
7 b)	Transform the sinusoid to phasor: V= -4 sin (30t -400).	**A**	**CO3**
8 a)	**Compare** between BJT & FET.	**U**	**CO5**
(OR)			
8 b)	Define the following: i) Active Power. ii) Reactive Power.	**U**	**CO2**
9 a)	Convert numbers: **i)** $(53.625)_{10} = (?)_2$, **ii)** $(A3B)_{16} = (?)_{10}$	**R**	**CO6**
(OR)			
9 b)	Draw the phasor diagram of R-L-C series circuit when XL>XC	**E**	**CO2**
10 a)	**Determine** the collector current (I_C) and V_{CE} for the given circuit as shown in figure. (Consider V_{BE}=0.7V for a Silicon Transistor)  	**E**	**CO5**
(OR)			
10 b)	A single 50 Hz motor takes 100 A at 0.85 p.f lagging from a 240 V supply. Calculate the (i) active and reactive components of the current and (ii) the power taken from the supply.	**E**	**CO2**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**i) Explain** the phenomenon of diffusion of current carriers in a semiconductor. **ii)** Write Einstein's relation between mobility & diffusivity.	**U**	**CO4**
(OR)			
11 b)	Find the node voltages V1 and V2 in the circuit	**A**	**CO1**

			
12 a)	**Analyze** the current components of PNP in Bipolar Junction Transistor.	**AN**	**CO5**
(OR)			
12 b)	**Find** the Thevenin's equivalent circuit for the following circuit. 	**AN**	**CO1**
13 a)	**i) Design** and implement EX-OR gate using NAND gate. **ii) Determine** the hole concentration of a silicon crystal having donor concentration of $2.4*10^{24}$ /m^3, when intrinsic carrier concentration is $1.6*10^{18}$ /m^3? Find the ratio of electron and hole concentration.	**C, E**	**CO6 & CO4**
(OR)			
13 b)	A certain current source has the values I= 4 µA and R = 1.2 MΩ. Determine the values for an equivalent voltage source.	**An**	**CO1**
14 a)	**i) What** is Fermi level? **Show** that the Fermi level is at the centre of forbidden gap in an intrinsic semiconductor. **ii) Determine** the current in a p-n junction, considering it at T=300 K, in which $I_S=10^{-14}$ A and n = 1. Find the diode current for V_D = 0.7 v and V_D = - 0.7 v	**E**	**CO4**
(OR)			
14 b)	What is resonance? Derive expression of resonance frequency for series R-L-C circuit.	**U**	**CO2**
15 a)	**i)** Draw schematically the structure of n channel JFET and explain the operation briefly. **ii) Why** Silicon type transistors are more often used than Germanium type?	**U, R**	**CO5, CO4**
(OR)			
15 b)	Prove that the energy stored in the inductor is, W = 1/2 L i^2	**E**	**CO2**

	(where, ‘L’ is the capacitance and ‘i’ is the current through inductor)		
16 a)	**i)** How you measure resistance value using colour code and power rating of a resistor? **ii)** Briefly explain the three regions that are present in the drain characteristics of JFET?	**R, U**	**CO6**
	(OR)		
16 b)	Write a short note on maximum power transfer theorem.	**R**	**CO1**
17 a)	**i)** What is Fermi level? Show that the Fermi level is at the centre of forbidden gap in an intrinsic semiconductor. **ii)** Why transistor is called current controlled device?	**R**	**CO5**
	(OR)		
17 b)	Draw the phasor diagram of the following circuits. (i) Series RL circuit and (ii) Parallel RLC circuit	**U**	**CO3**

MEE11002	Engineering Mechanics	L	T	P	C
Version 1.0	**Contact Hours – 60**	3	1	0	4
Pre-requisites/Exposure	12^{th} level Physics, Mathematics				
Co-requisites	--				

Course Objectives

1. To enable learners to solve force problems related to practical world.
2. To be able to determine the centroid, centre of gravity and moment of inertia.
3. To learn the effect of friction on equilibrium.
4. To learn kinematics, kinetics of particle and rigid body, related principles.
5. To introduce the concepts of Dynamic motion.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Apply** conditions of equilibrium of bodies subjected to forces
CO2. **Determine** the centroid, centre of gravity and moment of inertia of various one dimensional and two-dimensional objects
CO3. **Analyze** motion under the effect of dry friction
CO4. **Apply** the concept of virtual work for bodies in equilibrium
CO5. **Apply** the D'Alembert's Principle for reducing the problem of kinetics to equivalent statics problem.

Catalog Description

Engineering Mechanics. This is a basic first level course to learn rigid body mechanics covering both statics and dynamics. Statics covers free body diagrams, equilibrium of rigid bodies, analysis of trusses and beams, discussion on friction, virtual work and stability. Students will be expected to be familiar with engineering problems related to practical field.

Course Content

Module 1 **15 lecture hours**

Basics of Statics and Concurrent Forces
Statics of Particles: Force System: Force, classification & representation, force as a vector, composition and resolution of forces, principle of superposition and transmissibility of forces.
Statics of Rigid bodies: Equilibrium of coplanar force system, free body diagrams, determination of reactions, equilibrium of a body under three forces, Lami's theorem. Moment of a force about a point and an axis, moment of coplanar force system, Varignan's theorem.

Module 2: **15 lecture hours**
Parallel and Distributed Forces
Parallel forces in a plane, Distributed Parallel forces in a plane, couple, resolution of a force into a force and a couple, moment of a couple.

Centroid and Moment of Inertia: Determination of centre of gravity, centre of mass and centroid by direct integration and by the method of composite bodies, area moment of inertia of composite plane figures and mass moment of inertia, radius of gyration, parallel axis theorem, Pappas theorems, polar moment of inertia.

Module 3: **10 lecture hours**

Friction Introduction to wet and dry friction, laws of dry friction, cone of friction, block friction, ladder friction, wedge friction, application of friction in machines.

Module 4: **10 lecture hours**
Virtual Work Virtual displacement, principle of virtual work.

Module 5: **10 lecture hours**
Introduction to Dynamics Laws of motion, Projectile motion, D'Alembert's Principle, Work and energy, impulse and momentum, impact of bodies.

Text Books

1. Engineering Mechanics [Vol-I & II] by Meriam&Kraige, 5th ed. – Wiley India
2. Engineering Mechanics by S.S. Bhavikatti and K.G. Rajashekarappa – New Age International
3. Mechanics of Solids by Crandall,Dahl and Sivakumar-MC Graw Hill ,5th Edition 2015,New Delhi

Reference Books

1. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. – PHI
2. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. – TMH

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

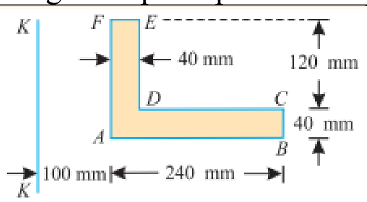
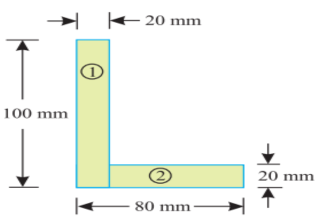
Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Apply** conditions of equilibrium of bodies subjected to forces	**PO1,PO2**
CO2	**Determine** the centroid, center of gravity and moment of inertia of various one dimensional and two dimensional objects	**PO1,PO2**
CO3	**Analyze** motion under the effect of dry friction	**PO1,PO2**
CO4	**Apply** the concept of virtual work for bodies in equilibrium	**PO1,PO2**
CO5	**Apply** the D'Alembert's Principle for reducing the problem of kinetics to equivalent statics problem.	**PO1,PO2,**

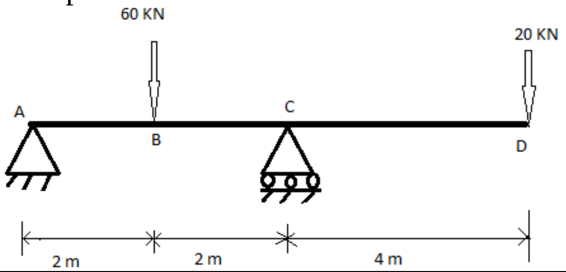
		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
MEE11002	Engineering Mechanics	3	3												

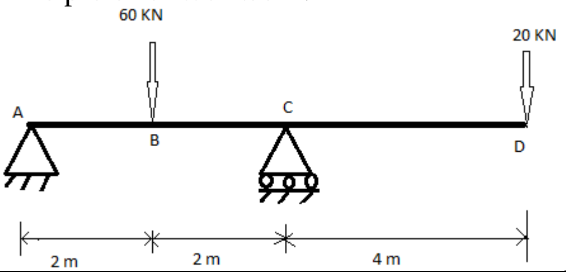
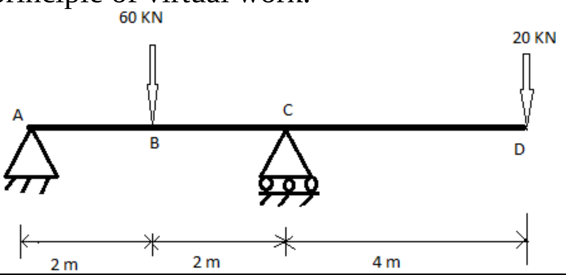
1=weakly mapped
2= moderately mapped
3=strongly mappe

Model Question Paper

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2021 – 22)		
Name of the Program:	B. TECH	**Semester:**	II
Paper Title:	Engineering Mechanics	**Paper Code:**	MEE11002
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	03
(Any other information for the student may be mentioned here)	**10.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **11.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **12.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**Explain**the Parallelogram Law of forces.	**U**	**CO1**
2	**Explain**: Varignon's principle of moments	**U**	**CO1**
3	 Compute the moment of inertia of the above area about axis K-K.	**R**	**CO2**
4	**Find** the centroid of an unequal angle section 100 mm × 80 mm × 20 mm.  	**R**	**CO2**
5	**What** is friction?	**U**	**CO3**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	a) **Explain** principle of transmissibility? (b)**Find** out the reaction forces at support as shown in figure below using	**U**	**CO1**

	principle of virtual work.  		
(OR)			
6 b)	F1 and F2 are two collinear forces. When they act in opposite directions, their resultant is 34N, when they act at right angles to each other, their resultant is 50N. Find F1 and F2.	R	CO3
7 a)	Explain free body diagram with an example.	R	CO5
(OR)			
7 b)	Define Radius of gyration, product of inertia and principal moment of inertia.	A	CO3
8 a)	State and prove Varignon's theorem.	U	CO5
(OR)			
8 b)	What is instantaneous centre? How can it be located?	U	CO2
9 a)	Show that the acceleration at any instant during simple harmonic motion is directly proportional to the displacement from the mean position	R	CO6
(OR)			
9 b)	An elevator weights 2500 N and is moving vertically downwards with constant acceleration. Write the equation for the elevator cable tension. Starting from rest it travels a distance of 35 metres during an interval of 10 seconds. Find the cable tension during this time. Neglect all other resistances to motion. What are the limits of cable?	E	CO2
10 a)	F1 and F2 are two collinear forces. When they act in opposite directions, their resultant is 34N, when they act at right angles to each other, their resultant is 50N. Find F1 and F2.	E	CO5
(OR)			
10 b)	State D'Alemberts principle. Draw the free body diagram of a lift of weight 'W', moving upwards with an acceleration 'a' and also write the equations of dynamic equilibrium using this principle.	E	CO2
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	A body is moving with simple harmonic motion and has amplitude of 4.5 m and period of complete oscillation of 3.5s. Find the time required by the body in passing between two points which are at a distance of 3.5 m and 1.5 m from the centre and are on the same side.	U	CO4
(OR)			
11 b)	A body of mass 50 kgs is suspended by two springs of stiffness 4kN/m and 6 kN/m. The body is pulled 50 mm down from its equilibrium position and then released. Calculate the frequency of oscillation, maximum velocity and (10) P 2000 N For More Visit : KtuQbank.com | Fair Use Policy 00000BE100121805 4 maximum acceleration if i) springs are connected in series ii) springs are connected in parallel.	A	CO1
12 a)	**Analyze** the current components of PNP in Bipolar Junction Transistor.	AN	CO5
(OR)			

12 b)	For the system of forces, determine the magnitude, direction of the resultant force about A.	**AN**	**CO1**
13 a)	State Parallel axis Theorem.	**C, E**	**CO6 & CO4**
	(OR)		
13 b)	a) **Explain** principle of transmissibility? (b)**Find** out the reaction forces at support as shown in figure below using principle of virtual work. 	**U**	**CO1**
14 a)	A 4m long ladder, 180N in weight, is supported against a wall (which is perpendicular to the floor) with its foot on the floor. The coefficient of friction between wall and the ladder is 0.2 and that between floor and ladder is 0.4.The ladder supports a weight of 900N at a distance of 1m along the ladder from its top. Compute the least value of the angle between the floor and the ladder for its equilibrium.	**E**	**CO4**
	(OR)		
14 b)	a) **Explain** principle of transmissibility? (b)**Find** out the reaction forces at support as shown in figure below using principle of virtual work. 	**U**	**CO1 /CO4**
15 a)	(a) **Explain** Laws of friction? (b) An effort of 200 N is required just to move a certain body up an inclined plane of angle 15° with the force acting parallel to the plane. If the angle of inclination of the plane is made 20° the effort required, again applied parallel to the plane, is found to be 230 N. **Find** the weight of the body and the coefficient of friction.	**Ap**	**CO3**
	(OR)		
15 b)	An electric light fixture weighting 15 N hangs from a point C, by two strings AC and BC. The string AC is inclined at 60° to the horizontal and BC at 45° to the horizontal as shown in Figure. Using Lami's theorem, **determine** the forces in the strings AC and BC.	**U**	**CO1**

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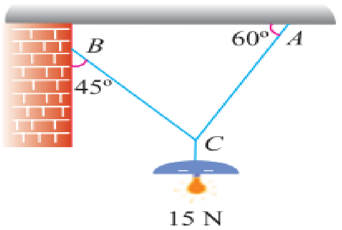
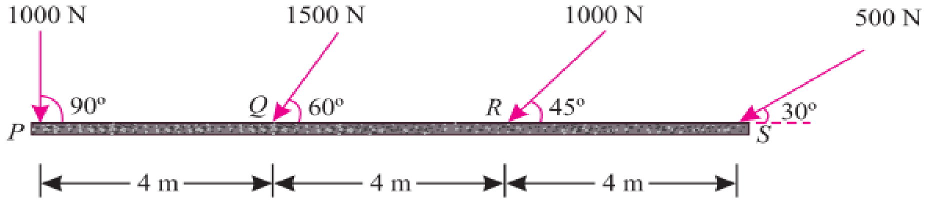
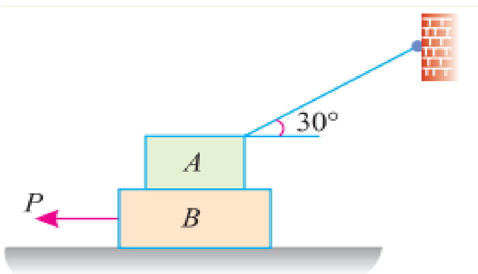
<tr><td></td><td>
</td><td></td><td></td></tr>
<tr><td>16 a)</td><td>A horizontal line PQRS is 12 m long, where PQ = QR = RS = 4 m. Forces of
1000 N, 1500 N, 1000 N and 500 N act at P, Q, R and S respectively with downward direction. The lines of action of these forces make angles of 90°, 60°, 45° and 30° respectively with PS. Find the magnitude, direction and position of the resultant force

</td><td>U</td><td>CO1</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>16 b)</td><td>Determine the angle between the vectors A = 4i-3j+k and B=2i-6j-3k</td><td>R</td><td>CO1</td></tr>
<tr><td>17 a)</td><td>Two blocks A and B of weights 1 kN and 2 kN respectively are in equilibrium position as shown in Figure 1. If the coefficient


of friction between the two blocks as well as the block B and the floor is 0.3,find the force ‘P’ required to move the block.</td><td>An</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>17 b)</td><td>(a) Explain Laws of friction?
(b) An effort of 200 N is required just to move a certain body up an inclined plane of angle 15° with the force acting parallel to the plane. If the angle of inclination of the plane is made 20° the effort required, again applied parallel to the plane, is found to be 230 N. Find the weight of the body and the coefficient of friction.</td><td>Ap</td><td>CO3</td></tr>
</table>

Course code: EVS11112	Course Name: Environmental Science	L	T	P	C
Version 1.1	Contact Hours – 30	2	0	0	2
Pre-requisites/Exposure	Basic physics, chemistry, mathematics of +2 level.				
Co-requisites	--				
Academic year	2022-23				

Course Objectives

5. To understand the intrinsic relation between humans and the environment, our position in the ecosystem around us
6. To comprehend the significance of the biodiversity surrounding us.
7. To figure out the importance and need for energy resources, various sources of energy, renewable and non-renewable sources, conventional and unconventional sources.
8. To have basic concepts about sustainability, our dependence on nature, and the consequences of overexploitation.
9. To enable students to appreciate the importance and how much we owe to the earth systems for our survival.
10. To have a basic concept about the types of pollution and mitigation procedures.
11. To have an overall idea about the environmental legal framework in our country and about the EIA and environmental audit procedures.

Course Outcomes: On completion of this course, the students will be able to

CO 1: Compare between various types of ecosystems, ecosystem dynamics, perceive and appreciate the surrounding nature.

CO 2: Perceive the intrinsic relation between humans and the environment, our position in the ecosystem around us, and the importance of biodiversity.

CO 3: Identify the presence of various pollutants, their significance, and impacts, and develop the underlying concepts involved in various air pollution prevention and mitigation measures.

CO 4: Estimate the importance of natural resources including energy resources.

CO 5: Relate to the legal framework in our country for safeguarding the environment including pollution prevention, control, management, and wildlife management.

Catalog Description

To distinguish between various types of ecosystems, ecosystem dynamics, perceive and appreciate the surrounding nature and feel connected, develop the concept of the innate relationship of humans and biodiversity, need for conservation, and different conservation strategies. The students will be developed in a way so that they can spontaneously comprehend the importance of studying the various air pollutants, their significance, and impacts, and develop the underlying concepts involved in various air pollution prevention and mitigation measures, understand fundamental water chemistry, deduce the relationship between various water pollutants, and understand the principles of various water and wastewater treatment procedures. They will understand the routes of generation, classification, management, and environmental significance of solid waste, apply the basic concepts of waste management in their daily lives, understand the need of the 5Rs of waste management, the importance of waste minimization.

Detailed syllabus

Unit I: Resources

Multidisciplinary nature of environmental sciences; scope and importance; need for public awareness; concept of sustainability and sustainable development

Forest resources: Function of forests, cause and effects of deforestation, case studies.

Water resources: distribution of water, hydrological cycle, use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies

Food Resources: World food problems and environmental concern, Food security, case studies

Energy resources: Concept of energy, SI Units of Work, Heat and Power, World energy use, Energy consumption pattern in India and U.S., Environmental aspects of energy utilization Renewable and non-renewable sources; Fossil fuel: types, use and environmental impacts, Solar energy: Solar Radiation – Passive and active solar systems – Flat Plate and Concentrating Collectors – Solar direct Thermal Application– Fundamentals of Solar Photo Voltaic Conversion-advantages and disadvantages of Solar Power generation, Solar energy status in India; Wind Energy: site selection, Wind turbine: basic working principle and types, Wind energy status in India, advantages and disadvantages of Wind Power generation; Hydroelectric power : How is it generated, advantages and disadvantages; Biomass energy: various types, generations of biofuel, Biogas plants, Bio diesel; Geothermal Energy: source, advantages and disadvantages, Nuclear Power: nuclear fission, moderation of reaction, nuclear reactor: pressurized water reactor, advantages and disadvantages

Unit II: Ecosystems and Biodiversity and its conservation

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Food chains, food webs and ecological pyramids, energy flow, ecological succession, Levels of Biodiversity: genetic, species and ecosystem diversity. Biogeographical classification of India, Values of biodiversity, Biodiversity at global, National and local levels, India as a mega-diversity nation, Biodiversity hotspots, Threats to Biodiversity, In-situ and Ex-situ conservation of Biodiversity

Unit III: Environmental Pollution and Waste Management

Environmental pollution: types, causes, effects and controls; Air, water, soil and noise pollution, marine pollution; case studies. Nuclear hazards and human health risks.

Sources and generation of solid wastes, their characterization, chemical composition and classification. Different methods of disposal and management of solid wastes, Recycling of waste material. Waste minimization technologies.

Unit IV: Global Issues and Environmental Acts if India

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, habitat loss, Holocene Extinction.

International agreements on Environmental conservation and pollution prevention.

Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. Waste Management Rules, 2016 and other important acts.

Text Books:

1. Principles of Environmental Science, 4th edition by Cunningham, W.P. and Cunningham, M.A. (2002), Tata McGraw-Hill Publishing Company, New Delhi

2. Basic Environmental Engineering & Elementary Biology by Monidranath Patra and Rahul Kumar Singha, Aryan Publishing house

3. Introduction to Environmental Engineering and Science, by Masters, G.M., Prentice Hall of India, Second Indian Reprint.

Reference Books:

1 Wastewater Engineering: Treatment and Reuse, 4th Edition, Metcalf and Eddy, Inc. McGraw-Hill, Inc., New York, 2002

2 Environmental Engineering", Howard S. Peavy, Donald R. Rowe and George Tchobanoglous, McGraw-Hill Education (India) Private Limited, New Delhi

3 Introduction to Environmental Engineering, 2nd Ed. by Davis, M. L. and Cornwell D. A. McGraw Hill, Singapore.

4 Environmental Sciences: The Environment and Human Impact by Jackson, A.R.W. and Jackson, J.M., Longman Publishers

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs):

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Compare between various types of ecosystems, ecosystem dynamics, perceive and appreciate the surrounding nature.	**PO2, PO5**
CO2	Perceive the intrinsic relation between humans and environment, our position in the ecosystem around us, and importance of biodiversity.	**PO2, PO5, PO6**
CO3	Identify the presence of various pollutants, their significance, and impacts, and develop the underlying concepts involved in various pollution prevention and mitigation measures.	**PO2, PSO7**
CO4	Estimate the importance of natural resources including energy resource.	**PO2, PO5, PO6**
CO5	Relate to the legal framework in our country for safeguarding the environment including pollution prevention, control, management, and wildlife management.	**PO2, PO5, PO6**

		Chemistry Knowledge: To understand basic facts and concepts in Chemistry while retaining the exciting aspects of Chemistry so as to develop an interest in the study of chemistry as a discipline.	**The Chemist and society:** To appreciate the achievements in Chemistry and to know the role of Chemistry in nature and in society.	**Computer usage in Chemistry:** To design and apply appropriate experiment techniques along with IT tools to solve chemical problems. Attain familiarity with the applications of computers in chemistry: Modelling and simulation of chemical phenomena.	**Practical Skills:** To develop skills in the proper handling of apparatus and chemicals.	**Analytical Skills:** To be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.	**Professional growth:** The students after completing the postgraduate course would have equipped their ability in the field of chemical analysis by their exposure to the sophisticated analytical instruments.	**Effective Communication:** Students will be able tocommunicate efficiently through project report writing, documentation and effective presentations.	**Skill Enhancement:** The postgraduate programme in Chemistry will enhance soft skills among students which is essential for future employability through activities such as seminar, communication skills, industrial visit, internship, and dissertation.	Postgraduate will encompass noteworthy opportunities in various service domains both at national and international level, and can work as scientist, analyst at testing facilities/labs, quality controller in production industries, academics, research laboratories etc.	To cultivate in –depth knowledge in Organic chemistry, Inorganic chemistry, Physical chemistry, Analytical chemistry, Spectroscopy, Pharmaceutical technique etc.	Students will acquire deep knowledge in the study of physical, chemical, electrochemical and magnetic properties, structure elucidation using various sophisticated techniques and their applications to study various organic and inorganic materials.	Students will imbibe research acumen and inculcate innovative thinking so as to become a good researcher/academician as well as will perk up analytical and logical capability so as to import the ability to solve new and complex problems.	Postgraduate students will be able to communicate effectively the scientific information and research results in written and oral formats, to both professional scientists and to the public.	Postgraduate students will attain leadership quality to handle all kind of circumstances in diversities by providing interdisciplinary and multidisciplinary learning environment with team work philosophy.	Students will evolve the culture of continuous learning to learn and adopt new skills and techniques for making of good society.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
SGY5 1111	Environmental Science	-	2	-	-	2	2	-	-	2	-	1	1	-	-	1

1=weakly mapped; 2= moderately mapped; 3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

Name of the Program: B.Tech Semester: II | Stream: ECE
PAPER TITLE: Environmental Science | PAPER CODE: EVS11107
Maximum Marks: 50 | Time duration: 3 hours
Total No of questions: 12 | Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	Briefly **evaluate** what information about any ecosystem are conveyed by ecological pyramids?	**U**	**CO1**
2.	**Analyse** how DO of a water body is related to eutrophication?	**U**	**CO3**
3.	**What** are the diverse applications of solar energy unlike other renewable energy resources?	**R**	**CO4**
4.	**What** are the different types of wind turbine?	**R**	**CO4**
5.	Mention few problems associated with large dams.	**R**	**CO2**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
4.	**What** are the adverse effects of open dumping of municipal solid wastes on environment? **How** does sanitary landfill differ from open dumping? (2.5+2.5 = 5)	**U**	**CO5**
5.	**What** is electrostatic precipitator? **What** are the advantages of electrostatic precipitator? (2.5+2.5 = 5)	**U**	**CO3**
6.	**Describe** the distribution of water resources.	**R**	**CO5**
7.	**Estimate** a simple flowchart describing the steps that are followed in an EIA process in India.	**R**	**CO6**
	SECTION C (Answer Any Two Questions) (2 x 15 = 30)		
8.	**How** is photochemical smog formed? **What** are effects of photochemical smog? **Discuss** the factors affecting photochemical smog? (5+5+5=15)	**U**	**CO4**
9.	**What** do you mean by BOD of water? **How** thermal pollution of water is linked to DO? A city discharges 1.25 m^3/s of wastewater into a stream whose minimum rate of flow is 8.0 m^3/s. The velocity of the stream is about 3.0 km/h. The temperature of the wastewater is 20°C and that of the stream is 15°C. The 20°C BOD_5 of the wastewater is 250 mg/l and that of the stream is 2 mg/L. The wastewater contains no dissolved oxygen, but the stream is flowing with saturated DO concentration of 9.2 mg/L. Saturated DO at 15°C is 10.2 mg/L. At 20°C, deoxygenation constant (k^1) is estimated to be 0.3 per day and reaeration constant (k^2) is 0.7 per day. Determine the critical oxygen deficit and its location. Also estimate the 20°C BOD_5 of a sample taken at the critical point. Use the temperature coefficients of 1.135 for k^1 and 1.024 for k^2. (4+4+7=15)	**Ap**	**CO3**
10.	**What** is hazardous waste? Discuss the methods of hazardous waste management? What is composting? (4+7+4=15)	**U**	**CO3**

GEE11011	**Basic Civil & Mechanical Engineering**	L	T	P	C
Version1.0		3	0	0	3
Pre-requisites/Exposure	11th level Physics				
Co-requisites	Engineering Mechanics				

Course Objectives

1. To study different materials and their properties
2. To know about engineering aspects related to buildings
3. To understand the importance of surveying and the transportation systems
4. To get exposed to the rudiments of engineering related to dams, water supply, and sewage disposal

Course Outcomes

Once completion of this course, the students will be able to

CO1. Define civil engineering and different building materials.
CO2. Describe various engineering properties and components of a building.
CO3. Explain the basics of surveying and the transportation system.
CO4. Identify different components of power plant and automobile sectors
CO5. Demonstrate the capabilities of robotic system in industry.

Catalog Description

This course covers the basic introduction of civil engineering and mechanical engineering. Demonstration of various engineering systems and other elements will be provided by pictorial representations as per requirements. Numerical problems will be solved in connection with the several aspects of civil and mechanical engineering. Classes will be conducted by lectures as well as powerpoint presentation per the requirements. Discussions related to the development of various empirical equations regarding water resources engineering will be done as well. Students will be subjected to class tests, assignments and tutorials problems and solving by course coordinator.Through these teaching methods students will have a strong understand of the fundamental concepts of this course and will be able apply these concepts in the working field in future.

CourseContent

Unit I: **7 LectureHours**

Introduction to Civil Engineering: Basic introduction, broad disciplines of civil engineering, importance, possible scopes for a career.

Building Materials: Stones, bricks, mortars, Plain, Reinforced &Prestressed Concrete, Construction Chemicals; Structural Steel, Carbon Composites; Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes.

Unit II: 10 LectureHours

Material Properties: Stress-strain – types, Hook's law, three moduli of elasticity, poisons ratio, relationship – factor of safety. Centroid –the center of gravity. Moment of inertia, parallel, perpendicular axis theorems and radius of gyration (definitions only)

Building Components: Building- classification, components. Foundations – functions, classifications, bearing capacity. Flooring – requirements, selection, types, cement concrete, marble, terrazzo flooring. Roof – types and requirements.

Unit III: 11 LectureHours

Surveying and Transportation: Surveying – objectives, classification, principles of the survey. Transportation – classification, cross-section, and components of road, classification of roads. Railway – cross-section and components of permanent way, functions. Waterway – docks and harbor, classifications, components. Bridge – components of the bridge.

Water Supply and Sewage Disposal: Dams – purpose, selection of site, types, gravity across-sectioning only). Water supply – objective, the quantity of water, sources, standards of drinking water, distribution system. Sewage – classification, technical terms, septic tank, components, and functions.

UnitIV: 9 Lecture **Hours**

Introduction to Mechanical Engineering: Basic introduction, broad disciplines of mechanical engineering, importance, possible scopes for a career.

Power-Plant Engineering: Introduction of the power plant and power plant components, boilers, turbines, pumps, cooling towers.

Automobile Engineering: Introduction of automobile engineering, an aerodynamic study in automobile, selection criteria of automobiles based on individual requirements, Performance, and safety parameters.

UnitV: 8 Lecture Hours

Introduction to Mechanism of Robots

Basics of Robotics,Degree of freedom of robots, Higher DOF robots,Vector transformation, Homogeneous transformation matrices, DH parameters, Introduction to kinematics & Dynamics, Introduction to actuators, sensors medical robots, space robots, underwater robots, and agriculture robots, Introduction to Roboanalyzer software.

ReferenceBooks

1. Raju .K.V.B, Ravichandran.P.T, "Basics of Civil Engineering", Ayyappa Publications, Chennai, 2012.
2. Rangwala .S.C," Engineering Material"s, Charotar Publishing House, Anand, 2012.
3. Rajput, R. K. A text book of automobile engineering. Firewall Media, 2008.

4. Ramakrishna, K., 2012. Automobile engineering. PHI Learning Pvt. Ltd..
5. Drbal, Larry, Kayla Westra, and Pat Boston, eds. Power plant engineering. Springer Science & Business Media, 2012.
6. Elliott, Thomas C. "Standard handbook of powerplant engineering." (1989).
7. Saha, Subir Kumar. Introduction to robotics. Tata McGraw-Hill Education, 2014.
8. Craig, John J. Introduction to robotics: mechanics and control. Pearson Educacion, 2005.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written ExaminationScheme:

Components	ClassAssessment	EndTerm
Weightage(%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

MappingbetweenCOsandPos		
	CourseOutcomes (COs)	**MappedProgramOutcomes**
CO1	Define civil engineering and different building materials.	**PO1, PO7, PSO1**
CO2	Describe various engineering properties and components of a building.	**PO1, PO7, PSO1**
CO3	Explain the basics of surveying andthe transportation system.	**PO1, PO7, PSO1**
CO4	Identify different components of the power plant and automobile sectors	**PO1, PO5**
CO5	Demonstrate the capabilities of robotic system in the industry.	**PO1, PO5**

		EngineeringKnowledge	Problem analysis	Design/developmentofsolutions	Conductinvestigationsofcomplexproblem	Moderntool usage	Theengineer and society	Environment and sustainability	Ethics	Individual or teamwork	Communication	Project management and finance	Life-longLearning	Competitive Examination Preparation	Technical Competency
Course Code	CourseTitle	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
GEE11011	Basic Civil & Mechanical Engineering	3	-	-	-	2	-	-	-	-	-	-	-	3	-

1=weaklymapped

2= moderately mapped

3=stronglymapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION**		
Name of the Program:	B.Tech in CE	**Semester:**	II
Paper Title:	Basic Civil & Mechanical Engineering	**Paper Code:**	GEE11011
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)	**16.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **17.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **18.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**State** the benefits of Deconstruction process in the Sites.	**U**	**CO1**
2	**What** is the thickness of the mortar bed on which the brick flooring is laid?	**R**	**CO2**
3	**Define** ‘Gravity Dry Dock’?	**R**	**CO3**
4		**R**	**CO4**

5		**U**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**List** the uses of Plastics in Construction Industry.	**App**	**CO1**
(OR)			
6 b)	Illustrate 4 applications of	**U**	**CO1**
7 a)	**Why** Poission's ratio always come with a negative value? Explain.	**U**	**CO2**
(OR)			
7 b)	**List** the characteristics of "Flag Stone Flooring"?	**U**	**CO2**
8 a)	**Compare** Plain and Geodatic Surveying using rough sketch if necessary.	**U**	**CO3**
(OR)			
8 b)	**List** the components in a Permanent Way.	**R**	**CO3**
9 a)			**CO4**
(OR)			
9 b)			**CO4**
10 a)			**CO5**
(OR)			
10 b)			**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**State** the procedure of preparing 'Lime Mortar' with their applications.	**U & App**	**CO1**
(OR)			
11 b)	**What** are the necessities of 'Concrete curing compounds' and 'Polymer Bonding Agents' in the domain of Construction Industry?	**R**	**CO1**
12 a)	**Write** down a short note on "Requirement and characteristics of Cement Concrete Flooring".	**R**	**CO2**
(OR)			
12 b)	**Differentiate** between 'Gable Roof' and 'Gambrel Roof' with their respective applications.	**U & App**	**CO2**
13 a)	**What** are the recommendations of Jayakar Committee? List the names of all official bodies established after Jayakar Committee. (3+2)	**R**	**CO3**
(OR)			
13 b)	**Explain** "Grid Iron System" in distribution of water with a proper sketch.	**App**	**CO3**
14 a)		**An**	**CO4**
(OR)			
14 b)			**CO4**
15 a)			**CO4**
(OR)			
15 b)			**CO4**
16 a)			**CO5**
(OR)			
16 b)			**CO5**
17 a)			**CO5**
(OR)			
17 b)			**CO5**

EIC11001	**Venture Ideation**	L	T	P	C
Version 2.0	**Contact Hours – 30**	2	0	0	2
Pre-requisites/Exposure	Basic knowledge of English and computer applications such as Internet Explorer and MS Office				
Co-requisites	--				

Course Objectives

1. To help the students understand the way to be an Entrepreneur
2. To identify the right business opportunity
3. To empower students to perform a technical feasibility study and thereby developing a prototype
4. To help students in identifying their customers using primary and secondary research methods.
5. Expose students to various factors of market and competition with the help of market feasibility study, forecasting techniques, business model canvass and insights about financial statements.
6. To prepare students with finalizing their entrepreneurial Portfolio

Course Outcomes

On completion of this course, the students will be able to:

CO1. **Assess** personal capacity in the context of the entrepreneurial process
CO2. **Assess** characteristics of successful entrepreneurs and entrepreneurial forms and processes
CO3. **Apply** resources, research and tools for Entrepreneurial ventures
CO4. **Analyze** and apply opportunity identification techniques, feasibility terminology, processes and models
CO5. **Develop** Ideation and planning documents for entrepreneurial venture

Catalog Description

Over the last decade, the core of our economy has been transitioning from one of industrial might, large monolithic corporations and mass production towards one of networks, flexible enterprises comprising many smaller units and unique value. This new economy is based on innovation originating in creativity and design; it is also disrupting long-standing and established employment patterns and bringing to the fore the importance of entrepreneurship. This core unit will bring together creativity, design and entrepreneurship at the conceptual and more practical level. It aims to explore the nature, determinants and consequences of creativity, design and entrepreneurship as well as the interaction between them.

Course Content

Unit 1. Introduction 6 hours

Preview of the Course, Introduction to the Course, Guest Lecture with U.S. Secretary of Commerce Penny Pritzker – Meaning of Innovation, Entrepreneurial opportunities, Factors influencing the feasibility of an innovation, Innovation strategy: technology-push or market-pull, Product-market fit, How to develop a business model, Walkthrough of the business model canvas, Welcome to Innovation for Entrepreneurs: From Idea to Marketplace.

Unit 2. Customer Discovery and Validation 6 hours

Customer types, Customer archetypes, Customer segments and business models, Customer segments, value propositions, product features, value mapping, interviewing customer, insights of your customers.

Unit 3: Product Understanding and Marketing. 6 hours

Customer value, The DNA of customer-centricity, Crossing the chasm, Qualitative and quantitative marketing research, importance and methods of market segmentation, Focusing on the target market, Beyond the chasm, Strategic implications of beyond the chasm, E-commerce: The internet as a selling platform.

Unit 4. Prototyping and Testing. 6 hours

Planning for prototyping, Rapid prototyping and development, Lean startup MVPs, Choosing a wire framing/UX prototyping tool, Anatomy of an experience map, What you'll learn from user testing, Analytics and insight, Troubleshooting your customer discovery, Levels of a product/service.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Program Outcomes (POs), Program Specific Outcomes (PSOs) and Course Outcomes (COs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Assess** personal capacity in the context of the entrepreneurial process	**PO6, PO11**
CO2	**Assess** characteristics of successful entrepreneurs and entrepreneurial forms and processes	**PO6, PO11**
CO3	**Apply** resources, research and tools for Entrepreneurial ventures	**PO6, PO8, PO11**
CO4	**Analyze** and apply opportunity identification techniques, feasibility terminology, processes and models	**PO6, PO8, PO11**
CO5	**Develop** Ideation and planning documents for entrepreneurial venture	**PO6, PO8, PO11**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
EIC11001	Venture Ideation						3		3			3			

1=Weakly mapped
2= Moderately mapped
3=Strongly mapped

GEE12002	Electrical and Electronics Technology Lab	L	T	P	C
Version 1.0	Contact Hours – 45	0	0	3	2
Pre-requisites/Exposure	Class 12^{th} Level physics				
Co-requisites					

Course Objectives

1. To study basic electronic components
2. To observe characteristics of electronic devices
3. To study basic electrical circuits

Course Outcomes

On completion of this course, the students will be able to
CO1**. Illustrate** different meters and instruments for measurement of electronic quantities and understand network theorems.
CO2. **Show** the characteristics of different semiconductor devices like diode, BJT, FET etc and carbon tungsten filament lamps experimentally.
CO3. **Design** and experiment with various application circuits using diodes
CO4. **Design** R-L-C circuits
CO5. **Construct** three phase circuits

Catalog Description

Present technology requires necessary knowledge of ELECTRONICS in most fields. Avionics, Autotronics, Agrotronics, Physics, Process Chemistry, Health Services, etc., already employ components or even whole systems based on Electronics. Thus, there is an increasing number of professionals in these and many other fields who need adequate knowledge and training. Taken this into account, ADAMAS has developed the Basic Electronics and Electricity Integrated Laboratory, capable of covering different levels of difficulty. It is based on a series of self-taught modules, each one referring to a specific area of Electronics.

Course Content

List of experiments (Electrical Part):

1. Verification of Thevenin's theorem and Norton's theorem.
2. Verification of Superposition theorem.
3. Verification of Maximum power transfer theorem.
4. Study of R-L-C series circuit.
5. Study of R-L-C parallel circuit.
6. Performance study of fluorescent, LED, tungsten and carbon lamps.
7. Measurement of power in a three-phase circuit using two-wattmeter method.

List of experiments (Electronics Part):

1. Familiarization of bread board and electronics elements such as R, L, C, diode, and BJT etc.
2. Familiarization of Function generator and measuring instruments such as CRO and multimeter.
3. Study the V-I characteristic of PN junction diode and find knee voltage.
4. Study the input and output characteristic of bipolar junction transistor (BJT): Common emitter (CE) configuration
5. Study the transfer and drain characteristic of junction field-effect transistor (JFET), hence determine the drain resistance, transconductance factor, amplification factor.
6. Study the transfer and drain characteristic of MOSFET, hence determine the drain resistance,

transconductance factor, amplification factor.

7. Realization of digital logic circuit using MOSFET (AND, OR, NOT etc.).

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Illustrate** different meters and instruments for measurement of electronic quantities and understand network theorems.	PO1
CO2	**Show** the characteristics of different semiconductor devices like diode, BJT, FET etc and carbon tungsten filament lamps experimentally.	PO3
CO3	**Design** and experiment with various application circuits using diodes.	PO3
CO4	**Design** R-L-C circuits	PO1
CO5	**Construct** three phase circuits	PO1

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
GEE12002	Electrical and Elecronics Technology Lab	3		2											

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: GEE12002 – Electrical & Electronics Technology Lab

Program: B.Tech. **Semester: ODD 2020-21**

Time: 03 hrs. **Max. Marks: 50**

SAMPLE QUESTIONS

1.	**A)** Draw the forward V-I Characteristic curve of p-n junction diode with proper circuit connection and also **find** out the knee voltage. **B) Explain** the mechanism of drift & diffusion of carriers.	**U** **R**	**CO3**
2.	**A)** Draw and **compare** the input characteristics of BJT with proper circuit connection (in common emitter configuration) with three different V_{CE} values. **B) What** are the differences between BJT & FET? Explain thermal runway	**U** **R**	**CO2**
3.	**A)** Draw and **compare** the output characteristics of BJT with proper circuit connection (in common emitter configuration) with three different I_B values. **B) What** do you mean by pinch-off voltage? Derive the relationship between α, β and γ.	**U** **R**	**CO2**
4.	**A)** Draw and **compare** the drain characteristics of FET with proper circuit connection with three different V_{GS} values (0v, -1v & -2v). **B) Define** the following terms of a FET with mathematical expressions: **i)** Trans conductance (g_m), **ii)** Drain resistance (r_d).	**U** **R**	**CO2**
5.	**A) i) Estimate** the various resistance values using colour code and compare with measured values. **ii) Measure** the forward & reverse resistance of various diodes. **iii) Identify** the pnp & npn transistors and find out the different terminals. **B) What** are the differences between intrinsic and extrinsic semiconductor? Write approximate value of cut-in voltage for Si and Ge diode.	**Ap** **U**	**CO1**
6.	**A) Show** the different signals (Sine, Square & Triangle) using function generator and measure the amplitude and frequency of each signal.	**U**	**CO2**

	B) Draw and **explain** the common emitter transistor circuit and output characteristics.		
7.	**A) Show** Thevenin's, Norton's, Superposition and Maximum power transfer theorem. **B) What** is load matching? **C)** To **what** type of circuit Thevenin's theorem is applicable? **D) What** is the use of Thevenin's theorem?	**Ap** **R** **R**	**CO1**
8.	**A) Estimate** the resistance, inductance and capacitance for series and parallel RLC circuit using ammeter and voltmeter reading. **B) Measure** power factor for RLC series circuit.	**Ap** **Ap**	**CO4**
9.	**A) What** is the nature (i.e. positive or negative) of the slop of the voltage vs. Resistance characteristics of Tungsten Filament Lamp? **Explain** it briefly. **B) What** is the function of starter? What is the function of choke?	**R**	**CO2**
10.	**A) How** many coils are there in a single in a single phase wattmeter? **B) Which** type of wattmeter is generally used for measuring power in a.c. circuits? **C) What** do you understand by phase sequence in reference to 3-phase circuits? **D)** In a star connected 3-phase balanced load with neutral available, **how** many wattmeters are necessary to measure power?	**R**	**CO5**

MEE12001	Engineering Workshop	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	12th level Physics, Engineering Mechanics				
Co-requisites	--				

Course Objectives:

1. To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude.
2. To acquire skills in basic engineering practice
3. To identify the hand tools and instruments
4. To gain measuring skills
5. To develop general machining skills in the students

Course Outcomes:

On completion of this course, the students will be able to

CO1 **Demonstrate** the basic operations in pattern and mould making
CO2 **Analyze** different metal fitting works
CO3 **Find** the basic forging and welding works
CO4 **Illustrate** the operations of machine tools
CO5 **Select** the appropriate tools required for specific operation
CO6 **Determine** the safety measures required to be taken while using the tools

Catalog Description:

Engineering Workshop is a place where students acquire knowledge on the operation of various processes involved in manufacturing and production. The Workshop Practice course makes students competent in handling practical work in engineering environment. Students will be expected to be familiar with engineering problems related to practical field.

Course Content

List of Experiments (Any ten)	
1	To make a single piece pattern from the given work piece and dimensions.
2	To make a double piece match pattern from the given dimensions.
3	To make a single piece cylindrical (solid) pattern from the given dimensions.
4	To make a cone from sheet metal as per given dimensions.
5	To make a frustum from sheet metal as per given dimensions.
6	To prepare a sand mold, given the single piece pattern and casting.
7	To prepare a sand mold, given the double piece match pattern and casting with different dimensions and shape
8	To make a square fitting from the given mild steel piece and the dimensions.
9	To make a square fitting from the given mild steel piece and the dimensions.
10	To make a single 'V' butt joint between two metal plates by using ARC welding.
11	To make a square butt joint between metal plates by using gas welding.
12	To perform various types of machining operations (cantering, facing and turning) on a given mild steel rod

	followed by the given dimensions.
13	To perform various types of machining operations (chamfering, grooving, thread cutting, and knurling) on a given mild steel rod followed by the given dimensions.

Reference Books

1. Workshop Technology by S.K. Garg, 3rd Edition, LP

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Demonstrate** the basic operations in pattern and mold making	**PO1,PO9 PSO1**
CO2	**Analyze** different metal fitting works	**PO1, PO9, PSO1**
CO3	**Find** the basic forging and welding works	**PO1, PO9, PSO1**
CO4	**Illustrate** the operations of machine tools	**PO1, PO9, PSO1**
CO5	**Select** the appropriate tools required for specific operation	**PO1, PO9, PSO1**
CO6	**Determine** the safety measures required to be taken while using the tools	**PO1, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
MEE1200 1	Engineerin g Workshop	3								3				3	

1=weakly mapped,
2= moderately mapped,
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech Semester: II/I
Stream: CE/ME/CSE/ECE/EE
PAPER TITLE: Engineering Workshop PAPER CODE: MEE12001
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	**Explain** advantages and limitations of Gas welding.	**U**	**CO3**
2.	**Design** the steps involved in making a mold	**U**	**CO1**
3.	**Show** the various types of pattern with neat sketch.	**R**	**CO1**
4.	**Show** the specification of lathe machine.	**R**	**CO4**
5.	**Explain** limitations of Gas welding.	**U**	**CO3**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
4.	**Show** the function of main parts of lathe machine. List some of the operation that can be done on the lathe machine and perform any one operation in lathe machine	**U**	**CO4**
5.	To **design** a single piece cylindrical (solid) pattern from the given dimensions.	**Ap**	**CO1**
6.	To **design** a square fitting from the given mild steel piece and the dimensions.	**Ap**	**CO2**
7.	**Discuss** about Turning, Facing, Runner.	**U**	**CO4 /CO5**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
8.	To **design** a single ‘V’ butt joint between two metal plates by using ARC welding.	**U**	**CO3**
9.	**Show** the various types of allowance in molding operation.	**U**	**CO1**

ENG12044	Communication and Collaboration Skill -II	L	T	P	C
Version 1.0	Contact Hours – 30	0	0	2	1
Pre-requisites/Exposure	12th level English, Communication and Collaboration Skill-I				
Co-requisites	--				

Course Objectives:

1. To develop an understanding of the process of oral communication
2. To acquire critical thinking and analytical skills
3. To obtain a basic understanding of how communication is related to "being human"
4. Become more knowledgeable about audience centred speaking
5. To Improve listening, observational skills, and problem-solving capabilities.

Course Outcomes:

On completion of this course, the students will be able to

CO1 **Utilize** Public speaking skills and develop confidence.

CO2 **Demonstrate** critical thinking skills, oral communication skills and leadership qualities.
CO3 **Find** creative thinking, willingness to work co-operatively and independently, and stress management.

Catalog Description:

Through Communication and Collaboration students will learn how to articulate and make and make an impact among the group members. They will also gain knowledge about formal and informal distinction. Through this course, students will learn about time management, conflict resolution, negotiation techniques, and how to capture attention of the audience.

Course Content

List of Experiments (Any ten)	
1	Individuals will be chosen + volunteers who will do ADA-TEDX talks on chosen subject of interest – current affairs / latest trends / technology / engineering / specific company.
2	Voting for the best speaker.
3	Group will present why they liked a specific speaker. Students will learn how to prepare, create impact and public speaking.
4	The groups will be given debate topics
5	They will be required to prepare. Everyone gets to speak on the topic for / against.
6	Audience gets to vote for winners.
7	Drama / Stand-up comedy topics will be chosen by students
8	They can pick from any source – movies, books etc.
9	Everyone in the groups must have a role to play/act.
10	The audience gets to vote for winners.

Reference Books

1. Stephen R Covey, Seven Habits of Highly Effective People, Free Press, 1989
2. Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster, 1998
3. Daniel Goleman, Emotional Intelligence, Bantam Book, 2006
4. Innovation and Entrepreneurship (1985) by Peter F. Drucker.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Utilize** Public speaking skills and develop confidence.	**PO10**
CO2	**Demonstrate** critical thinking skills, oral communication skills and leadership qualities.	**PO9, PO10**
CO3	**Find** creative thinking, willingness to work co-operatively and independently, and stress management.	**PO9,PO10**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
ENG12044	Communication and Collaboration Skill-II									3	3				

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech Semester: II
PAPER TITLE: Communication and Collaboration Skill-II PAPER CODE: ENG12044
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

	Section A		
1.	Q1. **Explain** in brief about the importance of your role which you have presented in Drama session.(5) Q2.Do you think time management has a role to play in this module? **Explain** in brief (5) Q3. **What** do you understand by the term collaboration? How have you applied this skill in your Drama? (5) Q4. **What** do you understand by language of Interruption? Explain in brief. (5) Fill in the blanks with correct form of verbs: (5) 1. He .... completely. (recovers, recovered, has recovered) 2. Most probably he .... to school next week. (will come, would come, has come) 3. .Mark .... for jobs ever since he passed his examination in March. (has applied, has been applying, applied) 4. Last month he ….................... for an interview. (has appeared, appeared, was appearing) 5. . He .... for the results. (waits, is waiting, waited)	**U**	**CO2**
	SECTION B (Attempt any **One Question)**		
4.	Q1. **Compose** a paragraph about Technology and Unemployment. Do Technological advances contribute to higher unemployment rates. (120 – 150 words) Q2. Is peer pressure harmful or beneficial to individuals? (120-150 words)	**U**	**CO3**

MTH11535	**Engineering Mathematics III B**	L	T	P	C
Version 1.0	**Contact Hours – 60**	3	1	0	4
Pre-requisites/Exposure	12^{th} level Mathematics and Engineering Mathematics- I &II				
Co-requisites	--				

Course Objectives

1. To understand the fundamental of Laplace transform and its properties.
2. To develop the concept to solve engineering problems using Laplace transform.
3. To give the basic idea of Z-transform and it's engineering applications.
4. To empower students to acquire knowledge of some special function such as Hermite, Laguerree and Legendre functions and its importance in engineering sciences.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Build** the fundamental concept of Laplace and inverse Laplace transform and its properties.

CO2. **Develop** the idea to apply Laplace transform technique in real life problems.

CO3. **Construct** the basic idea of Z-transform and its engineering applications.

CO4. **Develop** the concept of Special functions and their importance in engineering sciences.

Catalog Description

Transform Calculus and Special Functions is an integral part of engineering science. The topics covered in this course is very much important for core paper in engineering like digital signal processing, image processing, coding theory etc. Classroom activities will be designed to encourage students to play an active role in the construction of their own knowledge and in the design of their own learning strategies. We will combine traditional lectures with other active teaching methodologies, such as cooperative group solving problems, assignments, topic for power point presentation group wise. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities and to give an oral group presentation.

Course Content

Unit I: **15 lecture hours**

Laplace Transform: Definition, Linearity, shifting & scaling properties, Transform of elementary functions, Transform of derivatives and integrals, Multiplication by t & division by t. Inverse Laplace transform, Convolution theorem, Transform of periodic functions, Unit step function & Dirac delta function, Initial value & final value theorems and its application to solution of ordinary differential equations and partial differential equations such as heat conduction, wave equation and Laplace equation.

Unit II: **15 lecture hours**

Z – Transform: Sequence, Basic operations on sequences, Definition of Z- Transform, Linearity, Change of scale & shifting properties, Z-transform of standard sequences, Inverse Z- Transform, Multiplication by n & division by n, Initial value & final value theorems, Convolution of sequences, Convolution theorem, Inverse Z- transform by partial fraction, power series and residue methods and its application to solution of difference equations.

Unit III: **15 lecture hours**

Special Functions: Moment functionals and orthogonality, Existence of orthogonal polynomial systems, The fundamental recurrence formula, Zeros of orthogonal polynomials, Hermite Polynomial, Laguerre Polynomial, Legendre Polynomial.

Text Books

1. B.V.Ramana, *Higher Engineering Mathematics*, McGraw Hill Education, 2017.
2. H. K.Das,*Advanced Engineering Mathematics*, S Chand, 2007.

Reference Books

1. C. B. Gupta, S. R. Singh and Mukesh Kumar, *Engineering Mathematics for Semesters I and II*, McGraw Hill Education, 2017.
2. C. B. Gupta, S. R. Singh and Mukesh Kumar, Engineering Mathematics for Semesters III and IV, McGraw Hill Education, 2017.
3. T.S. Chihara, An introduction to orthogonal polynomials, Dover Publications Inc., 2011.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Build** the fundamental concept of Laplace and inverse Laplace transform and its properties.	**PO2, PO3, PO4, PO12, PSO2**
CO2	**Develop** the idea to apply Laplace transform technique in real life problems.	**PO1, PO2, PO3, PSO2**
CO3	**Construct** the basic idea of Z-transform and its engineering applications.	**PO2, PO3, PO4, PO12, PSO2**
CO4	**Develop** the concept of Special functions and their importance in engineering sciences.	**PO1, PO2, PO3, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
MTH11535	Engineering Mathematics – III	2	3	3	2								2		3

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2021 – 22)		
Name of the Program:	B.Tech. (EE/ECE/Bio-Medical Engineering)	**Semester:**	III
Paper Title:	Transform Calculus & Special Functions	**Paper Code:**	MTH11535
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**13.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **14.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **15.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	Define Laplace transform.	**Remember**	**CO1**
2	Find $L^{-1}\left\{\frac{6}{(s+\alpha)^4}\right\}$	**Remember**	**CO1**
3	Find Laplace transform of $t^{5/2}$, given that $\Gamma(1/2)=\sqrt{\pi}$.	**Remember**	**CO2**
4	Find $Z\left\{(-3)^n\right\}$.	**Remember**	**CO3**
5	Explain about orthogonal polynomial system.	**Understand**	**CO4**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	i) Define the change of scale property of Laplace transform. ii) Find $L\{t\sin 2t\}$.	**Remember**	**CO1**
	(OR)		
6 b)	i) What is the advantage of applying Laplace transform method to solve a partial differential equation? ii) Find $L\left\{e^{3t}\cos 5t\right\}$.	**Remember**	**CO1**
7 a)	Show that $L^{-1}\left\{\frac{s}{(s^2+a^2)^2}\right\}=\frac{t\sin at}{2a}$.	**Understand**	**CO2**
	(OR)		
7 b)	Find $L^{-1}\left\{\frac{1}{(s+1)(s^2+1)}\right\}$.	**Remember**	**CO2**
8 a)	Discuss region of convergence in Z-transform.	**Create**	**CO3**
	(OR)		
8 b)	Discuss the Residue method to find inverse of Z -transform.	**Create**	**CO3**

9 a)	Find the Z -transform of $Z\left(c^k \cosh \alpha k\right),\ k \geq 0$.	**Remember**	**CO3**
(OR)			
9 b)	For $\lvert z\rvert > \lvert a\rvert$, find the value of $Z^{-1}\left(\frac{4z}{z-a}\right)$.	**Remember**	**CO3**
10 a)	Define Hermite's polynomial. Find the value of $H_0(0)$.	**Remember**	**CO4**
(OR)			
10 b)	Show that $H_n^{'} = 4n(n-1)H_{n-2}$.	**Understand**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Find the Laplace transform of $\frac{1-\cos t}{t^2}$.	**Remember**	**CO1**
(OR)			
11 b)	Find $L\{f(t)\}$, if $f(t)=\begin{cases} \sin\left(t-\frac{\pi}{3}\right); & t>\frac{\pi}{3} \\ 0; & t<\frac{\pi}{3} \end{cases}$	**Remember**	**CO1**
12 a)	Apply Laplace transform to solve $y''-3y'+2y=1-e^{2t},\ y=1,\ y'=0$ when $t=0$.	**Apply**	**CO2**
(OR)			
12 b)	Apply Laplace transform method to solve the following initial value problem $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+2y=5\sin t,\quad y(0)=y'(0)=0.$	**Apply**	**CO2**
13 a)	Apply Laplace transform method to solve the heat equation $\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial x^2}$ which tends to zero as $x \to \infty$ and which satisfies the conditions $u(0,t)=1,\ u(x,0)=0$.	**Apply**	**CO2**
(OR)			
13 b)	Using Laplace transform solve the initial boundary value problem $u_{tt}=u_{xx},\ 0<x<l,\ t>0$ Subject to the conditions: $u(x,0)=0,\ u_t(x,0)=\sin\left(\frac{\pi x}{l}\right),\ 0<x<l$ $u(0,t)=0,\ u(l,t)=0,\ t>0$	**Apply**	**CO2**
14 a)	Find inverse Z-transform of the function $F(z)=\frac{2z^2-10z+13}{(z-3)^2(z-2)}$, when $2<\lvert z\rvert<3$ using partial fraction method.	**Remember**	**CO3**
(OR)			
14 b)	Find the inverse Z-transform of $F(z)=\frac{9z^3}{(3z-1)^2(z-2)}$ with the	**Remember**	**CO3**

	help of Residues method.		
15 a)	Solve the difference equation $6y_{k+2} - y_{k-1} - y_k = 0,\ y(0) = 0,\ y(1) = 1$ by applying Z -transform method	**Apply**	**CO3**
(OR)			
15 b)	Explain the steps to solve difference equation using Z-transform. Use these steps to solve $y_{n+2} - 2y_{n+1} + y_n = 3n + 5,$ subject to the condition $y_0 = y_1 = 0$.	**Understand & Apply**	**CO3**
16 a)	Prove that $\int_{-\infty}^{\infty} e^{-x^2} H_n(x) H_m(x) dx = 2^n n! \sqrt{\pi} \delta_{nm}$.	**Evaluate**	**CO4**
(OR)			
16 b)	Show that $\int_0^{\infty} e^{-x} L_n(x) L_m(x) dx = 0,$ if $m \neq n$ and $\int_0^{\infty} e^{-x} \{L_n(x)\}^2 dx = 1,$ if $m = n$.	**Remember**	**CO4**
17 a)	Define Legendre's polynomial. Prove that $(2n+1)xP_n = (n+1)P_{n+1} + nP_{n-1}$.	**Remember & Evaluate**	**CO4**
(OR)			
17 b)	Solve the Laguerre's differential equation $x\dfrac{d^2y}{dx^2} + (1-x)\dfrac{dy}{dx} + ny = 0$.	**Apply**	**CO4**

ECE11001	Prof. Core- I (Electronic Devices)	L	T	P	C
Version 2.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. 12th level Mathematics 2. Knowledge of 12th level Physics				
Co-requisites	--				

Course Objectives

1. To understand the functionality of p-n junction diode.
2. To compare different configurations of Bipolar Junction Transistors with low and high frequency analysis.
3. To study the characteristics of Field Effect Transistors.
4. To understand the concept of Short & Narrow Channel Effects in MOSFETs.
5. To acquire the knowledge of the advanced electronic devices.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Demonstrate** the properties p-n junction diodes.
CO2. **Explain** the concept of Bipolar Junction Transistors and its applications.
CO3. **Summarize** the concept of Metal Oxide Field Effect Transistors.
CO4. Understand and **develop** the concept of Short & Narrow Channel Effects in MOSFETs.
CO5. **Illustrate** the principle of special devices and its applications.

Catalog Description

Electronic devices are widely used in information processing, telecommunication, and signal processing. The ability of electronic devices to act as switches makes digital information-processing possible. Interconnection technologies such as circuit boards, electronics packaging technology, and other varied forms of communication infrastructure complete circuit functionality and transform the mixed electronic components into a regular working system, called an **electronic system.** Computers or control systems are the practical example of it. An electronic system may be a component of another engineered system or a standalone device. As of 2019 most electronic devices use semiconductor components to perform electron control. Commonly, electronic devices contain circuitry consisting of active semiconductors supplemented with passive elements and such a circuit is described as an electronic circuit. Electronics deals with electrical circuits that involve active electrical components such as vacuum tubes, transistors, diodes, integrated circuits, optoelectronics, and sensors, associated passive electrical components, and interconnection technologies. The nonlinear behaviour of active components and their ability to control electron flows makes amplification of weak signals possible.

Course Content

Unit I: 9 lecture hours

Semiconductor Basic

Physical description of p-n junction; transport equations; current voltage characteristics and temperature dependence; tunnelling current; small signal AC analysis of p-n junction diode.

Unit II: 9 lecture hours

Bipolar Junction Transistor

Introduction; BJT equivalent circuits and modelling; frequency response of transistors. Small Signal analysis: simplified hybrid-π model; and its application to single stage BJT amplifiers (Common Emitter, Common-Base and Common-Collector configurations), High frequency model of BJT; and its application to single stage BJT amplifiers.

Unit III: 9 lecture hours

Metal Oxide Semiconductor Field Effect Transistor

Introduction; MOS structure; threshold voltages; MOS static characteristics; small signal parameters and equivalent circuit; charge sheet model, strong, moderate and weak inversion;

Large signal behavior MOSFETs, Comparison of operating regions of Bipolar and MOS Transistors, Introduction to Charge–Sheet Models.

Unit IV: 6 lecture hours

Short & Narrow Channel Effects in MOSFETs

Velocity saturation from horizontal field, Mobility degradation from the vertical field, Weak Inversion in MOS Transistors, Transistor frequency in weak inversion, Narrow & Short Channel Effects in MOSFETs.

Unit V: 12 lecture hours

Special Devices

Ideal Schottky barrier; current voltage characteristics; MIS diode heterojunctions devices; optical absorption in a semiconductor; photovoltaic effect; solar cell; photoconductors; PIN photodiode; avalanche photodiode; LED; semiconductor lasers; negative conductance in semiconductors; transit time devices; IMPATT; Tunnel diode; ATT devices; Gunn diode; BiCMOS devices; PNPN diode; SCR; UJT, DIAC; TRIAC and IGBTs

Text Books:

1. Solid State Electronic Devices- Ben G. Streetman and Sanjay Kumar Banerjee, PHI.
2. Semiconductor Physics and Devices (4th Edition) by Donald Neamen and Dhrubes Biswas, McGraw Hill Education

Reference Books:

1. Electronic Devices and Circuit Theory (11th Edition) by Boylestad &Nashelsky, Pearson Education India Edition, 1995.
2. Microelectronic Circuits (Fifth Edition), Adel S. Sedra and Kenneth C. Smith, Oxford University Press

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Demonstrate** the properties p-n junction diodes.	**PO1, PO2, PO3, PSO1**
CO2	**Explain** the concept of Bipolar Junction Transistors and its applications.	**PO1, PO2, PO3, PO4, PSO1**
CO3	**Summarize** the concept of Metal Oxide Field Effect Transistors.	**PO1, PO2, PO3, PO4, PO5,PSO1**
CO4	Understand and **develop** the concept of Short & Narrow Channel Effects in MOSFETs.	**PO1,PO2, PO3, PO4,PO5, PSO1**
CO5	**Illustrate** the principle of special devices and its applications.	**PO1, PO2, PO3, PO4, PO5, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course	Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1		

Code	Title	1	2	3	4	5	6	7	8	9	0	1	2	PSO 1	PSO 2
ECE11001	Electronic Devices	3	3	3	3	2		-	-	-	-	-		3	

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END-SEMESTER EXAMINATION MARCH 2022** (Academic Session: 2021 – 22)		
Name of the Program:	B. Tech. ECE	**Semester:**	III
Paper Title:	Prof. Core 1 Electronic Devices (Theory)	**Paper Code:**	ECE11001
Maximum Marks:	40	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
	1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. 2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. 3. Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**What** are donor and acceptor impurities?	**R**	**CO1**
2	**Explain** ionic bonds.	**Ap**	**CO4**
3	**Why** do semiconductors belong to Column IV in the periodic table?	**U**	**CO2**
4	**What** is hot electron effect?	**U**	**CO5**
5	**Explain** the use of body terminal in MOS devices.	**U**	**CO3**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**Explain** the Fermi level.	**C**	**CO2**
	(OR)		

6 b)	**What** are the basic differences between unipolar and bipolar devices?	**AP**	**CO1**
7 a)	**Explain** the concept of depletion layer penetration in the base of BJTs.	**AN**	**CO2**
(OR)			
7 b)	**Explain** avalanche breakdown.	**AP**	**CO3**
8 a)	**Explain** the working principle of MOSFETs.	**AN**	**CO3**
(OR)			
8 b)	**Explain** the working of TRAPATT devices with relevant diagrams.	**U**	**CO4**
9 a)	**Explain** the biasing configuration for diode to be used as rectifier.	**AP**	**CO5**
(OR)			
9 b)	**Explain** sub threshold current and DIBL with emphasis on application difficulties.	**U**	**CO5**
10 a)	**Explain** the concept of depletion layer**.**	**U**	**CO1**
(OR)			
10 b)	**Explain** "punch through" in a BJT.	**U**	**CO2**
11 a)	**What** are the basic differences between BJTs and FETs?	**AN, AP**	**CO1**
(OR)			
11 b)	**Explain** the formation of pn junction with relevant diagrams.	**U**	**CO2**
12 a)	**Explain** a biasing configuration for BJT to be used as amplifier.	**AN**	**CO3**
(OR)			
12 b)	**Explain** the concept of tunnelling for diode formation.	**C**	**CO2**
13 a)	**Explain** the working principle of JFETs.	**U**	**CO3**
(OR)			

13 b)	**Explain** the differences between CE, CC and CB configurations with emphasis on application.	U	CO3
14 a)	**Explain** working principle of Gunn diode.	C	CO5
	(OR)		
14 b)	**Explain** SCEs in MOSFETs.	AP	CO4
15 a)	**Explain** the effect of trapped charges in MOSFETs.	C	CO5
	(OR)		
15 b)	**Explain** gate leakage current in MOSFETs.	C	CO5
16 a)	**Explain** channel formation in MOSFETs.	C	CO5
	(OR)		
16 b)	**Explain** working principle of IMPATT diode.	U	CO4
17 a)	**Explain** working principle of UJT.	AP	CO3
	(OR)		
17 b)	**Explain** working principle of SCR diode.	C	CO3

ECE11002	**Prof. Core- II (Analog Electronic Circuits)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. **Circuit Theory:** Kirchhoff's current law, Kirchhoff's voltage law, Two port network 2. **Basic Electronics:** Semiconductor Device				
Co-requisites					

Course Objectives

1. To prepare students to perform the analysis of any diode circuits.
2. To empower students to understand the design and working of BJT / FET amplifiers.
3. To observe the amplitude and frequency responses of common amplification circuits.
4. To study the important types of integrated circuits. Demonstrate the ability to design practical circuits that perform the desired operations.
5. To study the effect of negative feedback on different parameters of an Amplifier and the effect of positive feedback and able to design and working of different Oscillators

Course Outcomes

On completion of this course, the students will be able to

CO1. **Explain** working principle of different electronic circuit and their application in real life.
CO2. **Define** semiconductor device and different operating condition and their performance parameter.
CO3. **Make use of** modelling/simulation parameters with standard equivalent circuit models to predict correctly the expected performance of various general-purpose electronic circuits.
CO4. **Apply** mathematical and graphical analysis considering different practical issues modelling of semiconductor device and observe the performance parameter of the system.
CO5. **Analyze** the feedback amplifier and different oscillator circuits.

Catalog Description

This course develops a basic understanding of the fundamentals and principles of analog circuits and electronic devices. This understanding is a critical step towards being able to design new electronic circuits or use them appropriately as part of a larger engineering system. Hence the course seeks to develop foundational concepts and skills, but does so through a series of application-oriented topics such as the design of DC power supplies, speed control of electric motors and audio amplification. Learning opportunities include: active-learning lectures; tutorials in which small teams work together to explore, discuss, analyse and explain electronic circuits; and practical in which theory is put to practical application. Important topics covered include: the key electrical variables and the application of fundamental circuit laws and theorems to DC and AC resistive circuits; power supply applications of diodes and switch-mode transistors; the operating principles of DC and steady state sinusoidal analysis of RLC circuits. The course is designed to be one of the first undertaken by new students in electronics and communication engineering such that successfully completing the course will provide the necessary foundation for more specialist learning in analog and radio frequency electronics and electrical power systems.

Course Content

Unit I: **8 lecture hours**

Diode Circuits

Introduction, Simple Diode Circuits, Concept of Load Line, Linear Piecewise Model; Rectifier Circuits (Half-Wave, Full-Wave and Bridge), Peak Detector; Filter Circuits for Power Supply: Inductor Filter, Capacitor Filter, LC Filter, Multiple LC Filter, CLC Filter or Π Filter; Load Regulation, Diode Clipper and Clamper Circuits.

Unit II: 8 lecture hours

Transistor Biasing and Stabilization

Biasing Schemes for BJT and FET Amplifiers, Bias Stability, Thermal Runaway, Thermal Stability; Compensation Techniques: Diode Compensation and Thermistor Compensation.

Unit III: 10 lecture hours

Frequency Response and Transistors Amplifier

Low Frequency Transistor Amplifier: h-parameter Models for CB, CE, CC configurations and their interrelationship; Linear analysis of Transistor Circuits; Miller's Theorem; Single stage amplifier: Simplified models and calculation of gain for CE and CC Amplifiers; Effect of emitter resistance in CE amplifiers; Darlington Pair; Single stage FET amplifier: CS and CD Configuration.

High Frequency Transistor Amplifiers: CE hybrid-π model; Validity and parameter Variation; Current Gain with resistive load; frequency response of a single stage CE Amplifier; Gain Bandwidth product; CC stage High frequencies.

Unit IV: 9 lecture hours

Integrated Circuits (IC)

Introduction to IC, Concept of Operational Amplifier (OP-AMP), Ideal OP-AMP, Virtual Ground, Inverting & Non-Inverting Operational Amplifier; Differential Amplifier: Basic Structure and Principle of Operation, Calculation of Differential & Common Mode Gain, CMRR & ICMR; Summing Amplifier, Integrator & Differentiator, Current-to-Voltage Converter & Voltage-to-Current Converter; Instrumentation Amplifier, Logarithmic & Anti-Logarithmic Amplifier; Precision Rectifier; Schmitt Trigger & its Applications; Multivibrator Circuits using OP-Amp. Introduction, Monostable and Astable multivibrator circuits using 555 Timer.

Unit V: 10 lecture hours

Feedback Amplifier, Oscillators and Filters:

Feedback Amplifiers: Classification; Feedback concept; Ideal Feedback amplifier: Properties of Negative Feedback Amplifier Topologies: Method of Analysis of Feedback amplifiers: Voltage series Feedback: Voltage series Feedback pair: Current series, Current shunt and Voltage shunt feedback; Effect of feedback on amplifier Bandwidth and stability.

Phase Locked Loops: Simple PLL Operation, Applications.

Oscillators: The oscillator feedback loop; Oscillation criterion; Sinusoidal oscillator: phase shift oscillators, Wien Bridge oscillator; Resonant circuit oscillators: General form of oscillator configuration; LC Colpitts& LC Hartley oscillators; Crystal oscillator; Amplitude Frequency and phase stability analysis of all Oscillators.

Text Books

1. “Microelectronics circuits” by Sedra and Smith; Oxford University Press Floyd & Jain; “Digital Fundamentals”,8th Edition, Pearson Education,2006.
2. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, TMH

Reference Books

1. Microelectronics” by Millman and Grabel; Tata McGraw Hill.
2. Electronic Devices & Circuits – David A. Bell, PHI
3. Spencer and Ghausi, , Introduction to Electronic Circuit Design, Pearson Education
4. Linear Integrated Circuits (4th Edition), D. Roy Choudhury and Shahil B. Jain, New Age International.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

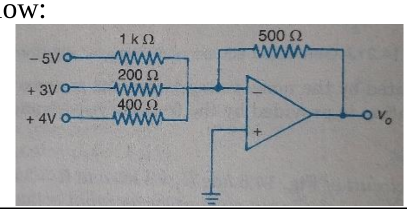
Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** working principle of different electronic circuit and their application in real life.	**PO1, PO3, PSO1**
CO2	**Define** semiconductor device and different operating condition and their performance parameter.	**PO1, PO2, PSO1, PSO2**
CO3	**Make use of** modelling/simulation parameters with standard equivalent circuit models to predict correctly the expected performance of various general-purpose electronic circuits.	**PO1, PO2, PO3, PSO1, PSO2**
CO4	**Apply** mathematical and graphical analysis considering different practical issues modelling of semiconductor device and observe the performance parameter of the system.	**PO1, PO3, PSO1, PSO2**
CO5	**Analyze** the feedback amplifier and different oscillator circuits.	**PO1, PO3, PSO1**

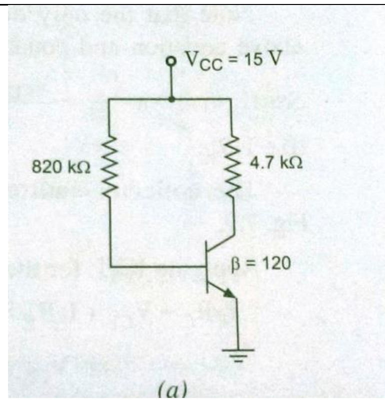
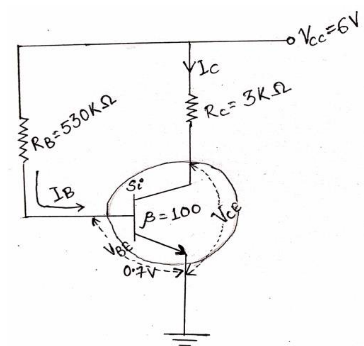
		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11002	Analog Electronic Circuits	3	2	3										3	3

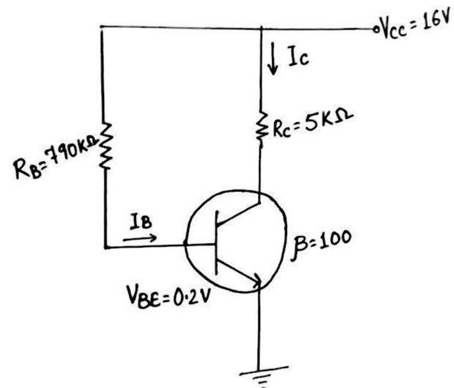
1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

	ADAMAS UNIVERSITY		
Name of the Program:	B.Tech (ECE)	**Semester:**	III
Paper Title:	Prof. Core- II (Analog Electronic)	**Paper Code:**	ECE11002
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	04
(Any other information for the student may be mentioned here)	**16.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **17.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **18.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**Compute** the output voltage V_o of the three-input summing amplifier circuit shown below:  	**Apply**	**[CO5]**
2	**Explain** the use of a Clamper circuit.	**Remember**	**[CO1]**
3	The negative part of the output signal in a transistor circuit starts clipping, if Q-point of the circuit moves towards **which** region of transistor output characteristics?	**Evaluate**	**[CO5]**
4	**Explain** the criteria which classifies the three categories of the power amplifiers (Class A, Class B, and Class C).	**Remember**	**[CO5]**
5	**Explain** the process of A.C. to D.C. conversion sing a block diagram. Also, explain the use of appropriate regulator IC employed for this conversion.	**Understand**	**[CO2]**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	i) Describe the piecewise linear approximation model of a diode. [2]	**Understand** **Evaluate**	**[CO1]**
(OR)			
6 b)	Draw the dc load line and locate the operating point for fixed biasing transistor circuit shown in the figure *(a)*. What will be the stability factor? V_{BE}= 0.7 V. [2]	**Evaluate**	**[CO3]**

			
7 a)	An RC coupled amplifier has a mid-frequency gain of 200 and a frequency response from 100 Hz to 20 kHz. A negative feedback network with β= 0.02 is incorporated into the amplifier circuit. **Estimate** the new system performance. [2]	**Evaluate**	**[CO5]**
(OR)			
7 b)	In a Wien-bridge oscillator, if the value of R is 100 kΩ, and frequency of oscillation is 10 kHz, **Estimate** the value of capacitor C. [2]	**Evaluate**	**[CO5]**
8 a)	**Derive** the equation of efficiency for a class-B amplifier. [2]	**Understand**	**[CO5]**
(OR)			
8 b)	**What** is crossover distortion? **Explain**. [2]		**[CO4]**
9 a)		**Evaluate**	
(OR)			
9 b)	**What** is the minimum number of RC circuits required to attain a phase shift of 180º? **Illustrate** Phase shift oscillator and its operating principles. [2]	**Remember Understand**	**[CO5]**
10 a)	**Explain** the two Barkhausen conditions required for sinusoidal oscillations to be sustained. [2]	**Understand**	**[CO5]**
(OR)			
10 b)	In the fixed bias compensation method shown in Fig. 1, A Silicon transistor with β=100 is used, V_{CC}=6V, R_C=3 KΩ, R_B=530 KΩ. **Draw** the D.C. load line and **determine** the operating point. [2]  Fig.1. Fixed Bias	**Evaluate** **Analysing**	**[CO2]**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Show** the circuit diagram of an inverting amplifier using an OP-AMP. “A virtual ground exists at the input of the power amplifier”. Explain. [5]	**Understand**	**[CO5]**
(OR)			

11 b)	**Derive** an expression for the average value of output voltage and load current in a Single-phase half wave rectifier. [5]	**Understand**	**[CO1]**
12 a)	If h_{fe}=50, and h_{ie}=0.83 KΩ, **Evaluate** the current gain (h_{fb}) and input impedance (h_{ib}) for a transistor in CB configuration. [5]	**Evaluate**	**[CO2]**
	(OR)		
12 b)	**Define** the following terms in connection with an OP-AMP: Common-mode rejection ratio, Output offset voltage, and Slew rate. [3+2]	**Remember**	**[CO5]**
13 a)	A Germanium transistor having β = 100, V_{BE} = 0.20 V is used in fixed bias amplifier circuit where, V_{cc}= 16 V, R_c= 5 KΩ and R_B= 790 KΩ. **Estimate** its operating point. [5]  	**Evaluate**	**[CO2]**
	(OR)		
13 b)	**Illustrate** the hybrid model for a two-port network. **Why** *h*-parameters are known as hybrid parameters? **Explain** with proper justifications. **Relate** the conversion formulas for converting h-parameters of common emitter configuration to h-parameters of common base configuration. [3+1+1]	**Understand** **Remember**	**[CO2]**
14 a)	A transistor amplifier circuit with R_1= 100 kΩ, R_2= 50 kΩ, R_C= 10 kΩ and R_L= 40 kΩ has the h-parameters as follows: h_{ie}= 1100 Ω, h_{fe}= 100, h_{re}= 10×10^{-4}, h_{oe}= 4×10^{-4} mho. **Evaluate** the (a) a.c. input impedance of the amplifier and (b) voltage gain. [2.5+2.5]	**Evaluate**	**[CO5]**
	(OR)		
14 b)	Design a first-order high-pass filter and a band pass filter using Op-amp. **What** is thermal runaway in case of a BJT? [3+2]	**Create** **Remember**	**[CO5]**
15 a)	**Explain** with proper circuit diagram why class B push-pull amplifier is known as emitter follower? [5]	**Understand**	**[CO5]**
	(OR)		
15 b)	**Explain** the need of compensation techniques in case of a BJT biasing. **Explain** Diode compensation for variations in I_{co} [1+4]	**Understand**	**[CO3]**
16 a)	**Explain** the significance of providing feedback. Draw the block diagram of an amplifier with feedback and **show** $A_f = \frac{A}{1+A\beta}$ for negative feedback. [1+4]	**Understand**	**[CO4]**
	(OR)		

16 b)	Derive the expression for regenerative feedback. Define Sensitivity in this context. Also, **relate** the expression for Desensitivity and **explain** it. [3+1+1]	**Understand Remember**	**[CO5]**
17 a)	**What** is the difference between A.C. load line and D.C. load line? **Explain** with a suitable illustrations. **Explain** the extension of bandwidth of an amplifier due to negative feedback with suitable **illustrations**. [2.5+2.5]	**Remember** **Understand**	**[CO5]**
(OR)			
17 b)	An amplifier has an open loop gain of 1000 and feedback ratio of 0.04. The open loop gain changes by 10% due to temperature, find the percentage change in gain of the amplifier with feedback. [5]	**Evaluate**	**[CO5]**

ECE11003	Prof. Core- III (Signals and Networks)	L	T	P	C
Version 1.0	Contact Hours – 45	3	0	0	3
Pre-requisites/Exposure	1. 12^{th} level Mathematics 2. Knowledge of 12^{th} level Physics				
Co-requisites					

Course Objectives

1. To help to understand the functionality of signals and systems.
2. To analyze the different types of signals
3. To study the different time stability analysis of system
4. To explain the use of network topology
5. To design different types one and two port network parameters and functions and its applications.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Demonstrate** the basics concept of signal and system types and classifications.
CO2. **Explain** the concept of Periodic and aperiodic signal analysis and its properties.
CO3. **Develop** the analytical and technical skills in different electrical circuits.
CO4. **Analyze** different performance criteria of network topology and its properties.
CO5. **Illustrate** the concept of one and two port network parameters and functions and its applications.

Catalog Description

In signal processing, a **signal** is a function that conveys information about a phenomenon. In electronics and telecommunications, it refers to any time varying voltage, current or electromagnetic wave that carries information. Whereas an **electrical network** is an interconnection of electrical components (e.g., batteries, resistors, inductors, capacitors, switches, transistors etc) or a model of such an interconnection, consisting of electrical elements (e.g., voltage sources, current sources, resistances, inductances, capacitances). Linear electrical networks, a special type consisting only of sources (voltage or current), linear lumped elements (resistors, capacitors, inductors), and linear distributed elements (transmission lines), have the property that signals are linearly superimposable. They are thus more easily analyzed, using powerful frequency domain methods such as Laplace transforms, to determine DC response, AC response, and transient response.

Course Content

Unit I: 9 lecture hours

Introduction of signals and systems

Signal and system types and classifications, basic Operations on signals, Parseval's theorem, step response, impulse response and convolution integral, concepts of correlation, power spectral density. Sampling: sampling theorem; aliasing.

Unit II: 9 lecture hours

Periodic and aperiodic signal analysis

Periodic signal analysis: Fourier series and properties; Aperiodic signal analysis: Fourier Transform - its properties and sinusoidal steady state analysis of systems.

Unit III: 12 lecture hours

Elements of electrical network and analysis

Dependent and independent sources, active and passive components; linear and nonlinear circuit, lateral and bilateral circuit, lumped and distributed circuit, Generalized formulation of KCL, KVL, Thevenin, Norton, Maximum Power Transfer, Tellegen and Reciprocity Theorems; classical differential equations for description of transient conditions of Network; Solutions of linear time invariant networks with initial conditions; Unilateral and Bilateral Laplace Transforms and properties; Transient analysis of RL and RC circuits using Laplace Transform; Network functions: poles, zeros, transfer function. Resonant Circuits-Series and Parallel resonance, Quality Factor, Half Power Points, Bandwidth, Coupled Circuits- magnetic coupling, self and mutual inductance, co-efficient of coupling.

Unit IV: 6 lecture hours

Network Topology

Graph theory: Tree, Co-tree, fundamental cut-set, fundamental loop analysis of network.

Unit V: 9 lecture hours

One and two port network parameters and functions and its applications.

Z, Y and ABCD parameters, hybrid parameters and their relationships driving point and transfer impedances and admittances. Analog filter design: HP, LP, BP, BR Filter,

Text Books:

1. "Signals & Systems" by Oppenheim, Willsky and Nawab, Pearson, PHI.
2. "Network Analysis & Synthesis" by F.F.Kuo; John Wiley & Sons Inc.
3. Signals and Networks Lab Manual

Reference Books:

1. "Digital Signal Processing", by Proakis : Pearson.
2. "Fundamental of electric circuit theory", by D. Chattopadhyay and P.C.Rakshit, S. Chand, 2009

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Demonstrate** the basics concept of signal and system types and classifications	**PO1, PO2, PO3, PSO1**
CO2	**Explain** the concept of Periodic and aperiodic signal analysis and its properties	**PO1, PO2, PO3, PO4, PSO1**
CO3	**Develop** the analytical and technical skills in different electrical circuits	**PO1, PO2, PO3, PO4, PO5, PSO1**
CO4	**Analyze** different performance criteria of network topology and its properties	**PO1, PO2, PO3, PO4, PO5, PO6, PSO1**
CO5	**Illustrate** the concept of one and two port network parameters and functions and its applications	**PO1, PO2, PO3, PO4, PO5, PSO1**

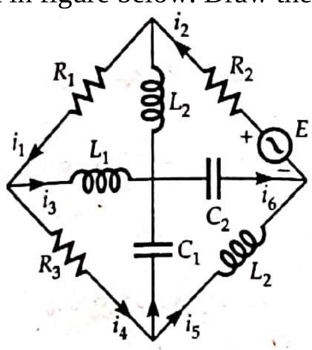
		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
ECE110 03	Signals and Networ ks	3	3	3	3	2		-	-	-	-	-		3	

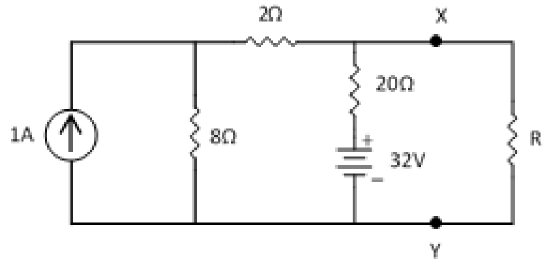
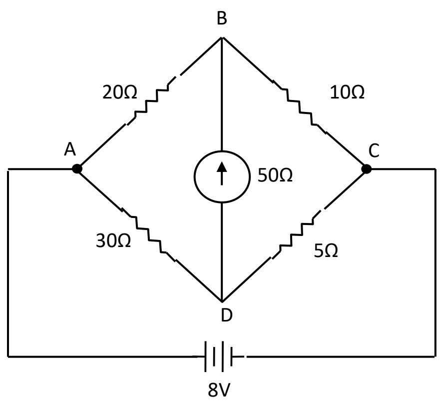
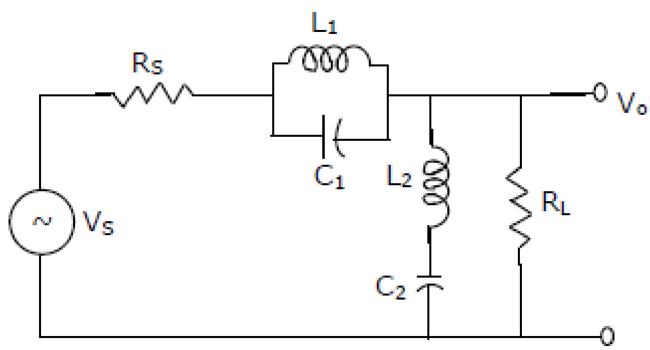
1=weakly mapped
2= moderately mapped
3=strongly mapped

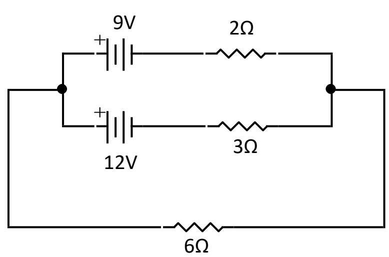
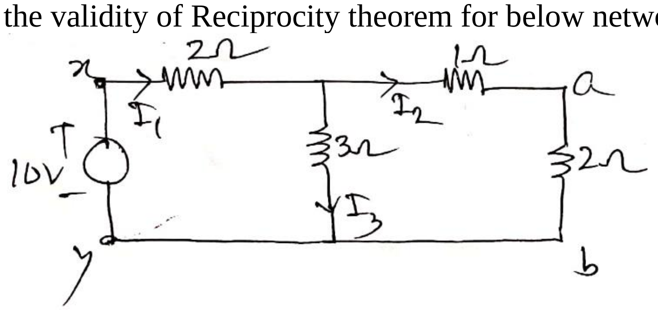
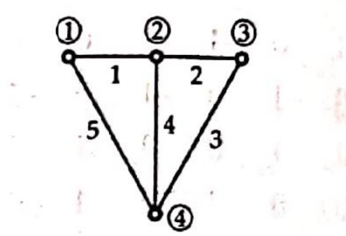
Model Question Paper

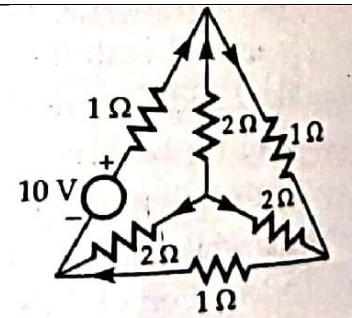
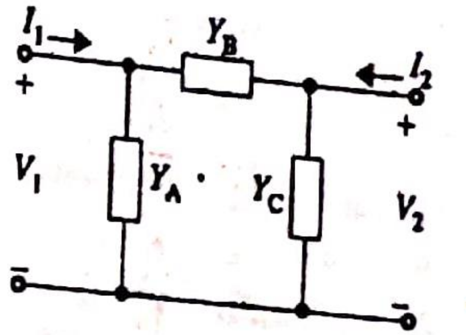
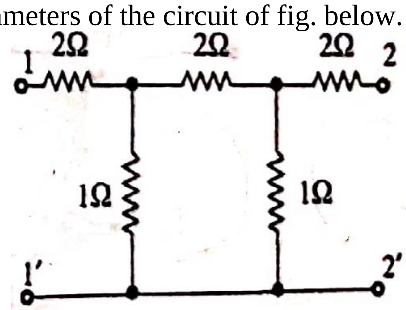
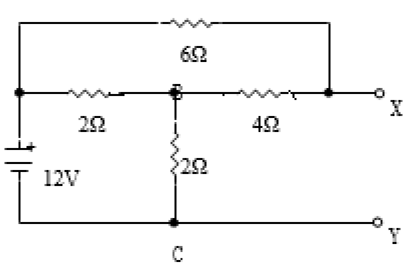
Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE11003 – Prof. Core- III (Signals and Networks)
Program: B.Tech. (ECE) **Semester: III** **Time: 03 hrs.** **Max. Marks:50**
Instructions: Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

Group A **Answer All the Questions (5 x 1 = 5)**			
1	What do you mean by a BIBO stable system?	**Remember**	**CO1**
2	Write the conditions for the existence of the Fourier transform.	**Understand**	**CO2**
3	What do you mean by linear circuit?	**Understand**	**CO3**
4	A network is shown in figure below. Draw the tree.  	**Understand**	**CO4**
5	A transfer function of a 1st order filter $\frac{V_O(s)}{V_i(s)} = \frac{1-2s}{1+2s}$ Find the nature of the filter.	**Analyse**	**CO6**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Draw a signal is defined by, $x(t) = u(t) - u(t-1)$. Find the signal is power or energy signal.	**Evaluate**	**CO1**
(OR)			
6 b)	Prove that $x(n) * \delta(n-n_0) = x(n-n_0)$.	**Analyse**	**CO1**
7 a)	Find the Fourier transform of the signal x(5t-3).	**Analyse**	**CO2**
(OR)			
7 b)	Find the Fourier transform of a signal $x(t) = e^{-3t^2}$.	**Analyse**	**CO2**
8 a)	State Maximum Power Transfer theorem.	**Understand**	**CO3**
(OR)			
8 b)	State Norton theorem.	**Understand**	**CO3**
9 a)	Find the Norton equivalent of the circuit of figure below as	**Analyse**	**CO3**

	shown at terminal *XY*. 		
(OR)			
9 b)	For the circuit as shown in the figure, find the current through the galvanometer having resistance of 50Ω . 	**Analyse**	**CO3**
10 a)	Find what type of filter is represented by the fig. below. 	**Evaluate**	**CO6**
(OR)			
10 b)	Calculate upper and lower cut-off frequencies of a band pass filter where the resonant frequency is 15 kHz and bandwidth is 7.5 kHz.	**Evaluate**	**CO6**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	The impulse response and input of an LTI systems are $h(n)=\{1,\underset{\uparrow}{2},1,-1\}$ $x(n)=\{\underset{\uparrow}{1},2,3,1\}$ Determine the response of the system.	**Evaluate**	**CO1**

(OR)			
11 b)	i) What is power spectrum density (PSD) of a finite power signal x(t). ii) Check whether the system defined by y(n) = x2(n-1) is time variant or time invariant.	**Understand** **Evaluate**	**CO1**
12 a)	Find the Fourier transform of the signal $x(t) = e^{-\|t\|}$	**Evaluate**	**CO2**
(OR)			
12 b)	Prove that a signal x(t) that satisfies half-wave symmetry contains Fourier coefficient with odd harmonics only.	**Evaluate**	**CO2**
13 a)	Calculate the current through the 6 Ω resistor in the electrical network. 	**Analyse**	**CO3**
(OR)			
13 b)	Check the validity of Reciprocity theorem for below network 	**Analyse**	**CO3**
14 a)	Fig. represents a graph of a network. Show the tree, twigs and links. 	**Understand**	**CO4**
(OR)			
14 b)	A network is shown in the figure below draw the graph, tree and show the loops. Calculate current flow through bottom 2 Ω resistors.	**Analyse**	**CO4**

<table>
<tr><td></td><td>
</td><td></td><td></td></tr>
<tr><td>15 a)</td><td>Evaluate Y-parameters of π-network which is shown in fig. below

</td><td>Evaluate</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>15 b)</td><td>Calculate Z-parameters of the circuit of fig. below.

</td><td>Evaluate</td><td>CO5</td></tr>
<tr><td>16 a)</td><td>Prove Maximum Power Transfer Theorem.</td><td>Understand</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>16 b)</td><td>For the electrical network as shown below, draw Norton's equivalent circuit.

</td><td>Analyse</td><td>CO3</td></tr>
<tr><td>17 a)</td><td>Draw the circuit diagram of active low pass filter and derive its transfer function.</td><td>Analyse</td><td>CO6</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>17 b)</td><td>Design a 2nd order Butterworth high pass filter with cut off frequency 1 kHz.</td><td>Analyse</td><td>CO6</td></tr>
</table>

CSE11104	Data Structures & Algorithms	L	T	P	C
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**C Programming**				
Co-requisite	**Logical Ability**				

Course Objectives:

1. Introduce the fundamental concept of data structures
2. Emphasize the importance of data structures in developing and implementing efficient algorithms.
3. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.

Course Outcomes:

On the completion of this course the student will be able to

CO1: Define the concept of Dynamic memory management, data types, and algorithms.
CO2: Illustrate advantages and disadvantages of specific algorithms and data structures.
CO3: Solve bugs in program, recognize needed basic operations with data structures.
CO4: Interpret algorithms and data structures in terms of time and memory complexity of basic operations.
CO5: Compare the computational efficiency of the principal algorithms for sorting, searching, and hashing.

Course Description:

Study of advanced programming topics focused on logical structures of data as well as the design, implementation and analysis of algorithms operating on these structures. Students will gain the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.

Course Content:

Unit-I	9 Lecture Hours
INTRODUCTION: Data and Information, Representation of Data, Data Type, Data Structure, Classifications of Data Structures, Application of Data Structures, Abstract Data Type, Operations Perform on Data Structure, Overview of Different Data Structures Algorithm: Types of Algorithms, Algorithm Development Life Cycle. **ARRAY AND STRING** Array, One-dimensional array, Address calculation in One-dimensional array, multi-dimensional array, Address calculation in two-dimensional array, Operations Perform on Array, Applications of Array, Representation of Polynomials , Sparse Matrix, Strings, Array of strings, Operations Perform on Strings. Pointer Declaration, Address of Operator, Indirection Operator, Null Pointer, void Pointer, Generic Functions, Dangling Pointer, Arithmetic Operation with Pointer, Pointer to Pointer, Pointers and Arrays, Array of Pointers, Pointer to an Array , Pointer to Function, passing addresses to Function, Function returning Pointer, Dynamic Memory Allocation Creating one-dimensional array, Creating two-dimensional array, Pointers, Arrays and Strings.	
Unit-II	**9 Lecture Hours**
STACK AND QUEUE: Stack, Operations on Stack, Stack Representation with Array, Stack Representation with Linked List, Processing of function calls, ,Evaluation of Arithmetic expressions, Queue, Operations on Queue, Queue Representation with Array, Queue Representation with Linked List, Application of Queue, Drawback of Linear Queue Circular Queue, Circular Queue Representation with Array, Dequeue, Operation on DeQueue, Priority Queue, Representation of Priority Queue. **LINKED LIST:** Limitations of Array, Linked List, Singly Linked list, Operations on Singly linked list, Representation of polynomials using linked list, Circular Linked list, Operation on Circular Link List, Josephus Problem, Doubly Linked list, Operation on Doubly Link List, Circular Doubly Linked List, Disadvantages of Linked List	
Unit-III :	**9 Lecture Hours**
TREE: Terminology of Tree, Binary Tree, Strictly Binary Tree, Extended Binary Tree, Complete Binary Tree, Full Binary Tree, Skewed Binary Tree, Binary Expression Tree, Balanced Binary Tree, Threaded Binary Tree, Properties of Binary Tree, Representation of Binary Tree, Binary Tree Traversal, Binary Search Tree, Operations on Binary Search Tree, Heap, Operations on Heap, AVL Tree, Operations on AVL Tree, **GRAPH:** Terminology of Graph, Terminology of a Directed Graph, Operations on Graph, Representation of Graph, Graph Traversal, Spanning Trees and Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm.	
Unit-IV	**9 Lecture Hours**
SEARCHING AND SORTING Linear Search, Binary Search, Interpolation Search, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort, Shell Sort, Time complexity of Sorting Algorithms **RECURSION:** Recursion Essentials, Infinite Regress, Depth of Recursion, Recursion Tree, Types of Recursions, Factorial,	

Fibonacci Sequence, GCD, Integer Power, Tower of Hanoi, Non-attacking Eight Queens, Converting Recursive function to Iterative.	
Unit-V	**9 Lecture Hours**

HASHING:

Hash Table, Hash Function, Division Method, Mid Square method, Folding method, Collision Resolution, Linear Probing, Quadratic Probing, Double Hashing, Separate Chaining, Load Factor

FILE STRUCTURE:

Elements of File System, Category of File Organisation, Sequential File Organisation, Heap File Organisation, Hash File Organisation, Index Sequential File Organisation, Primary Index, Secondary Index.

Text Books:

1. Fundamentals of Data Structures, Illustrated Edition by Ellis Horowitz, SartajSahni and Computer Science Press.
2. Introduction To Algorithms, Thomas H.Cormen, Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein.

Reference Books:

1. Algorithms, Data Structures, and Problem Solving with C++, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.
2. How to Solve it by Computer, 2nd Impression by R. G. Dromey, Pearson Education.

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination
Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	Define the concept of Dynamic memory management, data types, and algorithms	PO1, PO3, PO4
CO2	Illustrate advantages and disadvantages of specific algorithms and data structures.	PO1,PO2, PO3, PO4

CO3	Solve bugs in program, recognize needed basic operations with data structures.	PO1,PO2, PO3, PO4
CO4	Interpret algorithms and data structures in terms of time and memory complexity of basic operations.	PO1,PO2, PO3, PO4
CO5	Compare the computational efficiency of the principal algorithms for sorting, searching, and hashing.	PO1,PO2, PO3, PO4

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning			
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 11104	Data Structures & Algorithms	3	3	3	3	-	-	-	-	-	-	-	-			

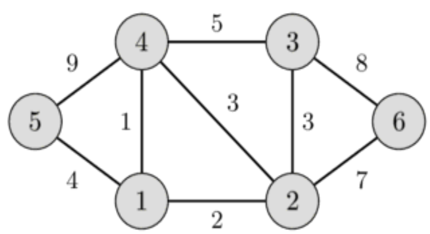
1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech (ECE)	**Semester:**	III
Paper Title:	Data Structures and Algorithms	**Paper Code:**	CSE 11104
Maximum Marks:	50	**Time Duration:**	3 Hrs

Total No. of Questions:	17	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**19.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam. **20.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **21.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**Define** Ø with suitable graph and example.	**Remembering**	**CO1**
2	**Define** full binary tree with suitable example.	**Remembering**	**CO1, CO3**
3	**Explain** why stack is called LIFO list?	**Understanding**	**CO1, CO3**
4	**Define** a B-tree with suitable example.	**Remembering**	**CO1, CO3**
5	**What** is the drawback of a linear queue?	**Remembering**	**CO2**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Evaluate** the postfix expression 8 2 + 4 * 5 / 6 3 / 2 / - using stack.	**Evaluating**	**CO1, CO3**
(OR)			
6 b)	**Compare** BFS and DFS traversals.	**Understanding**	**CO5**
7 a)	**Change** the following postfix expression into its equivalent infix expression by using stack: A B + C * D E - - F G + ^	**Creating**	**CO1, CO3**
(OR)			
7 b)	**Explain** why queue is called FIFO list?	**Understanding**	**CO2**
8 a)	**Build** the expression tree for the following expression. $(2x + y) * (3a – b)^2$	**Applying**	**CO1, CO3**
(OR)			
8 b)	**What** is the main disadvantage of a singly linked list and how can we overcome it?	**Remembering**	**CO2**
9 a)	**Develop** a C function to print the elements of a doubly linked list in reverse order.	**Creating**	**CO3**
(OR)			
9 b)	**How** can a polynomial such as $5x^2 - 3x + 9$ be represented by a linked list?	**Remembering**	**CO1, CO3**
10 a)	**Find** out the worst-case time complexity for merge sort algorithm.	**Remembering**	**CO4**
(OR)			
10 b)	**Construct** a binary search tree (BST) by considering the following values sequentially: 20, 15, 25, 29, 11, 9, 10, 22, 27, 8		**CO3**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Develop** a C function to insert a node at a specified position in a singly linked list.	**Creating**	**CO1, CO3**
(OR)			

11 b)	**Develop** a C function to delete a node from a doubly linked list.	**Creating**	**CO1, CO3**
12 a)	i) **Build** a C functions to implement push operation in a stack by using a singly linked list. ii) **Change** the following postfix expression into its equivalent infix expression by using stack: A B + C * D E - - F G + ^ **[3 + 2]**	**Applying** **Creating**	**CO1, CO3**
(OR)			
12 b)	i) **Change** the following infix expression into its equivalent prefix expression by using stack: (A + B * (C ^ (D / E) $ F)) + G ii) **Build** a C functions to implement pop operation in a stack by using a singly linked list. **[3 + 2]**	**Creating** **Applying**	**CO1, CO3**
13 a)	**Build** a C functions to insert an element in a circular queue by using a singly linked list.	**Applying**	**CO3**
(OR)			
13 b)	**Develop** a C functions to delete an element from a linear queue by using an array.	**Creating**	**CO3**
14 a)	**Find** a minimum cost spanning tree of the following weighted graph by using Prim's Algorithm. Give the total weight of the MST. 	**Remembering**	**CO5**
(OR)			
14 b)	**Prove** that the maximum number of nodes on level 'i' of a binary tree is 2^i, i> = 0. Hence prove that the maximum number of nodes in a binary tree of height 'h' is 2^h-1, h> = 1.	**Evaluating**	**CO3, CO4**
15 a)	**Build** an AVL tree by inserting the following keys in the order given below: A, Z, B, Y, C, X, D, W Clearly mention different rotations used and balance factor of each node.	**Applying**	**CO3, CO4**
(OR)			
15 b)	**Develop** a C function to implement insertion sort algorithm.	**Creating**	**CO5**
16 a)	**Construct** the binary tree whose in-order and pre-order traversal sequence of nodes are given below: In-order: D G B A H E I C F Pre-order: A B D G C E H I F	**Creating**	**CO3**
(OR)			
16 b)	**Prove** that the number of odd degree vertices in a graph is always even.	**Evaluating**	**CO5**
17 a)	i) **Construct** a B-tree of order 3 with the following data:	**Creating**	**CO3, CO4, CO5**

	50, 40, 60, 30, 70, 20, 80, 10, 90, 9, 99 ii) **Find** out the worst-case time complexity for merge sort algorithm. **[3 + 2]**		
(OR)			
17 b)	**Develop** a C function to implement merge sort algorithm.	**Creating**	**CO5**

ECE12004	**Prof. Core- II Lab (Analog Electronic Circuits Lab)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	Theory regarding Analog electronic Circuits				
Co-requisites					

Course Objectives

1. To illustrate the students different electronic circuit and their application in practice.
2. To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive parameters.
3. To understand the principle of operation of different oscillators circuits.
4. To understand the design process of various basic linear application circuits using OP-AMP.
5. To understand and design circuits using 555 Timer.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Identify** relevant information to supplement to the Analog Electronic Circuits course.
CO2. **Choose** testing strategies and select proper instruments to evaluate performance characteristics of electronic circuit.
CO3. **Construct** testing and experimental procedures on different types of electronic circuit and their operation in different operating conditions.
CO4. **Compare** possible causes of discrepancy in practical experimental observations to theory concepts.
CO5. **Explain** different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.
CO1. **Construct** professional quality textual and graphical presentations of laboratory data and Computational results, incorporating accepted data analysis and synthesis methods.

Catalog Description

Analog Electronics is the base of Electronics & Communication stream. In this course the working of various rectifier circuit is explained. In addition, students learn how various mathematical operations have done using OP-AMP (IC-741), different types of oscillators and their working and characteristics of various multi vibrator using IC 555 timer.

Course Content

List of experiments:

1. Study the half wave rectifier circuit: find ripple factor and observe output waveform without and with RC filter circuit.
2. Study centre-tap full wave rectifier circuit: find ripple factor and observe output waveform without and with RC filter.
3. Study full wave bridge rectifier circuit: find ripple factor and observe output waveform without and with RC filter.
4. Study the diode clipper and Clamper circuits.
5. Study the voltage regulator circuit using full wave rectifier and Zener diode and find the percentage of voltage regulation.

6. Study the characteristics of a common emitter RC couple transistor amplifier circuits.
7. Study RC phase shift oscillator and find the oscillation frequency.
8. Study the Wien bridge oscillator and find the oscillation frequency.
9. Design, study and plot the input, output waveforms of following circuits using OP-AMP:
   (a) Adder
   (b) Subtractor
   (c) Integrator
   (d) Differentiator
   (e) Voltage follower
   (f) V to I and I to V converter
10. Study the Monostable multi vibrator using 555 Timer
11. Study the Astable multi vibrator using 555 Timer

Text Books

1. Jacob. Millman, Christos C.Halkias, 'Electronic Devices and Circuits', Tata McGraw Hill Publishing Limited, New Delhi, 2008, ISBN 0070634556, 9780070634558.
2. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, TMH

Reference Books

1. Electronic Devices & Circuits – David. A. Bell, 3rd Edition, Prentice – Hall, 1986 ISBN 083591559X, 9780835915595.
2. Electronic Devices & Circuits – Allen Mottershead –Gale Group, 1992, ISBN 0023839902, 9780023839900.
3. Electronic Devices and Circuit Theory by Boylestad & Nashelsky (11th Edition), Pearson Education India
4. Linear Integrated Circuits (4th Edition), D. Roy Choudhury and Shahil B. Jain, New Age International.
5. Analog Electronic Circuits Lab handout

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Identify** relevant information to supplement to the Analog Electronic Circuits course.	**PO1, PO3, PSO1**
CO2	**Choose** testing strategies and select proper instruments to evaluate performance characteristics of electronic circuit.	**PO2, PO3, PSO1, PSO2**

CO3	**Construct** testing and experimental procedures on different types of electronic circuit and their operation in different operating conditions.	**PO1, PO3, PO12, PSO1, PSO2**
CO4	**Compare** possible causes of discrepancy in practical experimental observations to theory concepts.	**PO1, PO3, PSO1, PSO2**
CO5	**Explain** different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.	**PO1, PO2, PO12, PSO1, PSO2**
CO6	**Construct** professional quality textual and graphical presentations of laboratory data and Computational results, incorporating accepted data analysis and synthesis methods.	**PO2, PO3, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
ECE12004	**Analog Electronic Circuits Lab**	3	3	3									2	3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE12005 – Prof. Core- II Lab (Analog Electronic Circuits Lab)

Program: B.Tech. **Semester: ODD 2020-21**

Time: 03 hrs. **Max. Marks: 50**

Questions

1.	**Design** a voltage regulator using Zener diode and draw line regulation and load regulation waveforms, calculate percentage of regulation. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram and Conclusion.	**An**	**CO1+CO3+CO6**
2.	**Design** a full wave bridge-rectifier circuit with RC filter. Then calculate the ripple factor and draw the required wave forms. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram, Observation Table and Conclusion.	**U+An**	**CO3+CO5+CO6**
3.	**Design** a circuit of positive & negative clipper with and without bias voltage of 2V. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram, Conclusion and draw the output waveform.	**U+An**	**CO2+CO3+CO6**
4.	**Design** a circuit of positive & negative clamper with and without bias voltage of 2V. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram, Conclusion and draw the output waveform.	**U+An**	**CO2+CO3+CO6**
5.	**Design** a R-C coupled single stage CE amplifier and draw it's frequency Vs gain waveforms, calculate the BW of the Circuit. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram and Conclusion.	**U+An**	**CO1+CO3+CO5+CO6**
6.	**Design** a R-C Phase-Shift Oscillator using OP-AMP and calculate the frequency and measure the output of the Circuit. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram and Conclusion.	**U**	**CO1+CO3+CO6**
7.	**Design** a Wien-Bridge Oscillator using OP-AMP and calculate the frequency and measure the output of the Circuit. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram and Conclusion.	**U**	**CO1+CO3+CO6**
8.	**Design** a Low Pass Filter with cut- off frequency of 1.7Khz and draw it's frequency Vs gain waveforms of the Circuit. Also write down Title, Objective, Theory, Apparatus used, Circuit diagram and Conclusion.	**U**	**CO3+CO4+CO5+CO6**
9.	**Design** and implementation of half wave rectifier without and with capacitor filter. Calculate the dc output voltage & ripple factor from this experiment.	**U+An**	**CO2+CO3+CO6**
10.	**Demonstrate** the Monostable multi vibrator using 555 Timer	**U**	**CO2+CO3+CO6**

ECE12005	**Prof. Core- III Lab (Signals and Networks Lab)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	1. 12^{th} level Mathematics 2. Knowledge of 12^{th} level Physics				
Co-requisites	--				

Course Objectives

1. To help to understand the functionality of signals using MATLAB.
2. To familiar with different operations of systems.
3. To explain different response of systems.
4. To acquire the knowledge of different filter design.
5. To design different types one and two port network parameters.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Demonstrate** different types of common periodic and common aperiodic signals using MATLAB.
CO2. **Explain** the concept of different operations of systems.
CO3. **Illustrate** different responses of the system
CO4. **Utilize** different types of Analog filter design.
CO5. **Illustrate** different types one and two port network parameters.

Catalog Description

In signal processing, a **signal** is a function that conveys information about a phenomenon. In electronics and telecommunications, it refers to any time varying voltage, current or electromagnetic wave that carries information. Whereas an **electrical network** is an interconnection of electrical components (e.g., batteries, resistors, inductors, capacitors, switches, transistors etc) or a model of such an interconnection, consisting of electrical elements (e.g., voltage sources, current sources, resistances, inductances, capacitances). Linear electrical networks, a special type consisting only of sources (voltage or current), linear lumped elements (resistors, capacitors, inductors), and linear distributed elements (transmission lines), have the property that signals are linearly superimposable. They are thus more easily analyzed, using powerful frequency domain methods such as Laplace transforms, to determine DC response, AC response, and transient response.

Course Content

List of experiments:

1. Familiarization with MATLAB.

2. Generation of common Periodic (Sinusoidal, Square, sawtooth), common aperiodic (Gaussian Pulse, and Damped Sinusoidal Signal), impulse, Unit Step, ramp signal using MATLAB

3. Generation of Delayed Unit Step and Delayed Unit Impulse Signal.

4. Determination of Laplace Transform and Inverse Laplace transform of variables, functions.

5. Generate Transfer Function of 1st order and 2nd order system (including feedback) and compute Poles and zeros of a given TF in S domain.

6. Perform Convolution and Deconvolution one sinusoidal with one-unit step signal.

7. Determine the convolution of

i) Two vectors u = [1 2 3 4], v = [10 20 30], also recover vector v after deconvolving the result with u.

ii) A sinusoidal signal with a random noise.

8. Determination of impulse response of the system governed by the transfer function $G(S) = 1/(s^2+s+1)$. Determine the step response of the circuit defined by an impulse response of $h(t)= 5e^{-t} \sin 2t\, u(t)$.

9. Design an analog high pass Butterworth filter of the order 4th, with a Sampling frequency of 1000 Hz, cut off frequency of 300 Hz, which corresponds to a normalized value of 0.6.

10. Design and implement in HARDWARE a first order Low Pass Filter (Active Filter) using IC-741. Calculate the output voltage and plot the gain vs. frequency response of RC low pass filter. Finally determine the cut-off frequency (fc). Given that: R=10KΩ, C=0.01μF

11. Design and implement in HARDWARE a first order High Pass Filter (Active Filter) using IC-741. Calculate the output voltage and plot the gain vs. frequency response of RC high pass filter. Finally determine the cut-off frequency (fc). Given that: R=10KΩ, C=0.01μF

12. Determine the h and ABCD parameters of a two-port network.

13. Determine the Z parameters and Y of a two-port network.

Text Books:

1. "Signals & Systems" by Oppenheim, Willsky and Nawab, Pearson, PHI.
2. "Network Analysis & Synthesis" by F.F.Kuo; John Wiley & Sons Inc.
3. Signals and Networks Lab Manual

Reference Books:

1. "Digital Signal Processing", by Proakis : Pearson.
2. "Fundamental of electric circuit theory", by D. Chattopadhyay and P.C.Rakshit, S. Chand, 2009

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Demonstrate** different types of common periodic and common aperiodic signals using MATLAB.	**PO1, PO2, PO3, PSO1**
CO2	**Explain** the concept of different operations of systems.	**PO1, PO2, PO3, PO4, PSO1**
CO3	**Illustrate** different responses of the system	**PO1, PO2, PO3, PO4, PO5, PSO1**
CO4	**Utilize** different types of Analog filter design.	**PO1, PO2, PO3, PO4, PO5, PSO1**
CO5	**Illustrate** different types one and two port network parameters.	**PO1, PO2, PO3, PO4, PO5, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.

Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
ECE120 05	Signals and Networ ks Lab	3	3	3	3	2		-	-	-	-	-		3	-

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

Name:

Enrolment No:

Course: ECE12005 – Signals and Networks Lab

Program: B.Tech. (ECE) | **Semester: ODD 2020-21**

Time: 03 hrs. | **Max. Marks:50**

Write a MATLAB-program to

1.	**Construct** common Periodic (Sinusoidal, Square and sawtooth), common aperiodic (Gaussian Pulse, and Damped Sinusoidal Signal), impulse, Unit Step and ramp signal	**R**	**CO1**
2.	**Construct** delayed unit Step and delayed unit Impulse Signal.	**U**	**CO1**
3.	**Determine** Laplace Transform and Inverse Laplace transform of variables, functions.	**R**	**CO2**
4.	**Construct** Transfer Function of 1st order and 2nd order system (including feedback) and compute Poles and zeros of a given TF in S domain.	**U**	**CO2**
5.	**Determine** the convolution of i) Two vectors u = [1 2 3 4], v = [10 20 30], also recover vector v after deconvolving the result with u. ii) A sinusoidal signal with a random noise.	**Ap**	**CO2**
6	**Determine** impulse response of the system governed by the transfer function $G(S) = 1/(s^2+s+1)$. **Determine** the step response of the circuit defined by an impulse response of $h(t)= 5e^{-t} \sin 2t\, u(t)$.	**U**	**CO3**
	Hardware Based Practical		
7	**Design** and implement in HARDWARE a first order Low Pass Filter (Active Filter) using IC-741. Calculate the output voltage and plot the gain vs. frequency response of RC low pass filter. Finally determine the cut-off frequency (fc). Given that: R=10KΩ, C=0.01µF	**U**	**CO4**
8	**Design** and implement in HARDWARE a first order High Pass Filter (Active Filter) using IC-741. Calculate the output voltage and plot the gain vs. frequency response of RC high pass filter. Finally determine the cut-off frequency (fc). Given that: R=10KΩ, C=0.01µF	**U**	**CO4**
9.	**Design** a two-port network to determine the h and ABCD parameters of a two-port network.	**U**	**CO5**
10.	**Design** a two-port network to determine the Z parameters and Y of a two-port network.	**U**	**CO5**

CSE12107	**Data Structures & Algorithms Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**C Programming**				
Co-requisite	**Logical Ability**				

Course Objectives:

4. Introduce the fundamental concept of data structures
5. Emphasize the importance of data structures in developing and implementing efficient algorithms.
6. Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs.

Course Outcomes:

On the completion of this course the student will be able to

CO6: Define the concept of Dynamic memory management, data types, and algorithms.
CO7: Illustrate advantages and disadvantages of specific algorithms and data structures.
CO8: Solve bugs in program, recognize needed basic operations with data structures.
CO9: Interpret algorithms and data structures in terms of time and memory complexity of basic operations.
CO10: Compare the computational efficiency of the principal algorithms for sorting, searching, and hashing.

Course Description:

Study of advanced programming topics focused on logical structures of data as well as the design, implementation and analysis of algorithms operating on these structures. Students will gain the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing efficient algorithms.

Course Content:

List of Experiments:

1. Write a menu based C program to insert a node at the beginning, after a specified position, at the end of a singly linked list.

2. Write a menu based C program to delete a node from the beginning, from a specified position, from the end of a singly linked list.

3. Write a menu based C program to display the data part of the nodes in reverse order, reverse the list and sort the elements of a singly linked list.

4. Write a menu based C program to insert a node at the beginning, after a specified position, at the end of a doubly linked list.

5. Write a menu based python program to delete a node from the beginning, from a specified position, from the end of a doubly linked list.

6. Write a menu based C program to display the data part of the nodes in reverse order, reverse the list and sort the elements of a doubly linked list.

7. Write a menu based C program to insert, delete and display operation of a linear queue by using singly linked list.

8. Write a menu based C program to insert, delete and display operation of a linear queue by using an array.

9. Write a menu based C program to implement push, pop and display operation of a linear queue by using singly linked list.

10. Write a menu based C program to implement push, pop and display operation of a linear queue by using an array.

11. Write a menu based C program to implement insert, delete and display operation of a circular queue by using an array.

12. Write a menu based C program to implement insert, delete and traverse operation of a binary search tree using doubly linked list.

13. Write a menu based C program to implement linear search, binary search and interpolation search algorithm.

14. Write a menu based C program to implement bubble sort, selection sort, and quick sort, merge sort, insertion sort, heap sort and radix sort algorithm.

15. Implement Tree Traversals, BFS, Graph Traversal, Shortest path and some topics on Spanning Tree using C.

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	Define the concept of Dynamic memory management, data types, and algorithms	PO1, PO3, PO4
CO2	Illustrate advantages and disadvantages of specific algorithms and data structures.	PO1,PO2, PO3, PO4
CO3	Solve bugs in program, recognize needed basic operations with data structures.	PO1,PO2, PO3, PO4
CO4	Interpret algorithms and data structures in terms of time and memory	PO1,PO2, PO3, PO4

	complexity of basic operations.	
CO5	Compare the computational efficiency of the principal algorithms for sorting, searching, and hashing.	PO1,PO2, PO3, PO4

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	dividual and team work	Communication	Project management and finance	Life-long learning			
Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE 12107	Data Structures & Algorithms Lab	3	3	3	3	-	-	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

IDP14001	**Interdisciplinary Project**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45**	**0**	**0**	**5**	**3**
Pre-requisites/Exposure	**Knowledge of Basic English**				
Co-requisites	**Knowledge of Basic Computer Skills**				

Course Objectives	This course will develop a student's knowledge of and appreciation for the • interdisciplinary nature of knowledge and learning • importance and value of integrating knowledge and perspectives from multiple disciplines as a means to evaluating and understanding complex topics, problems, issues, phenomena, and events • competencies learned during the educational process and to apply these competencies in a real-world application
Course Outcomes	Upon successful completion of the course, students will be able to CO1. **Explain** the unique advantages of integrative research and learning CO2. **Illustrate** the fundamentals of research methods and practices of various academic disciplines CO3. D**emonstrate** an understanding of current issues and concerns CO4. **Utilize** the importance of ethics in research process CO5. **Illustrate** the inter-disciplinary systems of research documentation
Typical Progress Roadmap	• After discussion with the Project Advisor(s), each student shall prepare an initial outline of their assigned project indicating the major sections of discussion, list the principal research sources for each section, and explain the overall objective of the project, including a justification of the interdisciplinary nature of the work. • Each student shall meet with the Project Advisor(s) regularly as per the weekly Time-Table. Other meetings may be scheduled at the discretion of the Project Advisor(s) at mutually agreed upon timings. • Typically, the progress will include a combination of industrial and academic mentoring , self study sessions, case studies, trend studies, presentation by students, interactive sessions, industrial visits etc. • Regular submission of progress reports shall be required of each student-group as notified through the Project Advisor(s) from time to time.
Mode of Evaluation	Students will be evaluated by team participation and a team presentation at the end of the project. Interactive & continuous, task/assignment- based evaluation methodology will be applied for the course.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** the unique advantages of integrative research and learning	**PO1, PO3,PO12, PSO1, PSO2**
CO2	**Illustrate** the fundamentals of research methods and practices of various academic disciplines	**PO1, PO2, PO3 PO12,PSO1, PSO2**
CO3	**Demonstrate** an understanding of current issues and concerns	**PO1, PO2, PO3, PO12,PSO1, PSO2**
CO4	**Utilize** the importance of ethics in research process	**PO1,PO2, PO3, PO12, PSO1, PSO2**
CO5	**Illustrate** the inter-disciplinary systems of research documentation	**PO1, PO2, PO3, PO12, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
IDP14001	Interdisciplinary Project	3	3	3			-	-	-	-		-	3	3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

SOC14100	**Community Service**	L	T	P	C
Version 1.0	**Contact Hours – 15**	-	-	-	1
Pre-requisites/Exposure	Knowledge of Basic English				
Co-requisites	Knowledge of Basic Computer Skills				

Course Objectives

1. To familiarise the students on the concept 'giving back to the society'.
2. To familiarize the students on the issues faced by marginalized communities.
3. To provide an experiential platform to the students on any one or two issues as an internship.

Course Outcomes

On completion of this course, the students will be able to

CO1: **Utilize** the concept of social responsibility through an internship.
CO2: **Acquire** hands on experience in 'giving back to the society' through the concept of social responsibility through an internship.

Catalog Description

Along with Intelligent Quotient, it is important for students to enhance their Emotional Quotient as well. The Social Internship offers opportunity to the student to be empathetic towards social issues facing our society. To help and support the affected community / cause through a field internship is the essence of the course in 'giving back to the society'.

Course Content

Unit I:

Introduction to the course. A brief on social issues facing the society with both global and Indian examples.

Unit II:

Minimum 24 hours of field work on a social issue and helping the marginalized / affected community / cause with photographs and testimonies.

Unit III:

Submission of individual reflection on the social service rendered.

The benefits that accrue to the students are

A.) Subjective

1. Psychosomatic benefits: Volunteering increases overall life satisfaction and also helps to relive stress and acts as an anti-depressant.
2. Intellectual benefits: Enhances knowledge through new experiences, and develops communication skills.
3. Career benefits : Enhances career prospects by acquisition of work-related skills, builds good references for employers and provides a forum to network with future potential employers. It also The experience allows gained helps students to take up leadership positions. Letters of recommendation can also be easily sought. Research shows that students who indulge in volunteer word perform better in studies as it invigorates their passion for learning
4. Personal benefits : Real world skills like leadership, problem-solving, collaboration with others, time management and communication skills, learn patience and empathy.
5. Connect learning to real world and enables deeper and lifelong learning.

B.) **Community**

1. Collective benefits: Strong interpersonal bonds are created, and leads to increased civic and social awareness and responsibility.

Further Reading :

1. Tadevosyan, Gohar & Schoenhuth, Michael. Participatory Research Approach : Principles, Challenges and Perspectives. http://ysu.am/files/01G_Tadevosyan_M_Schoenhuth.pdf
2. Bergold, Jarg & Thomas Stefan. Participatory Research Methods: A Methodological Approach in Motion http://www.qualitative-research.net/index.php/fqs/article/view/1801/3334

Plan of Work

1. Reading on social issues facing the society with both global and Indian examples.
2. Selecting an issue where the student wishes to contribute and wants to make a difference.
3. Areas - The internship may be broadly completed by getting in touch with NGO in your city / town / Police / Municipal Corporation / Local Gram Panchayat / Hospital / State Health Department / Women & Child Development Centre / CSR departments of Corporates /school / Old Age Home / Orphanage / Literacy Drive / Aanganwadi Centres / etc.
4. **Online Discussion –** Through discussion, students elaborate their preferred area of work with reference to the Global Scenario and India. Reason for choosing that area also needs and resources of the people in their area of Social Internship and also submit the testimonials, which include signature of the authority where students initiated their work, or the signature of the authority in whose area students are currently working or photographs of work (photographs must include students working).
5. **Final Report Submission** - Submission of the Testimonials include signatures of the authorities you have worked with, or the signature of the authority in whose area you have worked or photographs of your work (photographs must include you working). Students' accomplishment in their area of operation along with the major successes student experienced and major challenges faced.
6. Students will submit the complete elaborated report along with testimonials and completion certificate in the form of signed Template

- The registration for all students will open twice, during winter and summer breaks. They may enroll for the internship in either of the two breaks.

- The student will have to submit a continuous record of their 10 to 15 days internship in the form of photographs and testimonies (wherever required).

Mode and Scheme of Online Evaluation:

Modes of Evaluation: Online – Quiz / Assignment / Discussions / Case Studies
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Utilize** the concept of social responsibility through an internship.	**PO6, PO9, PO12**
CO2	**Acquire** hands on experience in 'giving back to the society' through the concept of social responsibility through an internship.	**PO6, PO9, PO12**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
S SOC14101	Community Service						3			3			3		

1=weakly mapped
2= moderately mapped
3=strongly mapped

ECE11006	**Prof. Core-IV (Electromagnetic Fields)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Electricity & Magnetism of 12th Level Physics				
Co-requisites	Vector Algebra				

Course Objectives

1. Students will understand the basics of Coordinate System and Vector Analysis.
2. Students will learn the reason behind different natural phenomena from the knowledge of Electrostatics, examine the characteristics of dielectric materials used to make capacitors.
3. Students will have an appreciation of related applications to Magnetostatics.
4. Students will think about how materials affect magnetic fields.
5. Students will understand the behavior of electromagnetic waves in free space or in any medium with the mathematical expressions of Maxwell's equation.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Demonstrate** knowledge about the basics of Coordinate System and Vector Analysis.
CO2. **Explain** different natural phenomena from the knowledge of Electrostatics, classify different dielectric materials used to make capacitors.
CO3. **Analyze** different problems on Magnetostatics.
CO4. **Utilize** the examples of different real-life problems associated to magnetic forces and different issues related to it.
CO5. **Illustrate** the behaviour of electromagnetic waves in free space or in any medium with the mathematical expressions of Maxwell's equation.

Catalog Description

Electromagnetics (EM) is the subject having to do with electromagnetic fields. An electromagnetic field is made up of interdependent electric and magnetic fields, which is the case when the fields are varying with time, that is, they are An electric field is a force field that acts upon material bodies by virtue of their property of charge, just as a gravitational field is a force field that acts upon them by virtue of their property of mass. A magnetic field is a force field that acts upon charges in motion. EM is all around us. In simple terms, every time we turn a power switch on, every time we press a key on our computer keyboard, or every time we perform a similar action involving an everyday electrical device, EM comes into play. It is the foundation for the technologies of electrical and computer engineering, spanning the entire electromagnetic spectrum, from dc to light, from the electrically and magnetically based (elctromechanics) technologies to the electronics technologies to the photonics technologies.

Course Content

Module 1: Review of Coordinate System and Vector Analysis (9 Lecture Hours)

Vector algebra, Coordinate Systems- Cartesian Coordinate Systems, Cylindrical Coordinate Systems, Spherical Coordinate System, Conversion of Vector between Coordinate Systems, Vector Calculus- Differential Length, Area and Volume; Line, Surface and Volume Integral, Del Operator, Gradient of a Scalar, Divergence of a Vector Field, Divergence Theorem, Curl of a Vector Field, Stoke's Theorem, Laplacian of a Scalar

Module 2: Electrostatics (9 Lecture Hours)

Introduction, Coulomb's Law, Electric Field Intensity, Electric Fields due to Continuous Charge Distributions, Electric Flux Density, Gauss's Law and Applications, Electric Potential, Maxwell's Equation for Electrostatic Fields, Convection and Conduction Currents, Di-electric Materials, Continuity Equation, Relaxation Time, Poisson's and Laplace's equation, Capacitance-Parallel Plate Capacitors, Coaxial Capacitors, Spherical Capacitors, Resistance

Module 3: Magnetostatics (9 Lecture Hours)

Introduction, Magnetic Fields and their Properties, Biot-Savart's Law, Ampere's Circuit Law and its Applications, Magnetic Flux Density, Maxwell's Equations for Magnetostatic Fields, Magnetic Potential, Forces due to Magnetic Fields, Torque on a Loop, Magnetic Boundary Conditions, Magnetization Vector and Field Strength, Magnetic Materials, Inductance, Magnetic Energy.

Module 4: Magnetic Forces and Materials (9 Lecture Hours)

Force on a moving charge, Force on a differential current element, Force between current elements, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions involving magnetic fields, The magnetic circuit, Potential energy and forces on magnetic materials, Inductance, Basic expressions for self and mutual inductances, Inductance evaluation for solenoid, toroid, coaxial cables and transmission lines, Energy stored in Magnetic fields.

Module 5: Time Varying Field and Wave Propagation (9 Lecture Hours)

Maxwell's Equation in Different Forms, Maxwell's Equations in Different Media, Boundary Conditions at Surface, Wave Equations- For Free Space, Conducting Media and Perfect Di-electric Media, Uniform Plane Wave, Wave Propagation- Derivation of Attenuation Constant and Phase Shift Constant, Intrinsic Impedance, Wave Propagation in Lossless Media, Wave Propagation in Free Space, Conductors and Dielectrics: Characteristics, Wave Propagation in Good Conductors and Good Dielectric, Polarization-Linear, Circular, Elliptical; Reflection of Plane Waves in Perfect Conductor and Perfect Di-Electric, Refraction of Plane Waves, Brewster Angle, Critical Angle and Total Internal Reflection, Poynting Vector and Poynting Theorem, Power Loss in a Plane Conductor.

Text Books:

1. M.N.O. Sadiku, “Elements of Electromagnetics”, 4th Ed, Oxford University Press

2. G.S.Rao, “Electromagnetic Field Theory and Transmission Lines”, Wiley.

References:

1. D J Griffiths, “Introduction to Electro Dynamics”Prentice-Hall of India Pvt.Ltd.

2. J. D Kraus, “Electromagnetics”, Mc Graw-Hill companies.

3. W. Hayt and J.A. Buck, “Electromagnetic Field Theory”, 7th TMH.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Demonstrate** knowledge about the basics of Coordinate System and Vector Analysis.	**PO1, PO2, PSO1, PSO2**
CO2	**Explain** different natural phenomena from the knowledge of Electrostatics, classify different dielectric materials used to make capacitors.	**PO1, PO2, PO4, PO12, PSO1, PSO2**
CO3	**Analyze** different problems on Magnetostatics.	**PO1, PO2, PSO1, PSO2**
CO4	**Utilize** the examples of different real-life problems associated to magnetic forces and different issues related to it.	**PO4, PSO1, PSO2**
CO5	**Illustrate** the behaviour of electromagnetic waves in free space or in any medium with the mathematical expressions of Maxwell’s equation.	**PO1, PO12, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2
ECE11006	Electromagnetic Fields	3	3		2								2	3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE11006 – Electromagnetic Fields

Program: B.Tech. (ECE) **Semester: III**
Time: 03 hrs. **Max. Marks:50**

Instructions:
Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks). all the questions from **Section C** (carrying 5 marks).

Group A **Answer All the Questions (5 x 1 = 5)**			
1	Calculate the work done by the force $\vec{F} = 4\hat{a}_x - 3\hat{a}_y + 2\hat{a}_z$ N on 1 C charge to displace $10\hat{a}_x + 2\hat{a}_y - 7\hat{a}_z$ m.	**Understand**	**CO1**
2	A charge of Q1 = -1.0 mC is placed at the origin of a rectangular coordinate system and a second charge, Q2 = -10 mC is placed on the x-axis at a distance of 50 cm from the origin. Find the force on Q1 due to Q2 if they are in free space.	**Understand**	**CO2**
3	"Magnetic monople does not exist."- Justify this statement.	**Understand**	**CO3**
4	What do you mean by Brewster Angle?	**Understand**	**CO4**
5	What are the transmission line parameters?	**Understand**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	State Stoke's theorem. Show with an example, the use of this theorem in electrostatics.	**Remember**	**CO1**
(OR)			
6 b)	Given point $P(-2,\ 6,\ 3)$ and Express P in cylindrical and spherical coordinates.	**Analyse**	**CO1**
7 a)	Why did Maxwell introduce the concept of displacement current? Deduce the relation between J_c and J_d.	**Analyse**	**CO2**
(OR)			
7 b)	A potential, $V = 3x^2y - yz$. Find the electric field at a point $(2, -1,\ 4)$.	**Understand**	**CO2**
8 a)	State Faraday's law of electromagnetic induction.	**Understand**	**CO3**
(OR)			
8 b)	State Ampere's law in magneto-static.	**Understand**	**CO3**
9 a)	Write down the electromagnetic wave equation in terms of electric and magnetic field intensity.	**Understand**	**CO4**
(OR)			
9 b)	Obtain an expression of wave equation of a homogeneous, isotropic, lossy dielectric medium.	**Understand**	**CO4**

10 a)	Establish the condition for a distortion less transmission line.	**Understand**	**CO5**
(OR)			
10 b)	What type of transmission line of length λ/4 shorted at far end?	**Evaluate**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Explain the physical significance of the terms: i) Divergence of a vector field ii) Curl of a vector field [2.5+2.5]	**Understand** **Evaluate**	**CO1**
(OR)			
11 b)	Explain Divergence theorem and Laplacian of a scalar. [2.5+2.5]	**Evaluate**	**CO1**
12 a)	Determine the electric field for an infinite sheet of charge using Gauss's law.	**Evaluate**	**CO2**
(OR)			
12 b)	Derive the equation of continuity for time varying fields.	**Analyse**	**CO2**
13 a)	Establish a relation between the unit vectors $\hat{a}_r$, $\hat{a}_\phi$ and $\hat{a}_z$ in cylindrical coordinate system and the unit vectors $\hat{a}_x$, $\hat{a}_y$ and $\hat{a}_z$ in Cartesian coordinate system.	**Understand**	**CO1**
(OR)			
13 b)	Show that for a lossless transmission line, the impedance of a line repeats over every λ/2 distance.	**Analyse**	**CO5**
14 a)	The electric field intensity associated with a plane wave travelling in a perfect dielectric medium is given by, $E_x(z,t)=12\cos(2\pi\times10^7 t-0.1\pi z)$ V/m Find i) velocity of wave propagation and ii) intrinsic impedance.	**Evaluate**	**CO4**
(OR)			
14 b)	i) What do you mean by skin depth? ii) If the skin depth is 80 µm at 4 MHz in a certain conducting medium, calculate the skin depth if the frequency is changed to 16 MHz.	**Understand** **Evaluate**	**CO4**
15 a)	Obtain Poynting theorem for the conservation of energy in an electromagnetic field and write the physical significance of each term in the resulting expression.	**Understand**	**CO4**
(OR)			
15 b)	In free space $E(z,t) = 50\cos(\omega t - \beta z)$ V / m. Find the average power crossing a circular area of radius 5m in the plane x = constant.	**Evaluate**	**CO5**
16 a)	If the electric field of a TEM wave in free space is represented by $E=20\cos(10^9 t-0.4x)$ V/m Find i) frequency in Hz ii) wavelength of the wave and ii) expression of magnetic field.	**Evaluate**	**CO3**
(OR)			
16 b)	Find out the magnetic induction at a distance, r from an infinitely long thin wire carrying a current, I along z-axis.	**Analyse**	**CO3**

17 a)	A transmission line with air as dielectric Z_{in} = 50 Ω and a phase constant of 3 rad / m at 10 MHz. Find the inductance and capacitance of the line.	**Analyse**	**CO5**
(OR)			
17 b)	Derive the expression of input impedance, Z_{in} of a transmission line in terms of relevant parameters, when the line is terminated in a load impedance, Z_L. Hence, or otherwise, show that, $Z_0{}^2$= Zsc × Zoc where Z_0 is the characteristic impedance, and Zsc and Zoc are the input impedance of the transmission line respectively when they are terminated by short circuit and open circuit.	**Analyse**	**CO5**

ECE11007	**Prof. Core- V (Digital Electronics)**	L	T	P	C
Version 2.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. Basic concepts of number system (Decimal, Binary) 2. Basic knowledge of electronic circuits (working principle of Transistor) 3. Basic concepts of circuit theory (Mathematical Analysis, Theorems)				
Co-requisites	1. Microprocessor-8085 2. Robotic Fundamentals				

Course Objectives

1. Explain the elements of digital system abstractions such as digital representations of information, digital logic, Boolean algebra, state elements and finite state machine (FSMs).
2. Design simple digital systems based on these digital abstractions, using the "digital paradigm" including discrete sampled information.
3. Design and build a simple printed circuit assembly (PCA) that utilizes modern digital integrated circuits.
4. Improving the knowledge and laboratory skills of engineers to proactively anticipate problems and resolve them efficiently with best-practices.
5. Provide a learning platform for students to design, build and test hardware for an embedded application that utilizes a modern digital integrated circuit.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Compare** different type of codes and number systems which are used in digital communication and computer systems.
CO2. **Make use of** the codes and number systems converting circuits and compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.
CO3. **Apply** different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.
CO4. **Build** different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.

CO5. **Apply** the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.

Catalog Description

Digital Electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by two discreet voltages or logic levels. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world electronics. Digital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, etc. The major focus of the DE course is to expose students to the design process of combinational and sequential logic design, teamwork, communication methods, engineering standards, and technical documentation. Utilizing the activity-project-problem-based (APPB) teaching and learning pedagogy, students will analyze, design and build digital electronic circuits. While implementing these designs students will continually hone their interpersonal skills, creative abilities and understanding of the design process.

Course Content

Unit I: 10 lecture hours

Number Systems, Boolean Algebra and Logic Families

Introduction, Minimization Techniques: Boolean postulates and laws, De-Morgan's Theorem, Principle of Duality, Boolean expression, Minimization of Boolean expressions,8-4-2-1 BCD code, 1's and 2's complement subtraction, Minterm, Maxterm, Sum of Products (SOP), Product of Sums (POS), Karnaugh map Minimization, don't care conditions, Quine - McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR, Implementations of Logic Functions using gates, NAND–NOR implementations, Brief overview of Transistor as a switch; Logic gate characteristics – propagation delay, speed, noise margin, fan-out and power dissipation, TTL and CMOS Logic and their characteristics.

Unit II: 10 lecture hours

Combinational Circuits

Introduction, Design Procedure of Adder &Subtractor: Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Binary adder, Look Ahead carry adder, Serial adder, BCD adder, BCD to 7 segment decoder, Other Combinational Circuits: Binary Multiplier, Binary Divider, Parity Bit Generator/Checker, Magnitude Comparator, Code Converter, Encoder, Decoder, Multiplexer, De-Multiplexer.

Unit III: 12 lecture hours

Sequential Circuits

Introduction, Types of Sequential circuits, Comparison between Combinational and Sequential Circuits, Comparison between Synchronous and Asynchronous sequential circuit, Latches and Flip-Flops: Gated S-R Latch, D Latch, J-K Latch, T Latch, Edge Triggered S-R Flip Flop, Edge Triggered D Flip Flop, Edge Triggered J-K Flip Flop, Edge Triggered T Flip-Flops, Master - Slave Flip-Flops, Direct Preset and Clear Input.

Counters and Shift Registers: Asynchronous Counter, Ripple Counters, Design of asynchronous counters, Effects of propagation delay in Ripple counters, Synchronous Counters, 4-bit synchronous up down counter, Design of synchronous counters, Ring counter, Johnson counter, Design of Sequence Generators, Digital Clock using Counters, Parallel In Parallel Out Shift Register , Serial In Parallel Out Shift Register, Parallel In Serial Out Shift Register, Serial In Serial Out Shift Register, Bi-Directional Shift Registers, Universal Shift register.

Unit IV: 8 lecture hours

Memory and Programmable Logic

Introduction, Classification of memories: Programmable Read Only Memory, Erasable Programmable Read Only Memory, Electrically EPROM, EAPROM,RAM – RAM organization, Write and Read operation, Memory cycle and Timing wave forms, Memory decoding and memory expansion, Static

RAM Cell, Bipolar RAM cell, MOSFET RAM cell, Dynamic RAM cell, Programmable Logic Devices, Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Arrays (FPGA), Implementation of combinational logic circuits using ROM, PLA, PAL.

Unit V: **5 lecture hours**

Analog and Digital Converters:

Analog-to-Digital Converters (ADC): Single Slope Type, Dual Slope Type, Successive Approximation Type, Flash Type etc. Digital-to-Analog Converters (DAC): Weighted Resistor Type, R2R Ladder Type etc.

Text Books

1. M. Morris Mano , Michael D. Ciletti; "Digital Design", 4th Edition , Pearson Prentice Hall , 2007.
2. Floyd & Jain; "Digital Fundamentals",8th Edition, Pearson Education,2006.
3. S. Salivahanan and S. Arivazhagan; Digital Circuits and Design (Fourth Edition-2012); Vikas Publishing House

Reference Books

1. Anand Kumar; "Digital Electronics"; PHI.
2. Donald P Leach , Albert Malvino ;" Digital Principles and Applications", Tata McGraw - Hill, New Delhi; Year: 2006; Edition: 6.
3. G. K Kharate; "Digital Electronics"; Oxford Higher Education
4. R.P Jain, "Modern Digital Electronics", Tata McGraw - Hill, New Delhi, 4th edition
5. LEE, "Digital Circuits & Logic Design" –PHI
6. Maini. A.K., "Digital Electronics Principals, Devices and Applications". Chichester, England.: Jonh Wiley & Sons Ltd.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Compare** different type of codes and number systems which are used in digital communication and computer systems.	**PO1, PO2, PSO2**
CO2	**Make use of** the codes and number systems converting circuits and compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.	**PO1, PO2, PO12, PSO1, PSO2**
CO3	**Apply** different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.	**PO2, PO3, PSO1, PSO2**
CO4	**Build** different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.	**PO2, PO3, PO12, PSO1, PSO2**

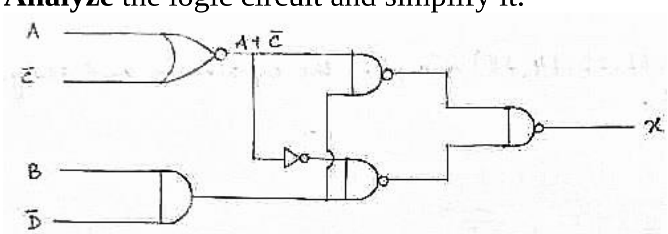
CO5	**Apply** the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.	**PO1, PO2, PO3, PO12, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO2
ECE1 1007	**Digital Electronics & Logic Design**	3	3	3									3	3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

	ADAMAS UNIVERSITY END-SEMESTER EXAMINATION JUNE 2023 (Academic Session: 2022-23)		
Name of the Program:	B. TECH (ECE)	**Semester:**	IV
Course/Subject Name:	Digital Electronics	**Course/Subject Code:**	ECE11007
Maximum Marks:	50	**Time Duration:**	180 Minutes
Total No. of Questions:	12	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)	**4.** At top sheet, clearly mention Univ. Roll No., Enrolment No., Course Name & Code, Date of Exam. **5.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **6.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All 5 Questions (5 x 2 = 10)**			
		Knowledge Level (BL1-6)	**Course Outcome (CO1-5)**
1	**Analyze** the logic circuit and simplify it.  	L4	CO1
2	**Construct** 16:1 MUX by using 4:1 MUX only.	L3	CO3
3	**Compare** between PROM, PLA & PAL.	L2	CO4
4	**Solve** the Boolean expression $\overline{\overline{A}B\overline{C}} + \overline{A\overline{B}C}$	L3	CO2
5	**Determine** the initial clock frequency of 4-bit ripple counter, if the period of waveform at the last flip-flop is 64 microseconds.	L5	CO5
Group B **Answer All 5 Questions (5 x 4 = 20)**			
6	**Find** the logic function using Karnaugh Map: F (A,B,C,D) = $\sum_m$ (0, 2, 3, 5, 9, 11, 13, 14, 15); d (1,4,6,12). Draw the logic circuit for the simplified function. **[4]**	L1	CO2
7	**i) Construct** the following function using a 3 line to 8-line decoder. S (A, B, C) = $\sum$m (1,2,4,7) C (A, B, C) = $\sum$m (3,5,6,7) **ii) What** is the difference between ROM & RAM? **[3+1]**	L3, L1	CO2, CO4
8	**i)** State the difference between Combinational and Sequential logic. **ii) Construct** the following functions into canonical POS form:	L1, L3	CO2, CO1

	$(A+\overline{B})(\overline{C}+\overline{D})(\overline{B}+\overline{C})$ **[2+2]**		
9	**Explain** the operation of S-R Flip flop with diagram and suitable characterisitic table. **[4]**	**L2**	**CO3**
10(a)	**Change** the S-R FF to D FF and using its corresponding characteristics & excitation table. **[4]**	**L6**	**CO3**
OR			
10(b)	Using D-Flip flops and waveforms **explain** the working of a 4-bit SISO shift register. **[4]**	**L2**	**CO5**
Group C **Answer All 2 Questions (2 x 10 = 20)**			
11(a)	**i)** Write the different conditions to check for **determining** the type of Decoder, number of AND gates and OR gates for realization of Boolean expression using PLDs. Realize the following set of logical expressions using ROM, PLA and PAL. $Y_1=AC+\overline{A}B$ $Y_2=ABC+AB\overline{C}+\overline{A}BC$ $Y_3=A\overline{B}C+AB\overline{C}+A\overline{B}\overline{C}$ **ii)** Design and implement the circuit using 3-bit BCD to EXCESS-3 converter and **simplify** the expression using Karnaugh map. **[6+4]**	**L5, L4**	**CO4, CO2**
OR			
11(b)	**i)** For F = A.B.C+ B.C.$\overline{D}$+ $\overline{A}$.B.C, write the truth table. **Simplify** using Karnaugh map and realize the function using logic gates only. **ii) Design** 4x1 MUX using Boolean function F (A, B, C, D) = $\sum_m$ (1,4,5,7,9,12,13). **[5+5]**	**L3, L6**	**CO2, CO3**
12(a)	**i)** Convert numbers: **i)** $(45.625)_{10} = (?)_2$, **ii)** $(B2C)_{16} = (?)_{10}$ **ii) Design** and implement EX-OR gate using NAND gate. **iii) Simplify** the expression Y = $\prod_M$ (1,2,3,8,9,10,11,14) using the K-map method and draw the equivalent circuit using logic gates. **iv)** Show **how** the J-K flip flop can be operated as a toggle flip flop. **[2+3+3+2]**	**L1, L3**	**CO1, CO2, CO3**
OR			
12(b)	**i) Design** a 4-bit asynchronous up counter using negative edge triggered and show the timing diagram. **ii)** Draw the logic diagram of a full adder and **explain** its working with the help of a truth table. **[6+4]**	**L4, L2**	**CO5, CO2**

ECE11008	**Prof. Core- VI (Communication Systems-I)**	L	T	P	C
Version 3.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	12^{th} Basic Physics				
Co-requisites	Basics of communication				

Course Objectives

1. To introduce the concept of modulation.
2. To clarify the basic differences amongst amplitude and angle modulation.
3. To enable the students to comprehend the modulation schemes.
4. To introduce the specific concepts and rules of data sampling and subsequent modulation & demodulation.
5. To associate practical applications with the theories of modulation & demodulation.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Analyze** analog modulation and demodulation techniques.
CO2. **Understanding** mathematical understanding of Analog Communication Systems.
CO3. **Understanding** the trade-offs (in terms of bandwidth, power, and complexity requirements)
CO4.**Analyze** performance evaluation of communication systems in the presence of noise.
CO5. **Apply** design theories to practical applications.

Catalog Description

Growing dependence on online connectivity has made communication technology the most relevant course in the domain of electronics engineering. Moreover, such modulation techniques should be extremely robust with respect to signal to noise ratio so that data distortion does not take place. Hence communication systems is the most significant branch of study for various applications of electronic communication, mobile communication, satellite communication etc.

Course Content

Module II: 11 lecture hours
Amplitude Modulation:
Modulation index, determination of transmission bandwidth; phase carrier power, sideband power, total transmitted power & efficiency; under modulation, over modulation and critical modulation, Suppressed carrier modulation, DSB-SC modulation, bandwidth and transmitted power for DSB, Balanced Modulator, Demodulation of AM waves: envelope detector, Synchronous detector for DSB-SC, Generation of DSB-SC signals, Detection of DSB-SC signals, Single-tone modulated DSB-SC, Costas loop, SSB-SC modulation, Generation of SSB-SC signals, Detection of SSB-SC signals, VSB, Comparison of various AM systems, Super

heterodyne receivers – Mixer, intermediate frequency, Local oscillator, selectivity, sensitivity and fidelity.

Module II: 11 lecture hours

Angle Modulation: Phase & Frequency Modulation:

Narrowband FM, wideband FM, methods of generation, FM spectrum, Generation of FM using PM modulator and vice-versa, Demodulation techniques for FM: using balanced frequency discriminator-Zero crossing detector, Linearized model of Phase Locked Loop, Single-tone FM, Multi-tone FM, Carson's Rule, Effect of the modulation index β on bandwidth, De-emphasis and Pre-emphasis filtering, Direct and Indirect (Armstrong) FM transmitter.

Module III: 8 lecture hours

Radio Receivers:

Introduction – Functions & Classification of Radio Receivers, Tuned Radio Frequency (TRF) Receiver, Super heterodyne Receiver – Basic Elements, Receiver Characteristics, Frequency Mixers, AGC Characteristics.

Module IV: 10 lecture hours

Noise and SNR of Various Analog modulation Technique:

Various noise sources, Noise calculations for – single noise sources, multiple noise sources, cascade amplifiers. Noise figure and its measurement, Noise temperature, Equivalent input noise resistance, Noise Bandwidth, Noise measurement on line and channel. Band – pass noise representation, noise figure calculation for various modulation systems (DSB-AM, DSB-SC, SSB and FM). Calculation of Signal to Noise Ratio for AM, DSB/SC, SSB, FM.

Module V: 5 lecture hours

Sampling a Signal by Periodic Pulse Stream:

Sampling, ideal sampling, Nyquist sampling theorem, generation and detection of PAM, PWM, PPM signals, generation and demodulation schemes.

Text Books

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, John Wiley and Sons, 3rd Edition, 2001.
2. Taub & Schilling, "Principles of Digital Communication "Tata McGraw-Hill" 28th reprint, 2003.
3. B.P.Lathi -Communication Systems- BS Publications.

Reference Books

1. Carlson—Communication System,4/e , Mc-Graw Hill.
2. Proakis& Salehi Fundamentals of Communication Systems- Pearson.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Compare** between modulation schemes.	**PO1, PO2**
CO2	**Analyze** amplitude & angle modulation and subsequent demodulation.	**PO1, PO2, PO3**
CO3	**Design** criteria for modulation & demodulation schemes.	**PO1, PO3, PO4, PSO1, PSO2**
CO4	**Assess** sampling rate and subsequent transmission.	**PO1, PO2, PO3, PO4, PSO1, PSO2**
CO5	**Apply** design theories to practical applications.	**PO3, PO4, PO12, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11008	Communication Systems I	3	3	3	3									3	3

1=weakly mapped

2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 20__ – 20__)		
Name of the Program:	B.Tech	**Semester:**	IV
Paper Title:	Communication Systems I	**Paper Code:**	ECE11008
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

19. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
20. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
21. Assumptions made if any, should be stated clearly at the beginning of your answer.

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**Define** envelope detection.	**R**	**CO2**
2	**Explain** Carson's rule.	**R**	**CO5**
3	State and **explain** the expression for frequency mixing.	**U**	**CO3**
4	**What** is the band width requirement of VSB modulation?	**U**	**CO1**
5	**What** is PLL?	**Ap**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**Explain** – mixer, intermediate frequency, local oscillator, selectivity, sensitivity and fidelity in context to super heterodyne receivers.	**AP**	**CO5**
	(OR)		
6 b)	**What** is sampling? State and prove Nyquist sampling theorem. Explain generation and detection of PAM signals.	**R, U**	**CO4**
7 a)	**Explain**in details Armstrong method of FM generation with block diagram.	**U, AP**	**CO2, CO5**
	(OR)		
7 b)	Explain generation and detection of FM signals.	**U**	**CO1**
8 a)	**Explain**in details about Envelop Detector with block diagram.	**U,Ap**	**CO2**

(OR)			
8 b)	**Compare** between SSB-SC and VSB-SC modulation schemes.	**U, AP**	**CO1**
9 a)	**Explain** – mixer, intermediate frequency, local oscillator, selectivity, sensitivity and fidelity in context to super heterodyne receivers.	**AP**	**CO5**
(OR)			
9 b)	Compare AM and FM Modulation technique.	**U**	**CO3**
10 a)	State the Carson's Rule.	**U**	**CO4**
(OR)			
10 b)	What is lossy source coding?	**Ap**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Highlight the **compare** between Narrow Band and Wide Band FM.	**U**	**CO1, CO5**
(OR)			
11 b)	**Explain** analytically bandwidth estimation of FM signals.	**U**	**CO1, CO2**
12 a)	Find Fourier Series for $\lvert x \rvert$ in the interval $[-\pi, \pi]$.	**U**	**CO1**
(OR)			
12 b)	Find half range sine series of $\pi x - x^2$ in $(0, \pi)$ upto first three terms.	**U**	**CO1**
13 a)	Show that the complex valued function $f(z) = \lvert z \rvert^2$ is analytic only at $z = 0$.	**Ap**	**CO2**
(OR)			
13 b)	Explain demodulation of DSBSC with simple diagram.	**Ap**	**CO2**
14 a)	Describe the properties of power spectral theorem.	**U**	**CO3**
(OR)			
14 b)	Describe the central limit theorem.	**U**	**CO3**
15 a)	Explain significance of pre-emphasis and de-emphasis in FM system.	**Ap**	**CO4**
(OR)			
15 b)	Derive the output SNR for FM reception.	**Ap**	**CO4**
16 a)	Draw the circuit diagram of Foster Seeley discriminator and its working.	**Ap**	**CO2**
(OR)			
16 b)	What are applications of PLL	**Ap**	**CO5**
17 a)	**Explain** analytically bandwidth estimation of FM signals.	**U**	**CO1, CO2**
(OR)			
17 b)	**Explain** generation and detection of PAM, PWM, PPM signals	**U, AP**	**CO4**

ECE11009	**Prof. Core- VII (Digital Signal Processing)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. 12th level Mathematics 2. Knowledge of Signal and Systems				
Co-requisites	--				

Course Objectives

1. To get basic idea about basic of Signals, Systems and Signal Processing.
2. To analyze discrete time signals using Fourier and Z-Transform
3. To familiarize with the different Structures of Discrete-Time Systems
4. To acquire the knowledge of different filter design.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the basic of Signals, Systems and Signal Processing
CO2. **Examine** the discrete time signals using Fourier and Z-Transform
CO3. **Demonstrate** the different Structures of Discrete-Time Systems
CO4. **Design** and examine the FIR Filter
CO5. **Design** and examine the IIR Filter

Catalog Description

Digital signal processing (DSP) is the use of digital processing to perform a wide variety of signal processing operations. In this course student will know basic discrete-time signal and system types, convolution sum, impulse and frequency response concepts for linear, time-invariant (LTI) systems, difference equation realization of LTI systems and discrete-time Fourier transform and basic properties of these. Student will understand periodic sampling of analog signals and grasps z and inverse z transform, region of convergence concepts and their properties, performs simple transform calculations, understands the system function concept with its relations to impulse and frequency responses. Student will understand definitions and basic properties of forward and inverse discrete Fourier transform and their computation by fast algorithms. Student will learn the difference structure of FIR and IIR system and how to design and study the FIR and IIR digital filter.

Course Content

Unit I: **7 lecture hours**

Introduction to Digital Signal Processing:

Types of Signal and systems, Sampling theorem, Frequency domain representation of sampling, Reconstructions of band limited signals from its samples, Aliasing, Linear Time Invariant (LTI) system, Stability and causality.

Unit II: **11 lecture hours**

Frequency Domain Analysis of Discrete Time Signals and Systems:

Z-transform, Regions of convergence (ROC) and Z-transform properties, Inverse z-transform, System analysis using Z transform, Discrete Fourier analysis, Discrete-Time Fourier Transform (DTFT), Inverse DTFT. Discrete Fourier Transform (DFT), Inverse DFT. Fast Fourier Transform, Types of FFT, N-point Radix-2 FFT, Inverse FFT. Discrete Linear Convolution, Circular Convolution, Fast Convolution, Frequency Response of LTI system using Discrete Fourier Analysis, All pass systems, Minimum/Maximum phase systems, Discrete Cosine Transform.

Unit III: **09 lecture hours**

Structures of Discrete-Time Systems:

Realization of discrete-time systems, FIR systems: Direct, Cascade, Frequency Sampling and Lattice structures. Structures for IIR systems: Direct, Signal Flow Graphs and Transposed, Cascade, Parallel, Lattice and Lattice-Ladder structures. State space system analysis and structures

Unit IV: **09 lecture hours**

FIR Filter Design

Symmetric and Anti-symmetric FIR filters, FIR Filter design by window method (Rectangular, Bartlett, Hamming, Hanning, Blackman and Kaiser window), Frequency Sampling method, Optimum approximation of FIR filters, Design of FIR differentiators, Design of Hilbert transformers

Unit V: **09 lecture hours**

IIR Filter Design

Design of Discrete-time IIR filters from Continuous-time Filters: Filter design by Impulse invariant and bilinear transformation method: Butterworth, Chebyshev and Elliptic approximation Filter, Frequency transformation.

Text Books:

1. Digital Signal Processing – Principles, Algorithms and Applications by J. G. Proakis and D. G. Manolakis, 4th Edition, Pearson
2. Discrete Time Signal Processing by A.V. Oppenheim, R. W. Schafer, & John R. Buck, , 2nd Edition, Prentice Hall, 1999.

Reference Books:

1. Digital Signal Processing: Fundamentals and Applications – Li Tan, Academic Press, Elsevier.
2. Digital Signal Processing – S. Salivahan, A. Vallavraj and C. Gnanapriya, TMH.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the basic of Signals, Systems and Signal Processing	**PO1**
CO2	**Examine** the discrete time signals using Fourier and Z-Transform	**PO1, PO2, PSO1**
CO3	**Demonstrate** the different Structures of Discrete-Time Systems	**PO1, PO3**
CO4	**Design** and examine the FIR Filter	**PO1, PO2, PO3, PO12, PSO1**
CO5	**Design** and examine the IIR Filter	**PO1, PO2, PO3, PO12, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course	Course Title	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO		

Code		1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2
ECE11009	Digital Signal Processing	3	3	3										3	

1=weakly mapped;

2= moderately mapped;

3=strongly mapped

Model Question Paper

Name:

Enrolment No:

ADAMAS UNIVERSITY

PURSUE EXCELLENCE

Course: ECE11009 – Digital Signal Processing

Program: B.Tech. (ECE) **Semester: IV**

Time: 03 hrs. **Max. Marks:50**

Instructions:

Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**What** do you mean by time and frequency domain aliasing problem?	**Understand**	**CO1**
2	**Prove** $W_N^{(k+N)} = W_N^{(k)}$	**Understand**	**CO2**
3	**What** is group delay?	**Understand**	**CO3**
4	**How** warping effect can be removed?	**Analyse**	**CO4**
5	**What** do you mean by order of a digital Butterworth filter?	**Analyse**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	A digital sequence $x(n)$is given as, $x(n) = \{1,2,3,4,5\uparrow,4,3,2,1\}$. **Find** and **sketch** $x(2n)$.	**Understand**	**CO1**
(OR)			
6 b)	A digital sequence is given as, $x(n) = \{1,2,1,5\uparrow,2\}$.**Find and sketch** $x(n+3)$.	**Understand**	**CO1**
7 a)	**Compute** the 4-point DFT of a sequence $(-1)^n$.	**Understand**	**CO2**
(OR)			
7 b)	**Write down** the advantages of FFT over DFT.	**Understand**	**CO2**

8 a)	The output and input of a recursive DTLTI system are related by the equation y(n) = - 0.1 y (n -1) + 0.2 y(n – 2) + 3 x(n) + 3.6 x(n – 1) + 0.6 x(n – 2). **Derive** the direct form II structure of realizing the system.	**Understand**	**CO3**
(OR)			
8 b)	**Distinguish** between FIR and IIR filters.	**Understand**	**CO3**
9 a)	**Prove** that, a causal LTI system is BIBO stable if and only if all the poles of the system function are inside the unit circle.	**Understand**	**CO4**
(OR)			
9 b)	**Design** a linear phase FIR filter.	**Understand**	**CO4**
10 a)	**Design** an IIR filter using impulse invariance technique.	**Understand**	**CO5**
(OR)			
10 b)	**How** to realize an IIR filter using Direct form-II realization?	**Understand**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Write** a short note on anti-aliasing filter.	**Understand**	**CO1**
(OR)			
11 b)	**What** are the advantages and limitations of DSP?	**Understand**	**CO1**
12 a)	**Determine** linear convolution and circular convolution of sequence, x(n)={1↑,2,3,4} and h(n)={2↑,1,2,1}	**Understand**	**CO2**
(OR)			
12 b)	**Find** the output y(n) of a filter whose impulse response is h(n) ={1,1,1} and x (n) = { 3, -1, 0, 1, 3, 2, 0, 1, 2, 1 } using overlap add method.	**Analyse**	**CO2**
13 a)	**Evaluate** 8-point DFT using DIT-FFT algorithm for sequence x(n)={0.5,0.5,0.5,0.5,0,0,0,0}	**Analyse**	**CO2**
(OR)			
13 b)	**Find** DFT of the sequence x(n)={1,1,1,1,2,2,2,2} using radix-2 DIT.	**Analyse**	**CO2**
14 a)	**Determine** ZT of x(n)=(n+2)$\left(\frac{1}{2}\right)^n u(n)$and **find** ROC	**Analyse**	**CO4**
(OR)			
14 b)	**Sketch** the magnitude response of the Butterworth LPF filter and derive an expression for the order of such filter.	**Understand**	**CO5**
15 a)	For the analog transfer function H(s) = $\frac{2}{(s+1)(s+2)}$ **Determine** H(Z) using impulse invariance method with T=1 s.	**Apply**	**CO4**
(OR)			
15 b)	For the analog transfer function H(s) = $\frac{2}{(s+2)(s+3)}$ **Determine** H(Z) using bilinear transformation with T=1 s.	**Apply**	**CO4**
16 a)	**Derive** the sketch the cascade and parallel structures for the system with transfer function H(Z)=2(Z+2)(Z-0.1)(Z+0.5)(z+0.4)	**Analyse**	**CO4**

(OR)			
16 b)	**Design** a symmetric linear phase FIR LPF filter using rectangular window by taking 7-samples of the window sequence and with cut-off frequency 0.1π rad/s.	**Understand**	**CO3**
17 a)	Given the specification $\alpha_p = 2\ dB, \alpha_s = 20\ dB, \Omega_p = 100$ rad/s, $\Omega_s = 500$ rad/s **Determine** the order of the filter.	**Analyse**	**CO5**
(OR)			
17 b)	**Design** a digital Butterworth filter using following specification using Bilinear transformation $0.8 \leq H(j\omega) \leq 1$ for $0<\omega < 0.2\pi$ $H(j\omega) \leq 0.2$ for $0.6\pi < \omega < \pi$	**Analyse**	**CO5**

PSG11021	**Human Values and Professional Ethics**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 30**	**2**	**0**	**0**	**2**
Pre-requisites/Exposure	**--**				
Co-requisites	**--**				

Course Objectives

1. To inculcate human values and professional ethics in students.
2. To enhance the understanding of students towards personal, professional & societal relationships and achieve harmony in life.
3. To develop moral responsibilities and ethical vision.

Course Outcomes

At the completion of the course, the student should be able to:

CO1. **Illustrate** the importance of values, ethics, harmony and lifelong learning in personal and professional life

CO2. **Apply** the knowledge to perform self-exploration and transformation augmenting harmony, peace and positivity in the surroundings

CO3. **Apprise** the core values that shape the ethical behaviour of a professional

Catalog Description

This course aims to develop an understanding for a movement from rule based society to a relationship based society. Apart from teaching values, this course encourages students to discover what values are for them and for society. Self-exploration also enables them to critically evaluate their pre-conditionings and present beliefs. It is designed in a way where students get familiar with the Ethical Code of Conduct, Ethical Dilemma, Conflict of Interest and all this will help them eventually in their professional life.

Corse Content

Unit I: Introduction to Human Values: Character, Integrity, Credibility, Mutual Respect, Dedication, Perseverance, Humility and Perception. Self-Assessment & Analysis, Setting Life Goals, Consciousness and Self-Transformation. Team Work, Conflict Resolution, Influencing and Winning People, Anger Management, Forgiveness and Peace, Morality, Conscience. Yoga and Spirituality

Unit II: Harmony and Life Long Learning: Harmony in human being, Nature and Existence. Harmony in family and society –Responsibilities towards society, Respecting teachers. Transition from School to College - Freedom & Responsibilities, Respecting Cultural Diversity, Learning beyond the Classrooms, Independent study and research

Unit III: Introduction to Professional Ethics: Work Ethics, Engineering Ethics, Moral Dilemma, Moral Development Theories, Ethical Theories- Kantinism, Utilitarianism, etc , Case Studies for Choice of the theory, Code of Ethics

Unit IV: Individual to Global Issues: Industrial Standards, A Balanced Outlook on Law, Safety, Responsibility, Rights, Confidentiality, Conflict of Interest, Occupational Crime, Whistle Blowing, Environmental Ethics, Business Conduct in MNC, E-Professionalism (IPR, Internet Ethics & Privacy issues)

Text Books

1. Shetty, Foundation Course in Human Values and Professional Ethics [R.R. Gaur, R. Sangal, G.P. Bagaria]

Modes of Evaluation: Quiz/Assignment/ Seminar/Written Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Programme Outcomes

CO1	**Illustrate** the importance of values, ethics, harmony and lifelong learning in personal and professional life	**PO6, PO8**
CO2	**Apply** the knowledge to perform self-exploration and transformation augmenting harmony, peace and positivity in the surroundings	**PO6, PO8**
CO3	**Apprise** the core values that shape the ethical behaviour of a professional	**PO8**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools	An ability to develop their problem-solving skills and assess social, environmental
Course	Course Title	PO1	PO	PO3	PO4	PO	PO	PO7	PO8	PO	PO1	PO1	PO1	PSO1	PSO2

PSG11021	Human Values and Professional Ethics						2		3						

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

Course: PSG11021 - Human Values and Professional Ethics

Programme: UG All program **Semester: IV**

Time: 03 hrs. **Marks:50**

Instructions:

Attempt any **Four Questions** from **Section A** (each carrying 6 marks); any **Two Questions** from **Section B**

	SECTION A (Attempt any **Four Questions) 6x4**	
1.	**What** do you mean by happiness and Prosperity? Critically examine the prevailing notions of happiness in the society and their consequences.	**Ap**
2.	**How** do the current world views lead to contradictions and dilemmas in professional	**U**
3.	**What** do you mean by 'Universal Human Order'?	**U**
4.	"Physical facilities are necessary and complete for animals, while they are necessary but not complete for humans." Comment.	**U**
5.	**Why** do you think that there should be emphasis on Life Long Learning in the current	**U**
	SECTION B (Attempt any **Two Questions) 5X2**	
6.	Critically examine the issues in professional ethics in the current scenario. **List** any five unethical practices in profession today and the methods being tried to curb them.	**Ap**
7.	What are the implications of value based living at all four levels of living? Explain.	**U**
8.	Discuss the Basic Aspects and Characteristic Features of Kohlberg's Theory and Gilligan's Theory.	**U**

		L	T	P	C
ECE12010	**Prof. Core- IV Lab (Communication Systems-I Lab)**	L	T	P	C
Version 1.0	**Contact Hours – 30**	0	0	2	1
Pre-requisites/Exposure	Students entering this course require a basic knowledge of communication systems and frequency domain analysis as taught in Analog Communication. It includes a treatment of signal-to-noise ratio and bit error rate in digital links that rely on the treatment of probability. It will definitely help if you study the tutorials of Signals and Systems as a reference.				
Co-requisites	1. Theory of Communication Systems-I				

Course Objectives

1. To understand the building blocks of analog communication system.
2. To prepare mathematical background for communication signal analysis.
3. To understand and analyze the signal flow in an analog communication system.
4. To understand concept of spread spectrum communication system.

Course Outcomes

On completion of this course, the students will be able to

CO1. To develop practical knowledge about theories of analog communication
CO2. To provide hands-on experience to the students, so that they are able to apply theoretical concepts in practice.
CO3. Demonstrate various pulse modulation techniques
CO4. Evaluate analog modulated waveform in time /frequency domain and also find modulation index
CO5. Develop understanding about performance of analog communication systems

Catalog Description

Communication systems are at the heart of today's information driven economy and support our modern-day lifestyles and even our very existence. From the familiar telephone that was invented over a century ago, to modern day cell phones, wireless networks, and Internet, as well as radio, television, cable and satellite systems, we now rely on electrical communication systems in almost all aspects of our lives. The course focuses on the technologies underlying these systems, which constitute the field of digital communications. Topics include several experiments based on p-n sequences using shift register, digital transmission and reception, spectral analysis of digitally modulated waveforms, design considerations for pass band transmissions and corresponding simulation using MATLAB, baseband digital transmission and spread spectrum modulation.
The course is intended for graduate/senior undergraduate level students. While the course is intended to serve as an introduction to digital communications, the pre-requisites/co-requisites listed are absolutely necessary.

List of experiments:

1. Generation & Demodulation of AM DSB-FC and Determining the Modulation Index
2. Generation & Demodulation of SSB-SC and Determining the Modulation Index
3. Generation of FM wave and determining the modulation width for narrowband FM
4. Designing FM Demodulator using Differentiator Circuit
5. Determine and demodulate PAM, PWM and PPM
6. Designing Super Heterodyne Receiver, Measuring Selectivity& Sensitivity and Determining the Intermediate Frequency and Demodulating the Baseband Signal
7. Designing Analog to Digital Converter Using Sampling
8. Designing PLL Using VCO and Measuring the Lock Frequency of the Incoming Signal.
9. Designing FM Demodulator Using PLL

Text Books

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, John Wiley and Sons, 3rd Edition, 2001

2. B.P.Lathi -Communication Systems- BS Publications

Reference Books

1. Digital Communications, J.G.Proakis, TMH Publishing Co.
2. Carlson—Communication System,4/e, Mc-Graw Hill
3. Digital Communication Systems Lab Handout

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	To develop practical knowledge about theories of analog communication	**PO1, PO3, PO10, PSO1, PSO2**
CO2	To provide hands-on experience to the students, so that they are able to apply theoretical concepts in practice.	**PO1, PO3, PO10, PSO1**
CO3	Demonstrate various pulse modulation techniques	**PO1, PO3, PO7, PO10, PSO1, PSO2**
CO4	Evaluate analog modulated waveform in time /frequency domain and also find modulation index	**PO3, PO7, PO10, PSO1, PSO2**
CO5	Develop understanding about performance of analog communication systems	**PO1, PO3, PO10, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
ECE12020	**Communication SystemLab**	3		3				2			3			3	3

1=weakly mapped;
2= moderately mapped;
3=strongly mapped

ECE12011	Prof. Core-IV Lab (Digital Electronics Lab)	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	**1.** Basic concepts of number system (Decimal, Binary) **2.** Basic knowledge of electronic circuits **3.** Basic Electrical & Electronics Engineering practices Lab				
Co-requisites	Principle of Digital Electronics				

Course Objectives

1. To understand number representation and conversion between different representation in digital electronic circuits.
2. To analyze logic processes and implement logical operations using combinational logic circuits.
3. To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines.
4. To understand characteristics of memory and their classification.
5. To evaluate the use of computer-based analysis tools to review performance of various digital circuits.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Apply** a digital logic to solve real life problems.
CO2. **Define** various combinational logic circuits.
CO3. **Construct** sequential logic circuits such as counters, shift registers etc.
CO4. **Make use of** different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.
CO5. **Analyze** professional quality textual and graphical presentations of laboratory data and Computational results, incorporating accepted data analysis and synthesis methods, Mathematical software and word-processing tools.
CO6. **Compare** possible causes of discrepancy in practical experimental observations to theory data.

Catalog Description

Digital Electronics is the study of electronic circuits that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by two discreet voltages or logic levels. This distinction allows for greater signal speed and storage capabilities and has revolutionized the world electronics. Digital electronics is the foundation of all modern electronic devices such as cellular phones, MP3 players, laptop computers, digital cameras, high definition televisions, etc. The major focus of the DE course is to expose students to the design process of combinational and sequential logic design, teamwork, communication methods, engineering standards, and technical documentation. Utilizing the activity-project-problem-based (APPB) teaching and learning pedagogy, students will analyze, design and build digital electronic circuits. While implementing these designs students will continually hone their interpersonal skills, creative abilities and understanding of the design process.

Course Content

List of experiments:

1. A. Study of Logic Gates
   B. Study Universal Logic Gates
2. Study of Half Adder & Full Adder
3. Study of Half Subtractor & Full Subtractor
4. Design and Implementation of Binary to Gray & Gray to Binary Code Convertor
5. Design and Implementation of BCD to Excess-3 & Excess-3 to BCD Code Convertor
6. Design and Implementation of 1Bit & 2Bit Magnitude Comparator
7. Design and Implementation of 4:1 Multiplexer and 1:4 Demultiplexer
8. Design and Implementation of 4:2 Encoder and 2:4 Decoder
9. Verification of Characteristics Tables of S-R and D Flipflop Using Universal Gates
10. Verification of Characteristics Tables of J-K and T Flipflop Using Universal Gates
11. Design of 2-bit Asynchronous Counter Using Flip Flops
12. Design of 2-bit Synchronous Counter Using Flip Flops
13. Design and Implementation of SISO & SIPO Shift Registers using Flip Flops
14. Design and Implementation of PISO & PIPO Shift Registers using Flip Flops

Text Books

1. M. Morris Mano , Michael D. Ciletti; "Digital Design", 4th Edition , Pearson Prentice Hall , 2007.
2. Floyd & Jain; "Digital Fundamentals",8th Edition, Pearson Education,2006.
3. S. Salivahanan and S. Arivazhagan; Digital Circuits and Design (Fourth Edition-2012); Vikas Publishing House

Reference Books

1. Anand Kumar; "Digital Electronics"; PHI.
2. Digital Fundamentals, Thomas L. Floyd, Pearson Education, ISBN:9788131734483
3. Digital Principles and Applications, Malvino and Leach, TMH

e-Resources

1. http://www.vlab.co.in/
2. http://www.asic-world.com/

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs

	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Apply** a digital logic to solve real life problems.	**PO1, PO2, PO6, PSO2**
CO2	**Define** various combinational logic circuits.	**PO1, PO3, PO6, PSO1, PSO2**
CO3	**Construct** sequential logic circuits such as counters, shift registers etc.	**PO1, PO3, PO6, PSO1, PSO2**
CO4	**Make use of** different types of wiring and instruments connections keeping in mind technical, Economical, safety issues.	**PO1, PO3, PO6, PSO1**
CO5	**Analyze** professional quality textual and graphical presentations of laboratory data and Computational results, incorporating accepted data analysis and synthesis methods, Mathematical software and word-processing tools.	**PO1, PO3, PO6, PSO1, PSO2**
CO6	**Compare** possible causes of discrepancy in practical experimental observations to theory data.	**PO1, PO2, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE12011	Digital Electronics Lab	3	2	3			3							3	3

1=weakly mapped;
2= moderately mapped;
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE12011– Prof. Core- IV Lab (Digital Electronics Lab)

Program: B.Tech. **Semester: ODD 2022-23**
Time: 03 hrs. **Max. Marks: 50**

Questions			
1.	**A)** Implement and verify the truth table of logic gates (AND, OR, NOT, EX-OR) using universal NAND gate. **B)** Simplify the following expression into sum of products using Karnaugh map F (A, B, C, D) = $\sum_m$ (1,3,4,6,7,12,13) + $\sum_d$ (2,8,11). Draw the simplified equation using logic gates.	**R** **An**	**CO1+CO4+CO5+CO6**
2.	**A) Design** and implement the half subtractor and full adder circuit using logic gates and verify the truth table. **B)** Minimize the following logic function using K-maps and realize using NAND gates. $Y = \prod (0, 1, 4, 5, 6, 8, 9, 12, 13, 14)$	**U** **An**	**CO2+CO4+CO5+CO6**
3.	**A) Design** and implementation of 3 bit binary to gray and gray to binary converter circuit and verify the truth table. **B)** Simplify the given expression to its Sum of Products (SOP) form. Draw the logic circuit for the simplified SOP function; $Y = (A+B)(A+\overline{AB})C + \overline{A}(B+\overline{C}) + \overline{A}B + ABC$	**U**	**CO2+CO4+CO5+CO6**
4.	**A) Design** and implementation of 4-bit BCD to Excess 3 code converter circuit. Simplify the equation using Karnaugh map and verify the truth table. **B) What** do you mean by priority encoder? State the De-Morgan's theorem.	**U** **R**	**CO2+CO4+CO5+CO6**
5.	**A) Design** and verify the truth table of 4:2 encoder and 2:4 decoder circuit. **B) Design** 1-bit full adder using Multiplexer with K-Map.	**U** **An**	**CO2+CO4+CO5+CO6**
6.	**A) Design** and verify the truth table of 4:1 multiplexer and 1:4 de-multiplexer circuit. **B)** Implementation of Boolean function F (A, B, C, D) = $\sum_m$ (1,4,5,7,9,12,13) using 4X1 MUX.	**U** **An**	**CO2+CO4+CO5+CO6**
7.	**A)** Design and verify the characteristics table of S-R Flip Flop & D Flip Flop using Universal NAND Gate. **B)** Implement or design a 16:1 MUX using two 8:1 MUX	**U**	**CO3+CO4+CO5+CO6**
8.	**A)** Design and verify the characteristics table of J-K Flip Flop & T Flip Flop using Universal NAND Gate. **B)** Design a 3-bit asynchronous down counter using positive edge triggered and show the timing diagram.	**An**	**CO3+CO4+CO5+CO6**
9.	**A)** Design & verify the state table of MOD-4 asynchronous up counter using JK Flip Flop. **B)** Explain the need of counters. Write down the differences between synchronous and asynchronous counter.	**U**	**CO3+CO4+CO5+CO6**
10.	**A)** Design & verify the state table of MOD-4 synchronous up counter using JK Flip Flop. **B)** Design a 3-bit asynchronous up counter using negative edge triggered and show the timing diagram.	**An**	**CO3+CO4+CO5+CO6**

		L	T	P	C
ECE12012	Prof. Core- VI Lab (Digital Signal Processing Lab)	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	1. 12^{th} level Mathematics 2. Knowledge of Signal and Systems				
Co-requisites	--				

Course Objectives

1. To expose the students with computing knowledge to generate different signals and wide variety of signal processing operations using MATLAB and Familiarization with the CC Studio and TI 6713 DSP.
2. To design different type of FIR and IIR filters and analyse them.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Design** difference signals using MATLAB
CO2. **Find** linear convolution and cross correlation of two sequences
CO3. **Illustrate** Z transform and Inverse Z transform
CO4. **Compare** DFT and IDFT using MATLAB
CO5. **Find** the linear convolution by overlap add method
CO6. **Design** and examine the different types of IIR and FIR filters

Catalog Description

Digital signal processing is a subfields of signal processing having wide applications include audio and speech processing, sonar, radar and other sensor array processing, spectral density estimation, statistical signal processing, digital image processing, data compression, video coding, audio coding, image compression, signal processing for telecommunications, control systems, biomedical engineering, and seismology, among others. Digital signal processing Lab is developed to observe difference type of signals and to perform a wide variety of signal processing operations such as convolution and cross correlation; Z transform and Inverse Z transform; DFT and IDF. Student will learn how to design and analyze the FIR and IIR digital filter.

Course Content

List of experiments:

1. Generation of different types of waveform using MATLAB.
2. Conversion of continuous time signals to discrete sequence/signals.
3. Generation of an arbitrary discrete sequence
4. Perform linear convolution of two sequences without using MATLAB “conv” command.
5. Perform cross correlation of two sequences without using MATLAB “corr” command.
6. Plot pole-zero for a given sequence and systems.
7. Perform Discrete Fourier Transform using Matrix Multiplication

8. Implementation of circular convolution of the two given sequences using DFT based approach.
9. Perform linear convolution of a finite length sequence with an infinite length sequence using overlap add method
h[n]={1,1,1} and x[n]={3,-1,0,1,3,2,0,1,2,1}
10. Design low pass, high pass and band pass IIR Butterworth direct form -1 digital filter using the Filter-builder command.
11. Design low pass, high pass and band pass IIR Butterworth direct form -1 digital filter using the FDA tool.
12. Design low pass, high pass and band pass IIR Butterworth direct form -1 digital filter using MATLAB.
13. Write a Matlab code to design an FIR filter using window method
14. Design a 25 tap low-pass FIR filter with cut off frequency 0.5pi radian using window method.
15. Design a 25 tap low-pass FIR filter with cut off frequency 0.5pi radian using window method and plot the responses using fvtool.
16. Familiarization with the CC Studio and TI 6713 DSP.
17. Display a message ("ADAMAS UNIVERSITY") in the monitor by writing a program in CC Studio environment and porting it to TI 6713 DSP.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Design** difference signals using MATLAB	**PO1, PO5**
CO2	**Find** linear convolution and cross correlation of two sequences	**PO1, PO2, PO5, PSO1**
CO3	**Illustrate** Z transform and Inverse Z transform	**PO1, PO5, PO9**
CO4	**Compare** DFT and IDFT using MATLAB	**PO1, PO5, PSO1**
CO5	**Find** the linear convolution by overlap add method	**PO1, PO2, PO5, PSO1**
CO6	**Design** and examine the different types of IIR and FIR filters	**PO1, PO2, PO5, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
ECE1 2012	Digital Signal Processing Lab	3	3			3				3				3	

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE12012- Prof. Core- VI Lab (Digital Signal Processing Lab)
Program: B. TECH (ECE) **Time: 03 Hrs.**
Semester: IV 2020-21 **Max. Marks: 50**

1	Generate 3 periodic and 3 aperiodic signals using MATLAB.	**R**	**CO1**
2	Conversion of continuous time signals to discrete sequence/signals.	**R**	**CO1**
3	Generation of an arbitrary discrete sequence	**R**	**CO1**
4	Perform linear convolution of two sequences without using MATLAB "conv" command.	**U**	**CO2**
5	Perform cross correlation of two sequences without using MATLAB "corr" command.	**U**	**CO2**
6	Plot pole-zero for a given sequence and systems.	**U**	**CO3**
7	Perform Discrete Fourier Transform using Matrix Multiplication	**U**	**CO1**
8	Implementation of circular convolution of the two given sequences using DFT based approach.	**Ap**	**CO4**
9	Perform linear convolution of a finite length sequence with an infinite length sequence using overlap add method h[n]= {1,1,1} and x[n]= {3, -1,0,1,3,2,0,1,2,1}	**Ap**	**CO5**
10	**Design** low pass, high pass and band pass IIR Butterworth direct form -1 digital filter using the Filter-builder command.	**Ap**	**CO6**
11	**Design** low pass, high pass and band pass IIR Butterworth direct form -1 digital filter using the FDA tool.	**AP**	**CO6**
12	**Design** low pass, high pass and band pass IIR Butterworth direct form -1 digital filter using MATLAB.	**AP**	**CO6**
13	Write a Matlab code to design an FIR filter using window method	**U**	**CO6**
14	**Design** a 25 tap low-pass FIR filter with cut off frequency 0.5pi radian using window method.	**U**	**CO6**
15	**Design** a 25 tap low-pass FIR filter with cut off frequency 0.5pi radian using window method and plot the responses using fvtool.	**Ap**	**CO6**
16	Familiarization with the CC Studio and TI 6713 DSP. Display a message ("ADAMAS UNIVERSITY") in the monitor by writing a program in CC Studio environment and porting it to TI 6713 DSP.	**U**	**CO6**

		L	T	P	C
ECE11013	Microcontrollers and Interfacing				
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Digital Electronics, Computer Architecture				
Co-requisites	--				

Course Objectives

1. Outline the history of computing devices.
2. Develop programs for microprocessor and microcontrollers.
3. Understand 8051 microcontroller concepts, architecture and programming.

Course Outcomes

At the end of the course, students will be able to:

CO1. Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.
CO2. Write 8051 Assembly level programs using 8051 instruction set.
CO3. Explain stack and Input Output Interfacing.
CO4. Write 8051 Assembly language program to generate timings and waveforms using 8051 timers, to send & receive serial data using 8051 serial port and to generate an external interrupt using a switch.
CO5. Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051and interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.

Catalog Description

To make the students understand that Microcontroller is a required course for under-graduate students in the ECE program. The purpose of this course is to teach students the fundamentals of microcontroller systems. The student will be able to incorporate these concepts into their electronic designs for other courses where control can be achieved via a microprocessor/controller implementation.

Course Content

Unit I: **9 lecture hours**

Introduction of 8051 Microcontroller:

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture-Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

Unit II: **9 lecture hours**

8051 Instruction Set:

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples (without loops) to use these instructions.

Unit III: **10 lecture hours**

8051 Stack, I/O Port Interfacing and Programming:

8051 Stack, Stack and Subroutine instructions. Assembly language program examples on subroutine and involving loops.Interfacing simple switch and LED to I/O ports to switch on/off LED with respect to switch status.

Unit IV: 8 lecture hours

8051 Timers and Serial Port:
8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin. 8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.

Unit V: 9 lecture hours
8051 Interrupts and Interfacing Applications:
8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch, 8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Stepper motor and their 8051 Assembly language interfacing programming.

Text Books

1. "The 8051 Microcontroller and Embedded Systems – using assembly and C", Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006.
2. "The 8051 Microcontroller", Kenneth J. Ayala, 3rd Edition, Thomson/Cengage Learning.

Reference Books

1. "The 8051 Microcontroller Based Embedded Systems", Manish K Patel, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. "Microcontrollers: Architecture, Programming, Interfacing and System Design", Raj Kamal, Pearson Education, 2005.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.	**PO1**
CO2	Write 8051 Assembly level programs using 8051 instruction set.	**PO1,PO5**
CO3	Explain stack and Input Output Interfacing.	**PO1**
CO4	Write 8051 Assembly language program to generate timings and waveforms using8051 timers, to send &	**PO1,PO2,PO5,PO11**

	receive serial data using 8051 serial port and to generate an external interrupt using a switch.	
CO5	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051and interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.	**PO1,PO2,PO3,PO5,PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11013	**Microcontroller and Interfacing**	3	2	1		3						1		1	

1=weakly mapped
2= moderately mapped
3=strongly mapped

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech	**Semester:**	V
Paper Title:	**Microcontroller and Interfacing**	**Paper Code:**	ECE11013
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)	**22.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **23.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **24.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Model Question Paper

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	Explain the role of flag register?	**U**	**CO1**
2	Define carry and auxiliary carry.	**R**	**CO2**
3	Describe why PUSH instruction is used in microcontroller?	**R**	**CO3**
4	Define the meaning of the instruction MOV A,#30 in 8051	**R**	**CO4**
5	Explain Non mask -able Interrupt. Define with example.	**U**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	Determine how internal RAM Memory will affect all interfacing circuits connected to microcontroller Explain.	**An**	**CO1**
	(OR)		
6 b)	Explain Function of every pins of 8051 microcontroller.	**U**	**CO1**

7 a)	Determine the value of C,Z,AC flag bit ,For this given ALP.
	MOV A, #45H
	MOV R1, #69H
	ADD A, R1
	MOV DPTR, #2050H
	MOV @ DPTR, A
		An	**CO2**

	(OR)		
7 b)	Explain 6 Data transfer group instructions with example.	**U**	**CO2**
8 a)	Explain stack structure of 8081	**U**	**CO3**
	(OR)		
8 b)	Define PUSH and POP Instruction operation.	**R**	**CO3**
9 a)	Differentiate Mode1 and Mode2 of timer/counter operation of 8051.	**An**	**CO4**
	(OR)		

9 b)	Explain Serial communication through special function register of 8051	**U**	**CO4**
10 a)	Define different types of interrupt of 8081 with example.	**R**	**CO5**
10 b)	Write a program to on LEDs by using switches.	**U**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Explain arithmetic group instructions of 8051.	**U**	**CO2**
(OR)			
11 b)	Define addressing mode of 8051 microcontroller.	**R**	**CO2**
12 a)	Explain External ROM Operation.	**R**	**CO1**
(OR)			
12 b)	Differentiate Microcontroller with Embedded System.	**An**	**CO1**
13 a)	Execute C program to turn on LEDs.	**App & An**	**CO3**
(OR)			
13 b)	Differentiate Subroutine with main program. How subroutine is needed to interface external circuit.	**App & An**	**CO3**
14 a)	Explain role of RS-232 Cable .	**U**	**CO4**
(OR)			
14 b)	Define different input output ports of 8051.	**R**	**CO4**
15 a)	Explain different modes of timer operations .	**U**	**CO4**
(OR)			
15 b)	How SCON and SBUF help to complete serial operation.	**Ev**	**CO4**
16 a)	Explain how led can be interfaced with 8051.	**U**	**CO5**
(OR)			
16 b)	Explain C programming to interface LCD with 8051.	**U**	**CO5**
17 a)	Explain ADC Operation using 8051.	**R**	**CO5**
(OR)			
17 b)	Define Stepper motor interfacing through 8051.	**U**	**CO5**

ECE11014	Prof. Core- IX (Communication Systems-II)	L	T	P	C
Version 2.0	**Contact Hours – 45**	3	1	0	4
Pre-requisites/Exposure	Students entering this course require a basic knowledge of communication systems and frequency domain analysis as taught in Analog Communication. It includes a treatment of signal-to-noise ratio and bit error rate in digital links that rely on the treatment of probability. It will definitely help if you study the tutorials of Signals and Systems as a reference. A basic knowledge of the terms involved in Electronics and Communications would be an added advantage.				
Co-requisites	Random Process, MATLAB				

Course Objectives

1. To Develop an intuitive grasp of random variables and notion of random process and their characteristics.
2. To learn about theoretical bounds on the rates of digital communication system and represent a digital signal using several modulation methods.
3. To present the fundamentals of modern digital communication system design and to evaluate the performance of digital signalling schemes on realistic communication channels. Emphasis is placed on physical layer digital communications, including waveform design and receiver design.
4. To get familiar with digital modulation techniques and its importance. Also study the probability of error.
5. To understand concept of spread spectrum communication system.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Explain** various functions of random variable and notion of random process and their characteristics.
CO2. **Explain** the analog waveform to digital data conversion. Also understand the generation and detection of base band system.
CO3. **Find** the performance of line codes and methods to mitigate Inter Symbol Interference.
CO4. **Analyze** the generation, detection, signal space representation, spectrum, bandwidth efficiency and probability of error analysis of different band pass modulation techniques.
CO5. **Compare** various spreading techniques and determine bit error performance of various digital communication systems.

Catalog Description

Communication systems are at the heart of today's information driven economy and support our modern-day lifestyles and even our very existence. From the familiar telephone that was invented over a century ago, to modern day cell phones, wireless networks, and Internet, as well as radio, television, cable and satellite systems, we now rely on electrical communication systems in almost all aspects of our lives. The course focuses on the technologies underlying these systems, which constitute the field of digital communications. Topics include digital transmission and reception, signal space representations, spectral analysis of digitally modulated waveforms, design considerations for bandlimited channels, baseband digital transmission and spread spectrum modulation. The course is intended for graduate/senior undergraduate level students. While the course is intended to serve as an introduction to digital communications, the pre-requisites/co-requisites listed are absolutely necessary.

Course Content

Unit I: 8 lecture hours

Probability and Random Processes

Probability theory, Conditional probability, continuous random variable, discrete random variable, Cumulative distribution function, conditional probability density function (Gaussian, Rayleigh and Rician), variance, covariance, properties of auto-correlation function, Random Process; time & ensemble averages, ergodic process, power spectral density of weakly stationary process.

Unit II: 10 lecture hours

Digital Modulation Systems

Difference between analog & digital signal, basic elements of digital communication systems, Sampling theorem, various types of sampling, Pulse Amplitude Modulation (PAM), interlacing, signal sample multiplexing, Quantization: uniform and non-uniform quantization, quantization noise, Pulse Code Modulation (PCM), binary encoding, A-Law and μ –law, companding, Regenerative Repeater, Noise in PCM, Delta modulation: Generation & Detection, Slope Overload & Granular noise, Signal to Quantization Noise ratio, Generation & Detection Adaptive Delta modulation, Differential PCM.

Unit III: 7 lecture hours

Baseband Digital Transmission

Concept of line coding polar/unipolar/bipolar NRZ and RZ, Manchester, differential encoding and their PSDs, Inter Symbol Interference (ISI), Nyquist criterion for zero ISI, pulse shaping, ideal Nyquist pulse, raised cosine pulse, Eye diagram, equalization, adaptive equalization, zero forcing equalizer, timing extraction.

Unit IV: 14 lecture hours

Digital Modulation Techniques

Coherent and non-coherent Binary Modulation, digital carrier modulation techniques: ASK, FSK and PSK, Coherent Binary Phase Shift Keying (BPSK): geometrical representation of BPSK signal; error probability, generation and detection of BPSK Signal, spectrum of BPSK, error probability of BPSK signal, DPSK Technique, Coherent Binary Frequency Shift Keying (FSK): geometrical representation of BFSK signals, generation and detection of Coherent Binary FSK signals, power spectrum of BFSK signal, error probability of BFSK signal, Quadrature Phase Shift Keying (QPSK): generation and detection of QPSK signals, power spectrum of QPSK signals, Minimum Shift Keying (MSK): Generation & Detection of MSK Signal, error probability of MSK signal, Concept of M-ary Communication, M-ary phase shift keying, Gaussian Minimum Shift Keying: GMSK.

Unit V: 6 lecture hours

Introduction to Spread Spectrum Techniques

Introduction-Discrete Sequence Spread Spectrum Technique-Use of Spread Spectrum with CDMA-Ranging Using Discrete Sequence Spread Spectrum-Frequency Hopping Spread

Spectrum-Generation & Characteristics of PN Sequence-Acquisition of FH a Signal-Tracking of FH a signal-Acquisition of a DS Signal-Tracking of a DS signal

Text Books

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, John Wiley and Sons, 3rd Edition, 2001
2. Taub & Schilling, "Principles of Digital Communication "Tata McGraw-Hill" 28th reprint, 2003
3. B.P.Lathi -Communication Systems- BS Publications

Reference Books

1. Digital Communications, J.G.Proakis, TMH Publishing Co.
2. Carlson—Communication System,4/e, Mc-Graw Hill
3. V. Chandra Sekar, Communication Systems, Oxford University Press

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** various functions of random variable and notion of random process and their characteristics.	**PO1, PO2, PSO2**
CO2	**Explain** the analog waveform to digital data conversion. Also understand the generation and detection of base band system.	**PO1, PO10, PSO1**
CO3	**Find** the performance of line codes and methods to mitigate Inter Symbol Interference.	**PO1, PO2, PSO1, PSO2**
CO4	**Analyze** the generation, detection, signal space representation, spectrum, bandwidth efficiency and probability of error analysis of different pass band modulation techniques.	**PO2, PO3, PO10, PSO1, PSO2**
CO5	**Compare** various spreading techniques and determine bit error performance of various digital communication systems.	**PO2, PO3, PO10, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO2
ECE1 1014	Communi cation Systems-II	3	3	2							3			3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 20__ – 20__)		
Name of the Program:	B.Tech	**Semester:**	V
Paper Title:	Communication Systems II	**Paper Code:**	ECE11014
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

2. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
3. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
4. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A
Answer All the Questions (5 x 1 = 5)

1	To avoid aliasing, **what** is the nyquist rate of this signal x(t) = 8cos100πt? a) 25 Hz b) 50 Hz c) 100 Hz d) 200 Hz	**U**	**CO2**
2	For a BPSK system, the bit error probability is given by, **a)** $\frac{1}{2}erfc\left(\sqrt{\frac{E_b}{2N_0}}\right)$ **b)** $\frac{1}{2}erfc\left(\frac{1}{2}\sqrt{\frac{E_b}{2N_0}}\right)$ **c)** $\frac{1}{2}erfc\left(\sqrt{\frac{E_b}{N_0}}\right)$ **d)** $\frac{1}{2}erfc\left(\frac{1}{2}\sqrt{\frac{E_b}{N_0}}\right)$	**U**	**CO4**
3	In **which** modulation technique redundant bits should be reduced a) ADM b) DPCM c) PCM d) None of these	**U**	**CO2**
4	Auto correlation function of a random process is defined as, a) R (t1, t2) = E(XY) = ∬ xyp(x,y)dxdy b) E (XY) = ∬ x2 y2dxdy c) R (t1, t2) = ∬ x2 y2dxdy d) None of these	**R**	**CO1**
5	The bit rate of a digital communication system is 34 Mbps. The modulation scheme is QPSK. The baud rate of the system is, a) 68 Mbps b) 34 Mbps c) 17 Mbps d) 8.5 Mbps	**U**	**CO4**

Group B
Answer All the Questions (5 x 2 = 10)

6 a)	a) For a PAM transmission of voice signal having maximum frequency 3 KHz, calculate the transmission bandwidth. It is given that f_S = 8 KHz	**U**	**CO2**

	and the pulse duration $\tau = 0.1\ T_S$		
	(OR)		
6 b)	Briefly describe the compressor and expander characteristics of companding.	**U**	**CO2**
7 a)	Represent QPSK signals in the signal space and **find** distance between them. What is the significance of each? Explain briefly.	**AP**	**CO4**
	(OR)		
7 b)	**What** is the difference between coherent and non-coherent digital modulation techniques? (R) What is the bandwidth of BFSK signal?	**U**	**CO3**
8 a)	State the comparison between FHSS & DSSS/CDMA.	**U**	**CO2**
	(OR)		
8 b)	**How** can OFDM (Orthogonal Frequency Division Multiplexing) achieve high data rates?	**U**	**CO5**
9 a)	Briefly describe the 'Nyquist Criterion for distortion less baseband transmission' by using time and frequency domain representation.	**AP**	**CO3**
	(OR)		
9 b)	**What** is the remedy to reduce ISI?	**U**	**CO3**
10 a)	Consider the binary sequence [0 1 0 0 1 0 1 1]. Draw the waveforms for the following i) Split phase Manchester format ii) Polar RZ signal iii) AMI RZ signal	**U**	**CO4**
	(OR)		
10 b)	Draw the block diagram of a QPSK reception and **explain** its principle of operation.	**U**	**CO4**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	Highlight the **compare** between Narrow Band and Wide Band FM.	**U**	**CO1, CO5**
	(OR)		
11 b)	**What** are the properties of line coding techniques?	**U**	**CO1, CO2**
12 a)	**What** is the remedy to reduce ISI?	**U**	**CO1**
	(OR)		
12 b)	Briefly describe the compressor and expander characteristics of companding.	**U**	**CO1**
13 a)	**What** is the difference between coherent and non-coherent digital modulation techniques? (R) What is the bandwidth of BFSK signal?	**Ap**	**CO2**
	(OR)		
13 b)	Explain demodulation of DSBSC with simple diagram.	**Ap**	**CO2**
14 a)	Draw the block diagram of a QPSK reception and **explain** its principle of operation.	**U**	**CO3**
	(OR)		

14 b)	**Explain** and calculate the probability of error in a BPSK signal.	**U**	**CO3**
15 a)	A television signal having a bandwidth of 10.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine: i) Code word length, ii) Transmission bandwidth	**Ap**	**CO4**
	(OR)		
15 b)	Prove that the difference between fH and fL is minimum in MSK technique.	**Ap**	**CO4**
16 a)	**What** is companding in digital baseband transmission system? c) A Delta Modulation (DM) system is designed to operate at five times the nyquist rate for a signal having a bandwidth equal to 3 KHz. Calculate the maximum amplitude of a 2 KHz input sinusoid for which the DM does not have slope overload. Given that the quantizing step size is 250 mV.	**R**	**CO2**
	(OR)		
16 b)	**What** are ‘Slope Overload Distortion’ and ‘Granular Noise’ in Delta Modulation?	**Ap**	**CO5**
17 a)	A continuous random variable has a Probability Density Function (PDF) expressed as, fX (x) = ae-b|x|, here X be the random variable whose values lie in the range x = -α to α. i) **Determine** the relationship between a & b. ii) The probability that outcome lies between 1 and 2.	**U**	**CO1, CO2**
	(OR)		
17 b)	Briefly describe **how** Gaussian MSK (GMSK) is used for GSM wireless communication?	**U**	**CO4**

ECE11015	Prof. Core- X (VLSI System Design)	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. 12^{th} level Mathematics 2. Knowledge of 12^{th} level				
Co-requisites	1. Understanding of Electronic Devices 2. Understanding of Analog Electronics				

Course Objectives

1. To help to understand the functionality of VLSI design.
2. To familiar with different types of VLSI fabrication technology
3. To explain the use of MOS and CMOS Circuits
4. To acquire the knowledge of fabrication of VLSI chip.
5. To study the system hardware design.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Utilize** the basic design principles of VLSI.
CO2. **Develop** the concept of the different fabrication techniques.
CO3. **Find** the basics of MOS and CMOS circuit design.
CO4.**Illustrate** the necessities of memory devices and able to design various types of semiconductor memories.
CO5. **Find** the concept of VLSI system hardware design

Catalog Description

Very large-scale integration (**VLSI**) is the process of creating an integrated circuit (IC) by combining millions of MOS transistors onto a single chip. VLSI began in the 1970s when MOS integrated circuit chips were widely adopted, enabling complex semiconductor and telecommunication technologies to be developed. The microprocessor and memory chips are VLSI devices. Before the introduction of VLSI technology, most ICs had a limited set of functions they could perform. An electronic circuit might consist of a CPU, ROM, RAM and other glue logic. VLSI lets IC designers add all of these into one chip

Course Content

Unit I: **9 lecture hours**

Introduction to VLSI Design:

Historical Perspective and Future Trends, Moor's Law;Scale of Integration (SSI, MSI, LSI, VLSI, ULSI), Types of VLSI Chips (Analog & Digital VLSI chips, General purpose, ASIC, PLA, FPGA), Design principles (Digital VLSI – Concept of Regularity, Granularity etc), Design Domains (Behavioural, Structural); VLSI design styles: Full custom, Gate array, Standard cell, Micro-cell based design, Field programmable device; Design quality.

Unit II: 9 lecture hours

Fabrication Technology

Si semiconductor technology: Wafer preparation, Oxidation, Ion implantation, Different deposition processes, Metallization, Etching, Lithography; Bipolar, CMOS and Bi-CMOS fabrication processes; Layout design rule.

Unit III: 9 lecture hours

MOS & CMOS Circuit Characterization and Performance Estimation

Resistance Estimation, Capacitance Estimation: MOS Device Capacitance, Diffusion Capacitance, Routing Capacitance, RC Effects, Capacitance Design Guide; Switching Characteristic: Fall Time, Rise Time, Delay Time; RC Circuit Delay Computation: Cascaded RC Stages, Elmore Delay. Propagation Delay Calculation with Elmore Model for Multiple RC Stages; CMOS Gate Transistor Sizing, Determination of Conductor Size, Power Consumptions: Static Dissipation, Dynamic Dissipation.

Unit IV: 9 lecture hours

CMOS logic design & Semiconductor memories

CMOS logic circuit, NMOS and CMOS Logic, Dynamic and Pass-transistor logic, Design of logic gate: Inverter, NAND and NOR gate, CMOS Full Adder ,Multiplexer, Decoder, logic minimization, Advanced CMOS Logic circuits; Sequential CMOS logic circuits; SR Latch circuit, clocked JK Latch/ Master-Slave JK , CMOS D-latch & Edge triggered flip-flop , Series and parallel transistor connection, source drain capacitance, charge sharing, Logic style comparison, Physical layout logic gate, CMOS standard cell design, Layout and layout design rules.SRAM: CMOS SRAM cell, Bipolar SRAM cell; DRAM: basic DRAM cell and its Operation Device design and scaling Considerations for a DRAM Cell; Non-volatile memories: MOSFET nonvolatile memory devices, Flash Memory Arrays, Floating-Gate Non-volatile Memory Cells, Nonvolatile Memory Cells with Charge Stored in Insulator

Unit V: 9 lecture hours

VLSI system hardware design

Basics of system hardware design: Hierarchical design using top-down and bottom-up methodology, System partitioning techniques, interfacing between system components, Logic synthesis with verilog HDL: Impact of logic synthesis – Interpretation of a few verilog constructs – Synthesis design flow. Introduction to FPGA and its architectures. Testing in VLSI: Defects, Fault Models, Path Sensitization, Scan, Built-in-self Test (BIST), IDDQ.

Text Books:

1. Digital Integrated Circuit, J.M.Rabaey, Chandrasan, Nicolic, Pearson Education,2nd edition 2003
2. Weste and Eshrighian, ―Principle of CMOS VLSI Design‖ Pearson Education

Reference Books:

1. Wayne, Walf, “Modern VLSI design: System on Silicon” Pearson Education, 2nd Edition, 1998.
2. Pucknull, “Basic VLSI Design” PHI 3rd Edition

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Utilize** the basic design principles of VLSI.	**PO1, PO2, PO3, PSO1**
CO2	**Develop** the concept of the different fabrication techniques.	**PO1, PO2, PO3, PO4,PO12, PSO1**
CO3	**Find** the basics of MOS and CMOS circuit design.	**PO1, PO2, PO3, PO4, PO5,PO6, PO12,PSO1**
CO4	**Illustrate** the necessities of memory devices and able to design various types of semiconductor memories.	**PO1,PO2, PO3, PO4,PO5, PO6, PSO1, PSO2**
CO5	**Find** the concept of VLSI system hardware design	**PO1, PO2, PO3, PO4, PO5, PO6, PO12, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11015	VLSI Systems Design	3	3	3	3	2	2	-	-	-	-	-	1	3	2

1=weakly mapped
2= moderately mapped
3=strongly mapped

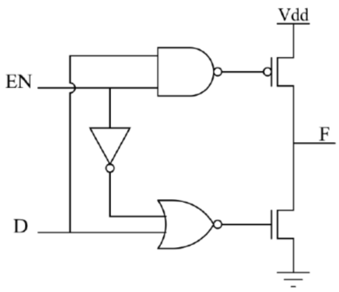
Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(Academic Session: 20__ – 20__)**

Name of the Program:	B.Tech	**Semester:**	V
Paper Title:	VLSI Systems Design	**Paper Code:**	ECE11015
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A
Answer All the Questions (5 x 1 = 5)

1	State Moor's Law;Scale of Integration in VLSI design.	**R**	**CO1**
2	What do you mean by ASIC?	**U**	**CO1**
3	Write down the applications of Chanel length modulation.	**U**	**CO3**
4	Where Elmore Model is used?	**U**	**CO4**
5	In the circuit shown, what are the values of F for EN= 0 and EN= 1 respectively 	**Ap**	**CO5**

Group B
Answer All the Questions (5 x 2 = 10)

6 a)	Write a short note on Full custom design.	**U**	**CO1**
	(OR)		
6 b)	Write a short note on Semi custom design.	**U**	**CO1**
7 a)	Write down the mathematical analysis of Capacitance Estimation in MOS.	**U**	**CO4**
	(OR)		
7 b)	Write down the mathematical modeling of Capacitance Estimation in CMOS.	**U**	**CO4**
8 a)	Write down the fabrication processes of PMOS.	**U**	**CO2**
	(OR)		

8 b)	Write down the fabrication processes of NMOS.	**U**	**CO2**
9 a)	What are the applications of body effect of CMOS transistor.	**U**	**CO3**
	(OR)		
9 b)	What are the applications of body effect of NMOS transistor.	**U**	**CO3**
10 a)	Design Master-Slave JK filp flop.	**U**	**CO5**
	(OR)		
10 b)	Design JK flip-flop.	**U**	**CO4**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	Calculate the dynamic power dissipation of CMOS inverter.	**Ap**	**CO4**
	(OR)		
11 b)	Calculate the dynamic power dissipation of NMOS inverter.	**Ap**	**CO4**
12 a)	Compare between static logic and dynamic logic. Explain the operation of Domino logic to design CMOS circuits. What are the limitations of it?	**U**	**CO5**
	(OR)		
12 b)	Write down the operation of NORA logic.	**U**	**CO1**
13 a)	What are the advantages and disadvantages of SOI process?	**Ap**	**CO2**
	(OR)		
13 b)	Why CMOS technology is most useful for analog functions?Explain	**Ap**	**CO2**
14 a)	What are the characteristics of FPGA?	**U**	**CO3**
	(OR)		
14 b)	Give the application of PLA?	**U**	**CO3**
15 a)	Explain the concept of MOSFET as switches?	**Ap**	**CO4**
	(OR)		
15 b)	Mention the defects that occur in a chip?	**Ap**	**CO4**
16 a)	What is meant by observability? And controllability?	**R**	**CO2**
	(OR)		
16 b)	What is fault sampling?	**Ap**	**CO5**
17 a)	What is known as IDDQ testing?	**U**	**CO1**
	(OR)		
17 b)	What is boundary scan?	**U**	**CO4**

ECE11016	**Antenna and Wave Propagation**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	12^{th} level Physics, Vector Analysis, Current Electricity				
Co-requisites	Vector Algebra, Analog communication systems, Transmission Lines, Microwave Engineering, Maxwell's Equations				

Course Objectives

1. To help the learners to understand the fundamental mechanism of radiation
2. To enable students to identify various antennas, their working mechanisms, associated vital parameters of antennas, and their applications.
3. To enable the learners to identify and analyse the different categories of antenna arrays, as well as to make them understand the modern applications of antenna arrays
4. To introduce the learners to wave propagation over ground, sky and space operating at radio frequencies.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the fundamental mechanism of radiation from antennas.
CO2. **Identify** and analyse the various types of antennas/arrays, their vital design parameters and applications.
CO3. **Solve** numerical involving mathematical analysis and design equations on antennas, antenna arrays and radio wave propagations.
CO4. **Evaluate** link budget and analyse atmospheric and terrestrial effects of wave propagation.
CO5. **Choose** techniques in designing antennas for Radar applications/portable device applications.

Catalog Description

Antenna and Wave Propagation is to introduce to the students the basics of radiating elements and effect of propagation of radio waves in actual environment. This course provides students with comprehensive coverage of a wide variety of antennas and propagation topics related to numerous communication systems with a particular emphasis on military applications. The course presents fundamental theory together with techniques for the practical design, measurement and application of antennas over the RF (radio-frequency) to microwave frequency range.

Course Content

Module I: E M Theory Basics and Wave Propagation **12 lecture hours**

Maxwell's equations – Displacement current, equation of continuity, boundary conditions; Propagation of uniform plane waves in unbounded medium – Reflection, phase and group velocities; Ground wave, Sky wave, tropospheric scattering propagation; Transmission lines and waveguides – Modes, design, traveling waves, standing waves, pulse propagation, characteristic impedance, cut-off frequency, attenuation, dispersion, power-handling capability; Smith chart and impedance matching techniques; Radiation concept– Elementary dipole, half-wave dipole, radiation patterns, gain, pattern multiplication, other basic antennas.

Module II: Fundamental Concepts of Antenna **8 lecture hours**

Physical concept of radiation, Radiation pattern, near-and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

Module III: Types of Antennas:

Aperture and Reflector Antennas: **6 lecture hours**

Huygens' principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, radiation from sectoral and pyramidal horns, design concepts, prime-focus parabolic reflector and Cassegrain antennas.

Broadband Antennas **4 lecture hours**

Log-periodic and Yagi-Uda antennas, frequency independent antennas, broadcast antennas

Microstrip Antennas **4 lecture hours**

Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

Module IV: Antenna Arrays **6 lecture hours**

Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays, synthesis of arrays of antenna using Schelkun off polynomial method, Woodward-Lawson method.

Module V: Modern Antennas and their Applications: **5 Lecture hours**

Planar inverted-F antennas, Dielectric resonator antennas, and MIMO antennas.

Application to Radar and Electronic Defense - Antenna designs for radar applications (Search Radar, Tracking Radar, Imaging Radar), Antenna design for ESM (Direction finding), Effects of antenna installation (Radome effects, antennas in proximity to other systems and objects.

Text Books

1. E.C. Jordan and Balmain, "Electro Magnetic Waves and Radiating Systems", PHI, 1968, Reprint 2003.

2. John D.Kraus and RonalatoryMarhefka, "Antennas", Tata McGraw-Hill Book Company, 2002.

Reference Books

1. R.E.Collin, "Antennas and Radio Propagation ", McGraw-Hill, 1987.
2. Balanis, "Antenna Theory", John Wiley & Sons, third edition , 2009..

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the fundamental mechanism of radiation from antennas.	**PO1, PO2, PO4, PO5**
CO2	**Identify** and analyse the various types of antennas/arrays, their vital design parameters and applications.	**PO1, PO2, PO5, PSO1**
CO3	**Solve** numerical involving mathematical analysis and design equations on antennas, antenna arrays and radio wave propagations	**PO1, PO2, PO4, PO5, PO6 PSO1**
CO4	**Evaluate** link budget and analyse atmospheric and terrestrial effects of wave propagation.	**PO1, PO2, PO6, PO7, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11016	Antenna and Wave Propagation	3	3		2	3	2							3	

1=weakly mapped;
2= moderately mapped;
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE11016– Antenna and Wave Propagation

Program: B.Tech. (ECE) **Semester: V**
Time: 03 hrs. **Max. Marks:50**

Instructions:
Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

Group A Answer All the Questions (5 x 1 = 5)			
1	A given antenna has radiation resistance of 70Ω and loss resistance of 15Ω. **Find** its directivity if the power gain is 20.	**Ap**	**CO3**
2	A dipole antenna is operating at 500 MHz.**Find** its effective area. (Given: Directivity= 1.644)	**Ap**	**C**
3	The antennas used for ground wave propagation should possess **which** kind of polarization?	**R**	**C**
4	**What** is Cassegrain feed? Explain its need in the parabolic dish antenna with the aid of suitable diagram	**U**	**C**
5	Write down the integral form of the Maxwell's equation (in free space) given	**R**	**C**

	below (in differential form): $\vec{\nabla}\times\vec{E} = -\frac{\partial \vec{B}}{\partial t}$		
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Explain** Transit time effect in a two wire transmission line. Draw the equivalent circuit of a transmission line and explain the fundamental parameters of the line.	**U**	**C**
(OR)			
6 b)	a) Calculate the quality factor (Q-factor) of an antenna with bandwidth of 500 KHz and cut off frequency of 20 MHz. b) For a 3-element Yagi-Uda antenna operating at 120 MHz, **find** the necessary dimensions if the inter element spacing is 0.19λ.	**U**	**C**
7 a)	**Calculate** time response analysis of 1^{st} Order closed loop systems.	**Analyse**	**C**
(OR)			
7 b)	**State** and **explain** Nyquist Stability Criterion.	**Understand**	**C**
8 a)	a) **What** is the difference between Broad-side antenna array and End-fire antenna array? Explain with proper diagram. b) **Explain** Duct propagation with the aid of suitable diagram.	**U**	**C**
(OR)			
8 b)	a) Calculate the quality factor (Q-factor) of an antenna with bandwidth of 500 KHz and cut off frequency of 20 MHz. b) For a 3-element Yagi-Uda antenna operating at 120 MHz, **find** the necessary dimensions if the inter element spacing is 0.19λ.	**Understand**	**C**
9 a)	a) **Explain** fringing effect in Microstrip patch antenna with proper figure. What are the different feeding methods of MSA? Explain with proper figure and equivalent circuits. b) Calculate the BWFN and power gain (G_p) (in dB) of a 2 m parabolic reflector operating at 6 GHz.	**U** **Ap**	**C** **C**
(OR)			
9 b)	**Design** a Lead Compensators.	**Analyse**	**C**
10 a)	a) **What** is the difference between Broad-side antenna array and End-fire antenna array? Explain with proper diagram. b) **Explain** Duct propagation with the aid of suitable diagram.	**U**	**C**
(OR)			
10 b)	**Solve** the state equations for a closed loop 2^{nd} order system.	**Evaluate**	**C**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Calculate** the resonant peak, M_r and damped natural frequency, ω_d of a second order system using time response analysis.	**Evaluate**	**C**
(OR)			
11 b)	State and **explain** Mason's gain formula using SFG.	**Understand**	**C**
12 a)	a) **Explain** fringing effect in Microstrip patch antenna with proper figure. What are the different feeding methods of MSA? Explain with proper figure and equivalent circuits. b) Calculate the BWFN and power gain (G_p) (in dB) of a 2 m parabolic reflector operating at 6 GHz.	**U** **Ap**	**C** **C**

12 b)	A system with an open loop transfer function $$G(s) = \frac{K}{s(s^2+s+4)}$$ Draw Nyquist plot and hence **investigate** the stability of the system for various values of K.	**Evaluate**	**C**
13 a)	a) **What** is the need for antenna arrays? Explain in detail. Explain uniform linear arrays with the help of suitable diagram. What are the three vital parameters of uniform arrays? b) **What** do you mean by a frequency independent antenna? Explain the design of a Log periodic antenna and write down the associated equation for scaling factor.	**U**	**C**
	(OR)		
13 b)	a) Enumerate the characteristics of D, E, F_1, and F_2 layers of the ionosphere with proper schematic diagrams. b)**Explai**n the following with the aid of suitable diagrams (a) Virtual Height (b) Critical frequency and (c) Skip Distance.	**U** **R**	**C** **C**
14 a)	a) **What** is the need for antenna arrays? Explain in detail. Explain uniform linear arrays with the help of suitable diagram. What are the three vital parameters of uniform arrays? b) **What** do you mean by a frequency independent antenna? Explain the design of a Log periodic antenna and write down the associated equation for scaling factor.	**U**	**C**
	(OR)		
14 b)	Sketch and **explain** the Bode plot for $$G(s)H(s) = \frac{64(s+2)}{s(s^2+3.2s+64)(s+0.5)}$$	**Analyse**	**C**
15 a)	a) Enumerate the characteristics of D, E, F_1, and F_2 layers of the ionosphere with proper schematic diagrams. b)**Explai**n the following with the aid of suitable diagrams (a) Virtual Height (b) Critical frequency and (c) Skip Distance.	**U** **R**	**C** **C**
	(OR)		
15 b)	a) **What** is the need for antenna arrays? Explain in detail. Explain uniform linear arrays with the help of suitable diagram. What are the three vital parameters of uniform arrays? b) **What** do you mean by a frequency independent antenna? Explain the design of a Log periodic antenna and write down the associated equation for scaling factor.	**U**	**C**
16 a)	Sketch and **explain** the Root locos for an open loop transfer function of a unity feedback control system is given below and determine a) the value of K for damping factor=0.5 b) the value of K for marginal stability c) frequency of oscillation at marginal stability condition d) the value of K at s=-6	**Understand**	**C**

	$$G(s) = \frac{K}{s(s+1)(s+3)}$$ [2+2+3+3]		
(OR)			
16 b)	a) Enumerate the characteristics of D, E, F_1, and F_2 layers of the ionosphere with proper schematic diagrams. b)**Explai**n the following with the aid of suitable diagrams (a) Virtual Height (b) Critical frequency and (c) Skip Distance.	**U R**	**C C**
17 a)	a) **Explain** fringing effect in Microstrip patch antenna with proper figure. What are the different feeding methods of MSA? Explain with proper figure and equivalent circuits. b) Calculate the BWFN and power gain (G_p) (in dB) of a 2 m parabolic reflector operating at 6 GHz.	**U Ap**	**C C**
(OR)			
17 b)	a) **What** is the need for antenna arrays? Explain in detail. Explain uniform linear arrays with the help of suitable diagram. What are the three vital parameters of uniform arrays? b) **What** do you mean by a frequency independent antenna? Explain the design of a Log periodic antenna and write down the associated equation for scaling factor.	**U**	**C**

ECE11017	**Foundation Course on Artificial Intelligence and Machine Learning**	L	T	P	C
Version 1.0	**Contact Hours - 30**	2	0	0	2
Pre-requisites/Exposure	Basic knowledge in Probability and Linear Algebra				
Co-requisites	----				

Course Objectives

1. To equip students with a solid foundation in linear algebra and optimization techniques, enabling them to understand and apply mathematical concepts crucial for data science and machine learning.
2. To introduce students to the essentials of inferential statistics, including probability theory, probability distributions, hypothesis testing, and their practical implementation in Python, fostering the ability to perform rigorous statistical analysis.
3. To provide a comprehensive refresher on Python programming, emphasizing data structures, functional programming, and the use of essential libraries such as NumPy and Pandas for data analysis, manipulation, and visualization.
4. To offer a foundational understanding of artificial intelligence and machine learning, covering their definitions, historical evolution, current trends, and real-world applications, preparing students for further study and practical work in these fields.

Course Outcomes
On completion of this course, the students will be able to

CO1: Demonstrate a comprehensive understanding of key concepts in linear algebra and optimization techniques.

CO2: Ability to conduct inferential statistical analysis, including understanding and applying probability distributions.

CO3: Develop strong programming skills in Python, with a focus on using key libraries like NumPy and Pandas for data analysis, manipulation, and visualization.

CO4: Acquire foundational knowledge in artificial intelligence (AI) and machine learning (ML).

Catalog Description:

This course provides a comprehensive introduction to the foundational concepts and skills required for data science and machine learning. Students will develop proficiency in linear algebra, optimization techniques, and inferential statistics and will apply these concepts using Python programming. The course emphasizes practical data manipulation and visualization using essential Python libraries like NumPy and Pandas. Additionally, students will gain a foundational understanding of artificial intelligence (AI) and machine learning (ML), exploring their historical context, current trends, and real-world applications. By the end of the course, students will be equipped with the knowledge and skills to tackle complex engineering problems and to engage in advanced studies in AI and ML.

Course Content

Unit I: **8 lecture hours**
Mathematical Foundations:
Linear Algebra: Vectors, Matrices, Norms, Subspaces, Projections, SVD, EVD, Derivatives of Matrices, Vector Derivative Identities, Least Squares
Optimization: Gradient Descent, Second Derivative Test, Constrained Optimization, KKT

Unit II: **8 lecture hours**
Statistics Essentials:
Inferential Statistics: Probability, Probability Distributions, and the Central Limit Theorem.
Hypothesis Testing: Definition and importance, Components of hypothesis testing: the null hypothesis and alternative hypothesis, steps involved in hypothesis testing. P-Value, different types of tests, and implementation in Python.

Unit III: **10 lecture hours**
Programming Refresher:
Introduction to Python: Understanding the structure of Python, Data Structures like lists, tuples, and dictionaries. Functional Programming in Python.
Python for Data Science: The 2 most important libraries of Python – NumPy and Pandas. NumPy and Pandas are essential for Data Analysis, cleaning, and most of the core Data Science work.

Data Visualization in Python: plotting graphs and trends using Python.

Unit IV: **4 lecture hours**

Introduction to Artificial Intelligence (AI) and Machine Learning (ML): Definition and Scope of AI and ML, Historical overview and current trends, Applications and impact of AI and ML in various industries

Text Books

1. "Introduction to Linear Algebra" by Gilbert Strang, published by Wellesley-Cambridge Press.
2. "Convex Optimization" by Stephen Boyd and Lieven Vandenberghe, published by Cambridge University Press.
3. "Statistics for Engineers and Scientists" by William Navidi, published by McGraw-Hill Education.
4. "Python Crash Course" by Eric Matthes, published by No Starch Press.
5. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, published by Pearson.
6. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy, published by The MIT Press.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Demonstrate** a comprehensive understanding of key concepts in linear algebra and optimization techniques.	PO1, PO2, PO5
CO2	**Ability to conduct** inferential statistical analysis, including understanding and applying probability distributions.	PO1, PO2 PO4, PO5
CO3	**Develop** strong programming skills in Python, with a focus on using key libraries like NumPy and Pandas for data analysis, manipulation, and visualization.	PO1, PO5, PO10, PO12
CO4	**Acquire** foundational knowledge in artificial intelligence (AI) and machine learning (ML).	PO1, PO3, PO5, PO7, PO12

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE11017	Foun-dation Course on Artificial Intelligence and Machine Learning	3	3		3	2		2			2		2	3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

ECE11018	Data Communication and Computer Networks	L	T	P	C
Version 2.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	FDM, TDM, Modulation				
Co-requisites	Fundamentals of Digital Communication				

Course Objectives

1. To investigate the configuration of a network.
2. To enable students to enlist the components of a network
3. To explain the importance of protocols in data communication networks.
4. To compare protocols based on their attributes in a data network.
5. To enable the students for acquiring the fundamental knowledge of switching, routing, congestion control and security issues related to a network.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the basics of Computer Networks, OSI and TCP IP Layered architecture, Model the LAN and WAN configuration using different media.
CO2. **Demonstrate** and practice the application of various layers of the OSI and TCP/IP models as well as various LAN and WAN configurations
CO3. **Appraise** the application of layered architecture and network security issues
CO4. **Apply** Matrix the knowledge of layered architecture/models to practical computer networks as well as various encryption and decryption algorithms for securing networks.
CO5. **Illustrate** and compare the fundamentals concept of digital communication techniques and medium, layering in networks, topologies in a network, network security issue, and LAN Topologies.

Catalog Description
This module introduces students to computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks. It is based around the OSI Reference Model that deals with the major issues in the bottom three (Physical, Data Link and Network) layers of the model. Students are also introduced to the areas of Network Security and Mobile Communications. This module provides the student with fundamental knowledge of the various aspects of computer networking and enables students to appreciate recent developments in the area.

Course Content

Module 1: Overview of data communication and Networking 11 lecture hours
Data communications components, data representation (ASCII, ISO etc.), direction of data flow (simplex, half duplex, full duplex), networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN, WAN),
Internet: brief history, internet today, protocols and standards, reference models: OSI reference model, TCP/IP reference model, their comparative study.

Module 2: Physical & Data Link Layer **11 lecture hours**

Physical Layer: Guided Transmission Media, Wireless Transmission Medium, Circuit Switching and Telephone Network, High Speed Digital Access.

Data Link Layer: Types of errors, framing (character and bit stuffing), error detection & correction methods, flow control, protocols: stop & wait ARQ, go-back-NARQ selective repeat ARQ, HDLC, point to point protocol, token bus, token ring, reservation, polling.

Module 3: Network and Transport Layer: **10 lecture hours**

Network Layer: Network Layer Design Issues, Routing Algorithms (Optimality principle, Static Routing Algorithms, Shortest Path, Flooding, Dynamic routing Algorithms, Distance Vector, Link State routing.), Congestion control Algorithms (Principles, Policies, Algorithms), Network Layer Protocols (IP Addressing, IP layer protocols: ICMP, ARP, RARP, DHCP, BOOTP, IPv6).

Transport Layer: Process to process delivery, UDP, TCP, congestion control algorithm: leaky bucket algorithm, token bucket algorithm

Module 4: Local Area Network & Multiple Access Protocols: **9 lecture hours**

LAN topologies, Layered architecture of LAN, IEEE standard, Traditional Ethernet, Fast Ethernet, Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA.

Module 5: Application Layer: **4 lecture hours**

DNS, Electronic Mail, SMTP, SNMP, FTP, HTTP, WWW, Multimedia.

Text Books

1. B A. Forouzan, “Data Communication and Networking”, 4/e, McGraw Hill, 2006.
2. W Stallings, “Data and Computer Communication” –7/e Pearson
3. A Tanenbarum, “Computer Networks” –4th Edition, PHI, 2004/Pearson Education 4th Edition

Reference Books

1. Jean Wairand - Communication Networks (A first Course) - Second Edition - WCB/McGraw Hill - 1998.
2. Leon-Garcia and Widjaja, “Communication Networks”, 2/e McGraw Hill, 2004.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the basics of Computer Networks, OSI and TCP IP Layered architecture, Model the LAN and WAN configuration using different media.	**PO1, PO2**

CO2	**Demonstrate** and practice the application of various layers of the OSI and TCP/IP models as well as various LAN and WAN configurations.	**PO2, PO3, PO4, PO5, PSO1**
CO3	**Appraise** the application of layered architecture and network security issues	**PO3, PO4, PO5**
CO4	**Apply** Matrix the knowledge of layered architecture/models to practical computer networks as well as various encryption and de-cryption algorithms for securing networks.	**PO1, PO2, PO3, PO4, PO5, PSO1**
CO5	**Illustrate** the fundamentals concept of digital communication techniques and medium, layering in networks, topologies in a network, network security issue, and LAN Topologies.	**PO1, PO2, PO5, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2

ECE11018	Data Communication and Computer Networks	3	3	3	2	3								3	

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	

Course: ECE11018– Data Communication and Computer Networks

Program: B.Tech. (ECE) **Semester: VI**
Time: 03 hrs. **Max. Marks:50**

Instructions:
Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**Explain** Shannon's and Nyquist theorem with suitable equations.	**U**	**CO1**
2	**What** is the difference between a Hub and a Switch? Explain.	**U**	**CO1**
3	**Explain** the Ring topology in brief. How can we overcome the limitations of uni-directional ring topology?	**An**	**CO6**
4	**What** is the need of sequence numbers in the Sliding window protocol?	**R**	**CO3**
5	**Explain** the need of Datalink layer in the OSI model.	**U**	**CO6**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**What** is IP addressing? What are the different classes of IP? What is the difference between static and dynamic IP's?	**R** **An**	**CO1**
(OR)			
6 b)	The bit pattern 01011001 is to be transmitted using the following techniques: (i) ASK (ii) FSK (iii) PSK. Sketch the transmitted waveform for each technique.	**Ap**	**CO4**
7 a)	Draw and **explain** the OSI reference Model. Also, compare TCP and UDP protocols in context of TCP/IP reference model.	**R** **An**	**CO6**
(OR)			

7 b)	**Explain** the process of encryption and decryption of a message using simple cryptography model. For n number of users, how many keys are needed if we use private and public cryptography schemes?	**U**	**CO3**
8 a)	**What** is IP addressing? What are the different classes of IP? What is the difference between static and dynamic IP's?	**R** **An**	**CO1**
(OR)			
8 b)	The bit pattern 01011001 is to be transmitted using the following techniques: (i) ASK (ii) FSK (iii) PSK. Sketch the transmitted waveform for each technique.	**Ap**	**CO4**
9 a)	**What** is IP addressing? What are the different classes of IP? What is the difference between static and dynamic IP's?	**R** **An**	**CO1**
(OR)			
9 b)	The bit pattern 01011001 is to be transmitted using the following techniques: (i) ASK (ii) FSK (iii) PSK. Sketch the transmitted waveform for each technique.	**Ap**	**CO4**
10 a)	**What** is IP addressing? What are the different classes of IP? What is the difference between static and dynamic IP's?	**R** **An**	**CO1**
(OR)			
10 b)	The bit pattern 01011001 is to be transmitted using the following techniques: (i) ASK (ii) FSK (iii) PSK. Sketch the transmitted waveform for each technique.	**Ap**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Draw and **explain** simple data communication model. Draw and explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?	**U**	**CO2**
(OR)			
11 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**
12 a)	Draw and **explain** simple data communication model. Draw and explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?	**U**	**CO2**
12 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**
13 a)	Draw and **explain** simple data communication model. Draw and	**U**	**CO2**

	explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?		
(OR)			
13 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**
14 a)	Draw and **explain** simple data communication model. Draw and explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?	**U**	**CO2**
(OR)			
14 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**
15 a)	Draw and **explain** simple data communication model. Draw and explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?	**U**	**CO2**
(OR)			
15 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**
16 a)	Draw and **explain** simple data communication model. Draw and explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?	**U**	**CO2**
(OR)			
16 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**
17 a)	Draw and **explain** simple data communication model. Draw and explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?	**U**	**CO2**
(OR)			

17 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**

ECE11019	**Optical Fiber Communication**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Basic Knowledge about Optical Laws & Semiconductor Physics				
Co-requisites	---				

Course Objectives

At the end of the course, the students will be able to:

1. Recall basic laws of optical physics. Distinguish between the various modes of operation of Optical fibers. Identify the various causes for signal degradation. Calculate the various types of losses occurring in transmission of energy. Recognize and classify the structures of Optical fiber and types.
2. Familiarize the student with the pulse broadening happening due to the effect of dispersion of the signal.
3. Classify the Optical sources on basis of physical construction and principle of operation. Classify the optical detectors on basis of ability to efficiently detect and hence convert electrical energy into light energy.
4. Explain the operation of optical receiver. Identify the various effects introducing noise in the optical system and evaluate the performance of digital receiver by calculating the probability of error.
5. To understand the applications of optical amplifiers like Erbium Doped Fiber Amplifier (EDFA).
6. Define the Wavelength Division Multiplexing. (WDM) principles and concepts and apply the principles to advanced devices like MachZehnder Interferometers

Course Outcomes

On completion of this course, the students will be able to

CO1. **Demonstrate** the basic construction of Optical fiber, classify its types and explain their working mechanisms

CO2. **Demonstrate** and practice the channel impairments like losses and dispersion, joining of multiple fibers together, and optical system performance parameters like dispersion, scattering etc.

CO3. **Explain** the factors behind coupling losses in optical fiber joints.

CO4. **Apply** the laws of optics to Optical sources as well as detectors and to discuss their principle
CO5. **Demonstrate** the understanding of fiber optic sensors and fiber optic networks.
CO6. **Illustrate** the fundamentals concept of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware, analyze the results to provide valid conclusions.

Catalog Description

Optical Fiber Communication is a method of transmitting information from one place to another by sending pulses of infrared light through an optical fiber. The light forms an electromagnetic carrier wave that is modulated to carry information. Fiber is preferred over electrical cabling when high bandwidth, long distance, or immunity to electromagnetic interference are required. This type of communication can transmit voice, video, and telemetry through local area networks, computer networks, or across long distances. Optical fiber is used by many telecommunications companies to transmit telephone signals, Internet communication, and cable television signals. Alcatel-Lucent recently announced that scientists in Bell Labs, the company's research arm, have set a new optical transmission record of more than 100 Petabits per second.kilometer (equivalent to 100 million Gigabits per second.kilometer).

Course Content

Module 1: Introduction to optical communications (10 Lecture Hours)

Ray theory transmission, Total internal Reflection-Acceptance angle, Numerical aperture, Skew rays, Electromagnetic mode theory of optical propagation, EM waves, modes in Planar guide, phase and group velocity, cylindrical fibers, SM fibers. Transmission characteristics of optical fiber: Fiber attenuation, Fiber dispersion, Group velocity, Material dispersion, Waveguide dispersion, Chromatic dispersion compensation, Polarization mode dispersion, Polarization-maintaining fibers, Optical fiber connectors, Fiber alignment and Joint Losses, Fiber connectors, Expanded Beam Connectors, Fiber Couplers.

Module 2: Optical Sources (10 Lecture Hours)

LEDs structure, surface and edge emitters, mono and hetero structures, Quantum efficiency, injection laser diode structures - comparison of LED and ILD Semiconductors LASER and their drive circuits. Distributed feedback lasers, tunable semiconductor lasers, laser characteristics, coupled-cavity semiconductor lasers, reliability considerations.

Module 3: Optical Detectors: (08 Lecture Hours)

PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Receiver performance, Photo detector noise, various types of Noise sources, Signal to Noise ratio, Detector response time, intensity noise, timing jitter, Performance of APD and PMT.

Module 4: Coherent optical communication & Fiber-Optic Sensors (10 Lecture Hours)

Heterodyne and Homodyne detection. Modulation formats and demodulation schemes, couplers and connectors, System design based on power budget and rise time budget.

Intensity Modulated Sensors, Phase Modulated Sensors, Fiber-optic Mach-Zehnder Interferometric sensor, Fiber-optic Gyroscope, Spectrally Modulated Sensors, Distributed Fiber Optic Sensors

Module 5: Optical Networks (7 Lecture Hours)

Basic Networks, SONET / SDH, Broadcast and WDM Networks, Wavelength Routed Networks, Nonlinear effects on Network performance, Performance of WDM and EDFA system, Optical CDMA, Ultra High Capacity Networks.

Text Books:

1. Optical Fiber Communication – Gerd Keiser – McGraw Hill – Third Edition. 2000

2. Optical Fiber Communication – John M. Senior – Pearson Education – Second Edition. 2007

3. Govind P. Agrawal, " Fiber-optic communication systems", third edition, John Wiley & sons, 2004.

References:

1. J. Gower, "Optical Communication System", Prentice Hall of India, 2001.
2. Optoelectronics and Fiber Optics Communication by C. K. Sarkar and D.C Sarkar, New Age International.
3. Fiber Optics and Opto electronics by R. P. Khare, Oxford University Press.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs

	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Demonstrate** the basic construction of Optical fiber, classify its types and explain their working mechanisms	**PO1,PO10, PSO1, PSO2**
CO2	**Demonstrate** and practice the channel impairments like losses and dispersion, joining of multiple fibers together, and optical system performance parameters like dispersion, scattering etc.	**PO1, PO2, PSO1, PSO2**
CO3	**Explain** the factors behind coupling losses in optical fiber joints.	**PO1, PO2, PO3, PO10**
CO4	**Apply** the laws of optics to Optical sources as well as detectors and to discuss their principle	**PO2, PO3. PSO1,**
CO5	**Demonstrate** the design considerations of fiber optic systems.	**PO1, PO2, PO3, PSO2**
CO6	**Illustrate** the fundamentals concept of optical fiber, sources and detectors, design as well as conduct experiments in software and hardware and analyze the results to provide valid conclusions.	**PO1, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ECE11019	Optical Fiber Communication	3	3	2							2			3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE11019– Optical Fiber Communication

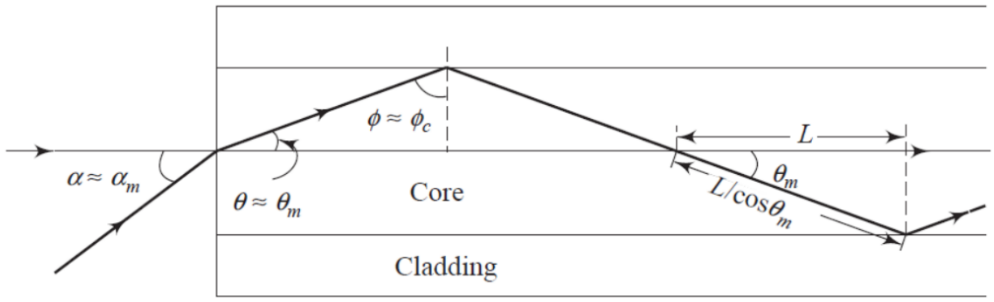
Program: B.Tech. (ECE) | **Semester: V**

Time: 03 hrs. | **Max. Marks:50**

Instructions:

Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**Define** refractive index of any material.	**[R]**	**CO1**
2	**What** do you mean by graded index optical fiber?	**[R]**	**CO1**
3	**What** is SONET?	**[R]**	**CO6**
4	**What** do you mean by wavelength for zero dispersion?	**[R]**	**CO2**
5	**Name** one semiconductor material that is used to fabricate LEDs.	**[R]**	**CO4**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**What** is the advantage of using optical fiber as a communication medium? **What** are the limitations of it?	**[R]**	**CO1**
	(OR)		
6 b)	**Illustrate** the basic block layout of SONET layers in comparison to the OSI layers. **Discuss** each of them.	**[U]**	**CO6**
7 a)	**What** is quantum efficiency for an optical detector? **Prove** that for 100% quantum efficiency responsivity is directly proportional to wavelength.	**[U+E]**	**CO4**
	(OR)		
7 b)	**What** do you mean by optical window? Along with proper plots **explain** the reason behind choosing different optical windows.	**[R+U]**	**CO2**
8 a)	**What** is the advantage of using optical fiber as a communication medium? **What** are the limitations of it?	**[R]**	**CO1**
	(OR)		
8 b)	**Illustrate** the basic block layout of SONET layers in comparison to the OSI layers. **Discuss** each of them.	**[U]**	**CO6**
9 a)	**What** is quantum efficiency for an optical detector? **Prove** that for 100% quantum efficiency responsivity is directly proportional to wavelength.	**[U+E]**	**CO4**
	(OR)		
9 b)	**What** do you mean by optical window? Along with proper plots **explain** the reason behind choosing different optical windows.	**[R+U]**	**CO2**
10 a)	**What** is the advantage of using optical fiber as a communication medium? **What** are the limitations of it?	**[R]**	**CO1**

	(OR)		
10 b)	**What** is the advantage of using optical fiber as a communication medium? **What** are the limitations of it?	**[R]**	**CO1**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	Make a tabular **list** of ITU optical spectral band indicating the application. **What** are the key elements of an optical fiber communication system? **Explain** each of them with diagram.	**[R+U]**	**CO2**
	(OR)		
11 b)	 If the step-index fiber shown in the above figure has a core of refractive index 1.5, a cladding of refractive index 1.48, and a core diameter of 100 mm, find, assuming that the fiber is kept in air, the (i) NA of the fiber (ii) angles α_m, θ_m, and φ_c (ii) pulse broadening per unit length $(\Delta T/L)$ due to multipath dispersion.	**[R]**	**CO1**
12 a)	Make a tabular **list** of ITU optical spectral band indicating the application. **What** are the key elements of an optical fiber communication system? **Explain** each of them with diagram.	**[R+U]**	**CO2**
12 b)	Make a tabular **list** of ITU optical spectral band indicating the application. **What** are the key elements of an optical fiber communication system? **Explain** each of them with diagram.	**[R+U]**	**CO2**
13 a)	**How** coupling efficiency in optical fiber connection is related to different types of fiber misalignments? Two compatible multimode SI fibers are jointed with a lateral offset of 10% of the core radius. The refractive index of the core of each fiber is 1.50. **Estimate** the insertion loss at the joint when (i) there is small air gap and (ii) an index matching fluid is inserted between the fiber ends.	**[R]**	**CO2**
	(OR)		
13 b)	Make a tabular **list** of ITU optical spectral band indicating the application. **What** are the key elements of an optical fiber communication system? **Explain** each of them with diagram.	**[R+U]**	**CO2**
14 a)	**How** coupling efficiency in optical fiber connection is related to different types of fiber misalignments? Two compatible multimode SI fibers are jointed with a lateral offset of 10% of the core radius. The refractive index of the core of each fiber is 1.50. **Estimate** the insertion loss at the joint when (i) there is small air gap and (ii) an index matching fluid is inserted between the fiber ends.	**[R]**	**CO2**
	(OR)		
14 b)	Make a tabular **list** of ITU optical spectral band indicating the application. **What** are the key elements of an optical fiber communication system?	**[R+U]**	**CO2**

	Explain each of them with diagram.		
15 a)	Draw and **explain** simple data communication model. Draw and explain three differences between OSI and TCP/IP reference models. What is the purpose of the timer at the sender site in systems using ARQ?	**U**	**CO2**
	(OR)		
15 b)	**Explain** fixed routing algorithm with the help of suitable example. Explain the limitation of flooding technique in context of routing. Explain hidden station problem and exposed station problem in CSMA/CA.	**U** **Ap**	**CO5**
16 a)	Make a tabular **list** of ITU optical spectral band indicating the application. **What** are the key elements of an optical fiber communication system? **Explain** each of them with diagram.	**[R+U]**	**CO2**
	(OR)		
16 b)	**How** coupling efficiency in optical fiber connection is related to different types of fiber misalignments? Two compatible multimode SI fibers are jointed with a lateral offset of 10% of the core radius. The refractive index of the core of each fiber is 1.50. **Estimate** the insertion loss at the joint when (i) there is small air gap and (ii) an index matching fluid is inserted between the fiber ends.	**[R]**	**CO2**
17 a)	Make a tabular **list** of ITU optical spectral band indicating the application. **What** are the key elements of an optical fiber communication system? **Explain** each of them with diagram.	**[R+U]**	**CO2**
	(OR)		
17 b)	**How** coupling efficiency in optical fiber connection is related to different types of fiber misalignments? Two compatible multimode SI fibers are jointed with a lateral offset of 10% of the core radius. The refractive index of the core of each fiber is 1.50. **Estimate** the insertion loss at the joint when (i) there is small air gap and (ii) an index matching fluid is inserted between the fiber ends.	**[R]**	**CO2**

ECE11020	**Introduction to Machine Learning**	L	T	P	C
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	Basic knowledge in Probability and Linear Algebra				
Co-requisites	----				

Course Objectives

1. To introduce students to the fundamental principles and techniques of machine learning.
2. To provide students with hands-on experience in implementing and evaluating various machine learning algorithms.
3. To familiarize students with advanced topics in machine learning and their applications in real-world scenarios.
4. To equip students with the necessary skills to tackle complex problems in domains such as robotics, speech/audio processing, IoT, and healthcare using machine learning techniques.

Course Outcomes

On completion of this course, the students will be able to

CO1: Understand fundamental machine learning concepts, including learning definition, evaluation methods, dataset handling, and feature sets.
CO2: Apply supervised, unsupervised, and reinforcement learning techniques in practical scenarios.
CO3: Implement and assess classification and regression algorithms like KNN, Linear Regression, and SVM.
CO4: Utilize clustering and dimensionality reduction techniques such as K-means clustering, PCA, and LDA.
CO5: Explore advanced machine learning topics like deep learning, NLP, CV, and analyse case studies across various domains.

Catalog Description:

This course offers a comprehensive introduction to machine learning, covering foundational concepts and practical applications. Students will learn about supervised, unsupervised, and reinforcement learning techniques and gain proficiency in implementing algorithms like KNN, Linear Regression, and SVM. Through hands-on exercises and case studies, students will explore advanced topics such as deep learning, NLP, and CV, and analyse their applications in domains like robotics, IoT, and healthcare. By the end of the course, students will be equipped with the skills to apply machine learning algorithms to solve real-world problems effectively.

Course Content

Unit I: **4 lecture hours**
Introduction:
What Is Machine Learning, How Do We Define Learning, How Do We Evaluate Our Networks, How Do We Learn Our Networks, What are datasets and how to handle them, Feature sets, Dataset division: test, train and validation sets, cross-validation.

Unit II: **10 lecture hours**
Basics of Machine Learning:
Applications of Machine Learning, processes involved in Machine Learning, Introduction to Machine Learning Techniques: Supervised Learning, Unsupervised Learning and Reinforcement Learning, Real life examples of Machine Learning

Unit III: **11 lecture hours**
Supervised Learning:
Classification and Regression: K-Nearest Neighbor, Linear Regression, Logistic Regression, Support Vector Machine (SVM), Evaluation Measures: SSE, MME, R2, confusion matrix, precision, recall, F-Score, ROC-Curve

Unit IV: **10 lecture hours**
Unsupervised Learning:
Introduction to clustering, Types of Clustering: Hierarchical, Agglomerative Clustering and Divisive clustering; Partitional Clustering - K-means clustering.

Unit V: **10 lecture hours**
Dimensionality reduction techniques: PCA, LDA, ICA. Introduction to Deep Learning, Gaussian Mixture Models, Natural Language Processing, Computer Vision.
Implement basic ML models like SVM, KNN, K-Means, Logistic Regression, and Linear Regression using Python
Case studies on ML: Robotics and automation/ Speech and audio processing/ Signal processing and pattern recognition/Internet of Things (IoT) applications/ Wireless Communication and Networking/ Embedded Systems and Edge Computing/ Circuit Design and Optimization/ Energy Efficiency and Power Management/ Healthcare/ Medical Diagnostics.

Text Books

1. "Machine Learning: A Probabilistic Perspective" by Kevin Murphy (MIT Press, 2012)
2. "The Elements of Statistical Learning" by Trevor Hastie, Robert Tibshirani, Jerome Friedman (Springer, 2009)
3. "Pattern Recognition and Machine Learning" by Christopher Bishop (Springer, 2007)
4. "Machine Learning" by Rajiv Chopra (Khanna Publishing House, 2018

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** fundamental machine learning concepts, including learning definition, evaluation methods, dataset handling, and feature sets.	**PO1, PO2, PO5**
CO2	**Apply** supervised, unsupervised, and reinforcement learning techniques in practical scenarios.	**PO1, PO2 PO5, PO9**
CO3	**Implement and assess** classification and regression algorithms like KNN, Linear Regression, and SVM.	**PO1, PO2, PO4, PO5**

CO4	**Utilize** clustering and dimensionality reduction techniques such as K-means clustering, PCA, and LDA.	**PO1, PO2, PO4, PO5**
CO5	**Explore** advanced machine learning topics like deep learning, NLP, CV, and analyse case studies across various domains.	**PO1, PO2, PO5, PO6, PO10**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE110 20	Intro-duction to Machine Learning	3	3		2	3	2			2	2			3	2

1=weakly mapped
2= moderately mapped
3=strongly mapped

ECE11021	**Introduction to Internet of Things**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. Sensors, Devices & Actuators 2. Basic programming language				
Co-requisites	Computer Networks				

Course Objectives

6. To study fundamental concepts of IoT.
7. To study the basic networking
8. To learn different protocols used for IoT design.
9. To be familiar with data handling and analytics tools in IoT.
10. To recognise the factors that contributed to the emergence of IoT.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Understand** the various concepts, terminologies and architecture of IoT systems and use sensors and actuators for design of IoT.
CO2. **Understand and apply** various protocols for design of IoT systems.
CO3. **Understand** about the technology behind the IoT and associated technologies in practical domains of society.
CO4. **Apply** various techniques of data storage and analytics in IoT.
CO5. **Analyze** applications of IoT in real time scenario.

Catalog Description

Internet of Things (IoT) is presently a hot technology worldwide. The explosive growth of the "Internet of Things" is changing our world and the rapid drop in price for typical IoT components is allowing people to innovate new designs and products at home. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Content

Module 1: Fundamentals of IoT: 11 lecture hours

Introduction, Definitions & Characteristics of IoT, IoT Architectures, Physical & Logical Design of IoT, Enabling Technologies in IoT, History of IoT, About Things in IoT, The Identifiers in IoT, About the Internet in IoT, IoT frameworks, IoT and M2M.

Sensors Networks: Definition, Types of Sensors, Types of Actuators, Examples and Working, IoT Development Boards: Arduino IDE and Board Types, Raspberry Pi Development Kit, RFID Principles and components, Wireless Sensor Networks: History and Context, The node, Connecting nodes, Networking Nodes, WSN and IoT.

Module 2: Internet/Web and Networking Basics: 11 lecture hours
Overview and working principle of Wired Networking equipment's; Router, Switches, Overview and working principle of Wireless Networking equipment's; Access Points, Hubs etc. Linux Network configuration Concepts: Networking configurations in Linux Accessing Hardware & Device Files interactions.
OSI Model, Data transfer referred with OSI Model, IP Addressing, Point to Point Data transfer, Point to Multi Point Data transfer & Network Topologies, Sub-netting, Network Topologies referred with Web, Introduction to Web Servers, Introduction to Cloud Computing.

Module 3: IoT Protocols: 7 lecture hours
Infrastructure (6LowPAN, IPv4/IPv6, RPL), Identification (EPC, uCode, IPv6, URIs), Communication/ Transport (Wi-Fi, Bluetooth, ZigBee, LPWAN), Data Protocols (MQTT, CoAP, AMQP, Websocket, Node).

Module 4: Data Handling & Analytics: 8 lecture hours
Introduction, Bigdata, Types of data, Characteristics of Big data, Data handling Technologies, Flow of data, Data acquisition, Data Storage, Introduction to Hadoop. Introduction to data Analytics, Types of Data analytics, Local Analytics, Cloud analytics and applications.

Module 5: Case Study / Industrial Applications: 8 lecture hours
Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plantwide Ethernet Model (CPwE) - Power Utility Industry - GridBlocks Reference Model - Smart and Connected Cities: Layered architecture – Smart Lighting - Smart Parking Architecture and Smart Traffic Control.

Text Books

4. Internet of Things - A Hands-on Approach, Ars deep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
5. Rajkumar Buyaa and Amir V Dastjerdi, Internet of things: Principles and Paradigms, Morgan Kaufmann
6. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

Reference Books

1. Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, Wiley
2. Olivier Hersent, David Boswarthick and Omar Elloumi, The Internet of Things: Key applications and Protocols, Wiley
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. Fadi Al-Turjman, Intelligence in IoT- enabled Smart Cities, 2019, 1st edition, CRC Press, ISBN-10: 1138316849
5. Giacomo Veneri, and Antonio Capasso, Hands-on Industrial Internet of Things: Create a powerful industrial IoT infrastructure using Industry 4.0, 2018, Packt Publishing.

6. Subhas Chandra Mukhopadhyay, Smart Sensing Technology for Agriculture and Environmental Monitoring, 2012, Springer, ISBN-10: 3642276377

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the various concepts, terminologies and architecture of IoT systems and use sensors and actuators for design of IoT.	**PO1, PO2, PO3, PO10, PSO1**
CO2	**Understand and apply** various protocols for design of IoT systems.	**PO1, PO2, PO3, PO5, PO10, PSO2**
CO3	**Understand** about the technology behind the IoT and associated technologies in practical domains of society.	**PO1, PO2, PO5, PO10, PSO1, PSO2**
CO4	**Apply** various techniques of data storage and analytics in IoT.	**PO1, PO2, PO3, PO5, PO10, PSO1**
CO5	**Analyze** applications of IoT in real time scenario.	**PO1, PO2, PO3, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE11 021	Introduction to IoT	3	3	3		3					3			3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

	# ADAMAS UNIVERSITY **END-SEMESTER EXAMINATION MARCH 2022** (Academic Session: 2021 – 22)

Name of the Program:	B. Tech. ECE	**Semester:**	V
Paper Title:	Introduction to IOT	**Paper Code:**	ECE11021
Maximum Marks:	40	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3

7. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
8. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
9. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**Explain how** IoT can also be used in medical systems.	**Understand**	**CO1**
2	**Differentiate** Bridge and Hub.	**Analyse**	**CO2**
3	**Describe** IR sensor.	**Remember**	**CO3**
4	**Define** REST API.	**Remember**	**CO4**
5	**What** is Amazon Auto-scalling?	**Understand**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**What** is function of application layer of IOT architecture?	**Understand**	**CO1**
(OR)			
6 b)	**Describe** the Transport layer Protocols.	**Remember**	**CO1**
7 a)	**Describe** an example of IoT service that uses REST-based communication.	**Remember**	**CO2**
(OR)			
7 b)	**How** does wireless sensor network works? **Explain** with example.	**Understand**	**CO3**

8 a)	**Explain** IOT Level 5 in detail with example**.**	**Understand**	**CO5**
(OR)			
8 b)	**Discuss** IOT Functional Block in details.	**Understand**	**CO1**
9 a)	**Explain** about Exclusive-pair communication model.	**Understand** **Understand**	**CO1** **CO2**
(OR)			
9 b)	**What** are the architectural constraints of REST?	**U**	**CO3**
10 a)	**Implement** Noise monitoring system using IOT-Level 4 system	**U**	**CO4**
(OR)			
10 b)	**Describe** the use of Amazon Kinesis for IOT**.**	**U**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Describe** an application that can benefit from Amazon DynamoDB.	**U**	**CO4**
(OR)			
11 b)	With necessary equation and wave forms **explai**n about Push Pull converter?	**U**	**CO2**
12 a)	**Discuss** about detailed operation of cascaded H bridge multi level Inverter?	**AN**	**CO3**
(OR)			
12 b)	**Explain** concepts of Big data analytics along with characteristics	**Ap**	**CO2**
13 a)	**Explain** about HTTP request methods and actions	**U**	**CO5**
(OR)			

13 b)	**Discuss** about Publish-Subscribe Model.	**U**	**CO3**
14 a)	**Explain** progressive and interlaced scan pattern.	**C**	**CO3**
(OR)			
14 b)	**Define** different types of Cloud Computing services	**U**	**CO3**
15 a)	**Explain** the working principle of static channels.	**C**	**CO5**
(OR)			
15 b)	**Explain** the working principle of dynamic channels.	**C**	**CO5**
17 a)	**Explain** the working principle of hierarchical block matching.	**C**	**CO5**
(OR)			
16 b)	**Illustrate** difference between interactive and non-interactive	**U**	**CO4**

	video.		
17 a)	**Differentiate** REST and WEBSOCKET API.	**AP**	**CO3**
(OR)			
17 b)	**Explain** about HTTP request methods and actions.	**C**	**CO3**

ECO11505	Economics for Engineers	L	T	P	C
Version 1.0	Contact Hours – 45	3	0	0	3
Pre-requisites/Exposure	12th level Mathematics				
Co-requisites					

Course Objectives

1. Prepare engineering students to function in the business and management side of professional engineering practice.
2. Help students in general to analyse, understand and explain the past, present economic conditions of the country.
3. To forecast the future course of changes and development through their knowledge of policies and programmes set by the governments and other development agencies.
4. Evaluate the economic theories, cost concepts and pricing policies.
5. Apply the concepts of financial management for project appraisal.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the basic economic concepts and make economic analyses in the decision making.
CO2. **Apply** principals of economics to analyze the behaviour of consumers and producers in a well- functioning economy and also in case of market failures.
CO3. **Develop** the ability to account for time value of money using factors and formulas, estimate annual and future worth comparisons for cash flows.
CO4. **Illustrate** how factor market works, identify the manpower and resources management, need of credit/finance for initiating and accelerating projects.

Catalog Description

This paper introduces students to the terminology and analytic principles used in microeconomics, which is broadly defined as the study of markets, and to the application of these conceptual tools to several policy issues. As the design and manufacturing process become more complex, an engineer is required to make decisions that involve money more than ever before. The competent and successful engineer at present must have an improved understanding of the principles of economics. This paper is concerned the analysis of individual behaviors and market structure, and systematic evaluation of the benefits and costs of projects.

Course Content

Module 1: Basic Concepts of Economics: **[10 lecture hours]**

Introduction to the Literature of Microeconomics centering around Decision Making at Individual Level. Some Fundamental Concepts: Maximization, Equilibrium and Efficiency.

Module 2: Theories of Economics: **[12 lecture hours]**

The Theory of Consumer Choice and Demand, the Theory of Supply, market equilibrium, market structure, market failure and environmental issues, Game Theory, concept of yield and Theories of Term Structure, the Theory of Asset Pricing, decision-making under uncertainty: risk and insurance.

Module 3: Sustainability Study of a Project: **[5 lecture hours]**

Budget plan, estimation of the project cost, prices, fees and cost recovery, financing of recurrent costs, sustainability of the activities generated by the project.

Module 4: Economic Feasibility Study: **[12 lecture hours]**

Problem of pricing under oligopoly, problem of market stagnation, problem of volatility in open economy, problem of global meltdown, problem of financing a project.

Module 5: Project Report: **[6 lecture hours]**

Facets of project viability – commercial, technical, financial, outline of a model project report, a real life case study.

Text Books:

1. R. Panneersalvam, *Engineering Economics*, 2nd Ed., Prentice Hall of India, 2014.
2. James Riggs, *Engineering Economics*, 4th Ed., McGraw Hill Education, 2004.

Reference Books:

1. Donald G. Newnan, Ted G. Eschenbach and Jerome P. Lavelle, *Engineering Economic Analysis*, 13th Ed., Oxford University Press, 2017.
2. Chan S. Park, *Contemporary Engineering Economics*, 6th Ed., Pearson, 2015.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the basic economic concepts and make economic analyses in the decision making.	**PO2, PO3, PO12**
CO2	**Apply** principals of economics to analyze the behaviour of consumers and producers in a well-functioning economy and also in case of market failures.	**PO3, PO4, PO12**
CO3	**Develop** the ability to account for time value of money using engineering economy factors and formulas, estimate annual and future worth comparisons for cash flows.	**PO3, PO4, PO12**

CO4	**Illustrate** how factor market works, identify the manpower and resources management, need of credit/finance for initiating and accelerating projects.	**PO2, PO3**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
ECO11 505	HSS–IV (Economics for Engineers)		2	3	2								3		

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

	ADAMAS UNIVERSITY **(Academic Session: 2021 – 22)**		
Name of the Program:	B. Tech	**Semester:**	VI
Paper Title:	HSSM-IV(ECONOMICS FOR ENGINEERS)	**Paper Code:**	ECO11505
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**25.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **26.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **27.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	What do you mean by the supply of goods? (a) Stock available for sale (b) Total stock in the warehouse (c) The actual production of the goods (d) Quantity of the goods offered for sale at a particular price per unit of time	**Remembering**	**CO1**
2	Which of the following is the relation that the law of demand defines? (a) Income and price of a commodity (b) Price and quantity of a commodity (c) Income and quantity demanded (d) Quantity demanded and quantity supplied	**Remembering**	**CO2**
3	Which of the following is a type of economic activities? (a) Production (b) Consumption (c) Exchange and Investment (d) All of these	**Remembering**	**CO3**

4	To which factor, economic problem is basically related to: (a) Choice (b) Consumer's Selection (c) Firm Selection (d) None of these	**Remembering**	**CO4**
5	The slope of a production possibility curve falls: (a) From left to right (b) From right to left (c) From top to bottom (d) From bottom to top	**Remembering**	**CO4**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Distinguish between microeconomics and macroeconomics.	**Understanding**	**CO1**
(OR)			
6 b)	Why does an economic problem arise?	**Understanding**	**CO1**
7 a)	What does a rightward shift of production possibility curve indicate?	**Understanding**	**CO2**
(OR)			
7 b)	Define Opportunity Cost.	**Remembering**	**CO2**
8 a)	What do you mean by Perfectly Elastic demand?	**Remembering**	**CO3**
(OR)			
8 b)	What is Giffen Goods?	**Remembering**	**CO3**
9 a)	The points inside the PPF are inefficient points. Explain why?	**Understanding**	**CO4**
(OR)			
9 b)	State and explain the Law of Diminishing marginal utility.	**Understanding**	**CO4**
10 a)	Explain two features of Perfectly Competitive market.	**Understanding**	**CO4**
(OR)			
10 b)	What is a Monopoly?	**Remembering**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Distinguish between Cardinal and Ordinal utility theory. Mention any two exceptions to the law of demand.	**Analyzing**	**CO1**
(OR)			
11 b)	Why is the demand curve downward sloping?	**Analyzing**	**CO1**
12 a)	Discuss any two properties of Indifference Curve with diagram.	**Creating**	**CO2**
(OR)			
12 b)	Define income elasticity of demand. How does the sign of income elasticity differ for inferior goods and luxury goods?	**Understanding**	**CO2**
13 a)	The outbreak of Covid-19 has led to an increase in demand for cycles as a medium of transportation. How will the equilibrium price and quantity demanded of cycle change in this new situation? Explain diagrammatically	**Applying**	**CO3**
(OR)			
13 b)	What is the relation between quantity demanded and price? Explain with a figure.	**Understanding**	**CO3**
14 a)	Explain the short run equilibrium using figure for a	**Understanding**	**CO4**

	monopoly market.		
(OR)			
14 b)	State and explain the features of an Oligopolistic market.	**Understanding**	**CO4**
15 a)	What do you mean by risk? How can we differentiate among people depending upon their attitude towards risk? Define risk premium. Arrange the assets in decreasing order of liquidity.	**Understanding**	**CO4**
(OR)			
15 b)	What do you mean by Own Price, Cross Price and Income Elasticity of demand? Explain with examples.	**Understanding**	**CO4**
16 a)	Why there is no free entry or free exit in Monopoly market?	**Analyzing**	**CO5**
(OR)			
16 b)	With the help of diagram, show the effect on equilibrium price and quantity when supply is perfectly elastic and demand increases and decreases.	**Applying**	**CO4**
17 a)	What are the factors responsible for change in demand and change in supply?	**Understanding**	**CO4**
(OR)			
17 b)	Suppose due adequate rainfall, there has been a good harvest for mangoes. How will the equilibrium price and quantity demand change under the new situation? Explain diagrammatically.	**Applying**	**CO4**

		L	T	P	C
ECE12022	**Prof. Core- VIII Lab (Communication Systems II Lab)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	Students entering this course require a basic knowledge of communication systems and frequency domain analysis as taught in Analog Communication. It includes a treatment of signal-to-noise ratio and bit error rate in digital links that rely on the treatment of probability. It will definitely help if you study the tutorials of Signals and Systems as a reference.				
Co-requisites	1. Theory of Communication Systems-II 2. Basic functions of MATLAB				

Course Objectives

5. To understand the building blocks of digital communication system.
6. To prepare mathematical background for communication signal analysis.
7. To understand and analyze the signal flow in a digital communication system.
8. To analyze error performance of a digital communication system in presence of noise and other interferences.
9. To understand concept of spread spectrum communication system.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Compare** basic theories of Digital communication system in practical.
CO2. **Explain** the concepts of signal, geometrical representation of signal and the performance of digital communication system in the presence of noise.
CO3. **Analyze** sampling, quantization in digital transmission, PAM, PCM, Delta and Adaptive Modulation.
CO4. **Make use of** the Polar, Unipolar, Bipolar NRZ, RZ and Manchester line coding techniques and their PSD in digital communication.
CO5. **Analyze**e the digital modulation techniques, generation and detection, power spectra and their probability of error performance.

Catalog Description

Communication systems are at the heart of today's information driven economy and support our modern-day lifestyles and even our very existence. From the familiar telephone that was invented over a century ago, to modern day cell phones, wireless networks, and Internet, as well as radio, television, cable and satellite systems, we now rely on electrical communication systems in almost all aspects of our lives. The course focuses on the technologies underlying these systems, which constitute the field of digital communications. Topics include several experiments based on p-n sequences using shift register, digital transmission and reception, spectral analysis of digitally modulated waveforms, design considerations for pass band transmissions and corresponding simulation using MATLAB, baseband digital transmission and spread spectrum modulation.
The course is intended for graduate/senior undergraduate level students. While the course is intended to serve as an introduction to digital communications, the pre-requisites/co-requisites listed are absolutely necessary.

Course Content

List of experiments:

10. Design, implementation and study of all the properties of 7-length and 15-length p-n sequences using shift register.

11. Study of TDM Pulse Code Modulation & Demodulation

12. Delta modulation & demodulation.

13. Adaptive Delta Modulation and Demodulation.

14. Study of line coders: polar/unipolar/bipolar NRZ, RZ and Manchester.

15. Carrier modulation and demodulation [ASK]

16. Carrier modulation and demodulation [FSK]

17. Carrier modulation and demodulation [PSK]

18. QPSK Modulation and Demodulation.

19. Realization of DSSS technique based on CDMA

20. Simulation study of probability of symbol error for BPSK modulation.

21. Simulation study of probability of symbol error for BFSK modulation.

Text Books

1. Simon Haykin, Introduction to Analog and Digital Communication Systems, John Wiley and Sons, 3rd Edition, 2001

2. B.P.Lathi -Communication Systems- BS Publications

Reference Books

4. Digital Communications, J.G.Proakis, TMH Publishing Co.
5. Carlson—Communication System,4/e, Mc-Graw Hill
6. Digital Communication Systems Lab Handout

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Compare** basic theories of Digital communication system in practical.	**PO1, PO3, PO10, PSO1, PSO2**
CO2	**Explain** the concepts of signal, geometrical representation of signal and the performance of digital communication system in the presence of noise.	**PO1, PO3, PO10, PSO1**
CO3	**Analyze** sampling, quantization in digital transmission, PAM, PCM, Delta and Adaptive Modulation.	**PO1, PO3, PO7, PO10, PSO1, PSO2**

CO4	**Make use of** the Polar, Unipolar, Bipolar NRZ, RZ and Manchester line coding techniques and their PSD in digital communication.	**PO3, PO7, PO10, PSO1, PSO2**
CO5	**Analyze** the digital modulation techniques, generation and detection, power spectra and their probability of error performance.	**PO1, PO3, PO10, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE12022	**Communication System Lab**	3		3				2			3			3	3

1=weakly mapped;
2= moderately mapped;
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE
Course: ECE12022 – Prof. Core- VIII Lab (Communication Systems Lab)	
Program: B.Tech. (E.C.E.) **Time: 03 hrs.**	**Semester: ODD 2020-21** **Max. Marks: 50**

SAMPLE QUESTIONS			
1.	A) Set up an experiment to produce pulse amplitude modulated waveform taking modulating signal frequency and measure the distortion of demodulated signal. B) **How** to generate Flat top sampled PAM using sample and hold circuit?	**U**	**CO3**
2.	A) **Design** a circuit to generate a 15 length & 7 length PN sequence & trace the waveform. (An) B) **Explain** the generation of ADM using suitable block diagram. (R)	**An** **R**	**CO2**
3.	A) i) Take two base band signals of 1KHz & 2KHz respectively and determine the rate of sampling from the sampled waveforms and show the multiplexed waveform to explain the interference. Also generate PCM signal. ii) Taking the above two multiplexed waveforms, generate its PCM signal provided in TDM/PCM kit. (Ap) B) Describe the generation of DM Technique. (U)	**Ap** **U**	**CO3**
4.	A) Perform an experimental setup to produce a Delta modulated waveform. Take a modulating signal of frequency 2 KHz and amplitude 1VP-P. Drag the signal and integrator output. Compare these two to verify Delta modulated waveform. Now set up a demodulator and pass the modulated wave through it and draw the output. B) **Explain** the DPCM technique using suitable block diagram. (U)	**Ap** **U**	**CO3**
5.	A) Set up an experiment and simulate to produce bit error rate of BPSK signal. B) State sampling theorem. **What** do you mean by aliasing effect?	**Ap** **U**	**CO5**
6.	A) Perform an experimental setup to produce an Adaptive Delta modulated waveform. Taking modulating signal frequency 1KHz and amplitude 1 Vp-p. Drag the signal and the integrator output. Compare these two to verify Delta modulated waveform. Now set up a demodulator and pass the modulated wave through it and draw the output. B) **What** is Line Coding? Briefly describe the Line Coding properties.	**Ap** **R**	**CO3**
7.	A) i) Setup an experiment to produce PSK waveform by using carrier frequency. Use Non-return to Zero (level) signal as binary data stream. Draw the output waveform of the modulator. ii) Pass the modulated signal through a filter and draw the output. B) **Explain** the reception of BPSK signal using suitable block diagram.	**Ap** **U**	**CO5**
8.	A) i) Setup an experiment to produce FSK waveform by using carrier frequency. Use Non-return to Zero (level) signal as binary data stream. Draw the output waveform of the modulator. ii) Pass the modulated signal through a filter and draw the output. B) **Explain** the generation of BFSK signal using suitable block diagram.	**Ap** **U**	**CO5**
9.	A) i) Perform an experimental setup to produce an ASK waveform by using carrier frequency of 1.6 MHZ. Use Non-return to Zero (level) signal as binary data stream. Draw the output waveform of the modulator. ii) Pass the modulated signal through a filter and draw the output. B) **Why** ASK is called OOK? Calculate the signal space representation of PSK signal.	**Ap** **U**	**CO5**
10.	A) Set up an experiment to encode and decode information using p-n sequence of	**U** **Ap**	**CO2**

	DSSS technique based on CDMA. B) **Derive** the signal space representation of BFSK signal. What is the bandwidth of QPSK signal?		

		L	T	P	C
ECE12023	Prof. Core- IX Lab (VLSI Systems Design Lab)				
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	1. 12^{th} level Mathematics 2. Knowledge of 12^{th} level Physics				
Co-requisites	1. Understanding of Electronic Devices 2. Understanding of Analog Electronics				

Course Objectives

1. To help to understand the functionality of VLSI design.
2. To explain the use of MOS and CMOS Circuits
3. To explain the use of FPGA kits
4. To acquire the knowledge of fabrication of VLSI chip

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the requirement of a software platform for automated circuit testing.
CO2. **Make use of** the design principles of Tanner EDA.
CO3. **Design** basic logic gates.
CO4. **Develop** different circuits using CMOS.
CO5. **Utilize** FPGA based developed circuits.

Catalog Description

Very large-scale integration (**VLSI**) is the process of creating an integrated circuit (IC) by combining millions of MOS transistors onto a single chip. VLSI began in the 1970s when MOS integrated circuit chips were widely adopted, enabling complex semiconductor and telecommunication technologies to be developed. The microprocessor and memory chips are VLSI devices. Before the introduction of VLSI technology, most ICs had a limited set of functions they could perform. An electronic circuit might consist of a CPU, ROM, RAM and other glue logic. VLSI lets IC designers add all of these into one chip.

Course Content

List of experiments:

Combinational Design

1. a) Familiarization with Tanner tools & Layout Design rules.
   b) Design & simulate a CMOS Inverter in schematic editor.
   c) Obtain the transient response of a CMOS Inverter for different values of W/L.
2. a) Obtain the Voltage Transfer Characteristics (VTC) of CMOS Inverter.
   b) Plotting the Drain Current vs Input Voltage.
3. a) Design & simulate a 2 input CMOS NAND gate in schematic editor.
   b) Design & simulate a 2 input CMOS NOR gate in schematic editor.
   c) Design & simulate a 2 input CMOS XOR gate in schematic editor.
4. Design of (a) Half-Adder, (b) Full Adder, (c) Half Substractor, (d) Full Substractor in schematic editor.
5. a) Familiarization with Xilinx ISE.
   b) Design of (i) 3:8 Decoder and (ii) 8:3 Encoder in Xilinx ISE.

Sequential Design

6. Design of S-R and J-K Flip-flops in Xilinx ISE.
7. Realize a given state transition table by using S-R/ J-K flip-flops.
8. Design of Counter in Xilinx ISE.

Layout Design

9. a) Design layout of CMOS inverter using Tanner Tools – L-Edit.
   b) Design layout of CMOS inverter using Magic tool.
10. a) Design layout of a two input CMOS NAND gate using Tanner Tools – L-Edit.
    b) Design layout of a two input CMOS NAND gate using Magic tool.

Extras:

1. Design of Binary to Gray and Gray to Binary code Converter.
2. Design of Shift Register.
3. Design of 6-T SRAM cell.

Text Books:

1. Digital Integrated Circuit, J.M.Rabaey, Chandrasan, Nicolic, Pearson Education,2nd edition 2003
2. Weste and Eshrighian, ―Principle of CMOS VLSI Design‖ Pearson Education
3. VLSI System Design Lab Manual

Reference Books:

1. Wayne, Walf, "Modern VLSI design: System on Silicon" Pearson Education, 2nd Edition, 1998.
2. Pucknull, "Basic VLSI Design" PHI 3rd Edition

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs, POs and PSOs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the requirement of a software platform for automated circuit testing.	**PO1, PO2, PO3, PSO1**
CO2	**Make use of** the design principles of Tanner EDA	**PO1, PO2, PO3, PO4, PSO1**
CO3	**Design** basic logic gates.	**PO1, PO2, PO3, PO4, PO5, PSO1**
CO4	**Develop** different circuits using CMOS.	**PO1, PO2, PO3, PO4, PO5, PSO1**
CO5	**Utilize** FPGA based developed circuits.	**PO1, PO2, PO3, PO4, PO5, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE12023	VLSI Systems Design Lab	3	3	3	3	2		-	-	-	-	-		3	-

1=weakly mapped
2= moderately mapped
3=strongly mapped

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: EEC12023 – Prof. Core- IX Lab (VLSI Systems Design Lab)
Program: B.Tech. (ECE) **Semester: ODD 2020-21**
Time: 03 hrs. **Max. Marks:50**

	Using Tanner tools		
1.	**Design** and simulate a 2 input CMOS NAND gate in schematic editor.	**U**	**CO1, CO3**
2.	**Design** and simulate a 2 input CMOS NOR gate in schematic editor.	**U**	**CO1, CO3**
3.	**Design** and simulate a 2 input CMOS XOR gate in schematic editor.	**U**	**CO1, CO3**
4.	**Design** of (a) Half-Adder, (b) Full Adder in schematic editor.	**U**	**CO1, CO2**
5.	**Design** of (a) Half Substractor, (b) Full Substractor in schematic editor.	**U**	**CO1, CO2**
6	a) **Find** the Voltage Transfer Characteristics (VTC) of CMOS Inverter. b) Plot and **explain** the Drain Current vs Input Voltage.	**U**	**CO1, CO4**
7	a) **Design** layout of a two input CMOS NAND gate using Tanner Tools – L-Edit. b) **Design** layout of a two input CMOS NAND gate using Magic tool.	**U**	**CO1, CO4**
	Using Xilinx ISE		
8	**Design** of S-R and J-K Flip-flops.	**U**	**CO4**
9	**Show** a given state transition table by using S-R/ J-K flip-flops and verify using FPGA kit.	**U**	**CO5**
10	**Design** of Counter in Xilinx ISE and verify using FPGA kit.	**U**	**CO5**

		L	T	P
ECE12024	**Prof. Core- VII Lab (Microcontroller and interfacing Lab)**	L	T	P
Version 2.0	**Contact Hours – 45**	3	0	0
Pre-requisites/Exposure	Digital Electronics, Computer Organization basics			
Co-requisites	--			

Course Objectives

1. To know the operations of microcontrollers through performing experiments.
2. To learn machine label language programming and interfacing techniques with peripherals.
3. To learn different application part of microcontroller.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Find** the Assembly language programs of 8051.
CO2. **Illustrate** the real time analysis of 8051 through programs.
CO3. **Find** how to interface external devices with microprocessor.
CO4. **Find** how to interface external devices with microcontroller.
CO5. **Design** project based on microcontroller knowledge.

Catalog Description

To make the students understand Microprocessor in order to provide them with the necessary tools for the analysis of Electronic equipment in the field of Microprocessor, microcontroller &Embedded systems to be used in industries, research field and in commercial field applications.

Course Content

List of experiments:

1. Familiarization with 8051 controller Kit.
2. Add two 8 bit numbers and stored at consecutive memory location.
3. Subtract two 8 bit numbers and stored at consecutive memory location.
4. To multiply two 8 bit numbers and stored at consecutive memory location.
5. To divide two 8 bit numbers and stored at consecutive memory location.
6. To find the largest element in an array.
7. To find the smallest element in an array.
8. To sort the given number in ascending order
9. To sort the given number in descending order
10. To convert decimal to hexadecimal.
11. To convert hexadecimal to decimal.
12. BCD addition.

13. BCD subtraction.

14. Copying a block of memory

15. Shifting a block of memory

16. Interfacing Keyboard and Multi-digit Display with multiplexing using 8255

17. Interfacing Stepper Motor.

18. Interfacing ADC and DAC.

Text Books

1. Microprocessor architecture, programming and application with 8085 – R. Gaonkar (Penram International)
2. Ray &Bhurchandi, Advanced Microprocessors & Peripherals, TMH
3. The 8051 microcontroller and Embedded systems - Mazidi, Mazidi and McKinley (PEARSON)
4. Fundamental of Microprocessors and Microcontroller-B Ram,Dhanpat rai publication

Reference Books

1. The 8051 microcontroller - K. Ayala (Thomson)
2. Microprocessors & interfacing – D. V. Hall (Tata McGraw-hill)
3. Microprocessors and microcontrollers - N. Senthil Kumar, M. Saravanan and Jeevananthan (Oxford university press).

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Find** the Assembly language programs of 8051.	**PO1,PO9,PSO1**
CO2	**Illustrate** the real time analysis of 8051 through programs..	**PO1,PO9,PSO1**
CO3	**Find** how to interface external devices with microprocessor.	**PO1,PO9,PSO1**
CO4	**Find** how to interface external devices with microcontroller.	**PO1,PO9,PSO1**
CO5	**Design** project based on microcontroller knowledge.	**PO1,PO3**

Course Code	Course Title	Engineering Knowledge PO1	Problem analysis PO2	Design/development of solutions PO3	Conduct investigations of complex problems PO4	Modern tool usage PO5	The engineer and society PO6	Environment and sustainability PO7	Ethics PO8	Individual or team work PO9	Communication PO10	Project management and finance PO11	Life-long Learning PO12	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems PSO1	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas. PSO2
ECE12024	Microcontroller and its interfacing lab	3		2						3				3	

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE12024- Prof. Core- VII Lab (Microcontroller and its interfacing Lab)
Program: B. TECH (ECE) **Time: 03 Hrs.**
Semester: IV 2020-21 **Max. Marks: 50**

1	Familiarization with 8086 processors & 8051 controller Kit.	**U**	**CO1**
2	Add two 8 bit numbers and stored at consecutive memory location.	**U**	**CO1**
3	Subtract two 8 bit numbers and stored at consecutive memory location.	**U**	**CO1**
4	To multiply two 8 bit numbers and stored at consecutive memory location.	**U**	**CO1**
5	To divide two 8 bit numbers and stored at consecutive memory location	**U**	**CO1**
6	To **find** the largest element in an array.	**U**	**CO1**
7	To **find** the smallest element in an array.	**U**	**CO1**
8	To sort the given number in ascending order	**U**	**CO1**
9	To sort the given number in descending order	**U**	**CO1**
10	To convert decimal to hexadecimal.	**U**	**CO1**
11	To convert hexadecimal to decimal.	**U**	**CO1**
12	BCD addition.	**U**	**CO1**
13	BCD subtraction.	**U**	**CO1**
14	Copying a block of memory	**U**	**CO3**
15	Interfacing Stepper Motor.	**Ap**	**CO2, CO4, CO5**

ECE11025	**Prof. Core- XI (Embedded Systems Design)**	L	T	P	C
Version 2.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Digital Electronics, Microprocessor and Microcontroller				
Co-requisites	--				

Course Objectives

1. To have knowledge about the basic functioning of a microcontroller system and its programming in assembly language and C language.
2. To provide knowledge to integrate hardware and software for microcontroller applications systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
CO2. **Demonstrate** the architecture of the 8051, PIC microcrontroller and ARM processor and its programming aspects (assembly Level)
CO3. **Illustrate** about various communication interfaces and role of embedded systems in industry
CO4. **Illustrate** about interrupts and software optimization.
CO5. **Design** real time embedded systems using the concepts of RTOS.

Catalog Description

To make the students understand Microprocessor in order to provide them with the necessary tools for the analysis of Electronic equipment in the field of Microprocessor, microcontroller &Embedded systems to be used in industries, research field and in commercial field applications.

Course Content

Unit I: **8 lecture hours**

Fundamentals of Embedded System

Introduction to embedded systems, Differences between Microprocessor and Microcontroller, General computing systems Vs Embedded system, Classification of embedded systems, embedded processor in system, purpose of Embedded systems

Unit II: **10 lecture hours**

Hardware of Embedded System

Input: Sensors, Sample-and-hold circuits, A/D converters; Communication: Requirements Electrical robustness, Real-time behaviour, Examples; Processing Unit: Application-Specific Circuits (ASICs), Processors, Reconfigurable Logic; Output: D/A-converters, Actuators ; Memories: Memory organization; System design using PIC 16FXXX and ARM Processor 7 or 9, Development of protocol converter, Case studies digital camera, Robotics, Popular microcontrollers used in embedded systems

Unit III: **9 lecture hours**

Communication Buses and Devices:

I/O types, Serial Parallel communication port, Timer and Counting devices, Watchdog timers, real time clock, Brown out reset, Serial bus communication protocol-I2C, CAN, Parallel communication protocol-ISA

Unit IV: **8 lecture hours**

Interrupt Service Mechanism

Interrupt sources, Interrupt handling mechanism, Fast interrupts, Interrupt controller, Interrupt latency, Interrupt programming, Device driver

Unit V: **10 lecture hours**

Embedded software development and Program Modelling Concepts

Assembly language programming (ALP), High level language-C, Processor directives, functions and macros and other programming elements, primary issues in Hardware software co-design, Unified Modelling Language(UML), DFG model, state machine programming model, Hardware Software trade-offs, RTOS overview, types of Real-time tasks, Basic design rule using RTOS, Task swapping methods ,Scheduler algorithms, Priority inversion, process, thread, Choice of RTOS, Overview of embedded RTOS, Programming in RTOS.

Text Books

1. Steve heath, ―Embedded system design, 2nd edition 2003, elsevier
2. Rajkmal, Embedded system, 2nd edition.
3. SantanuChattopadhyay, -- Embedded System Design,2ndedition, PHI Learning

Reference Books

1. Shibu. K.V, ―Introduction to Embedded systems‖, mcgraw hill 2009
2. Frank Vahid, Embedded systems.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.	**PO1**
CO2	**Demonstrate** the architecture of the 8051, PIC microcrontroller and ARM processor and its programming aspects (assembly Level)	**PO1, PO5**
CO3	**Illustrate** about various communication interfaces and role of embedded systems in industry	**PO1, PSO1**
CO4	**Illustrate** about interrupts and software optimization.	**PO1, PO3, PO5**
CO5	**Design** real time embedded systems using the concepts of RTOS.	**PO1, PO3, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11 025	**Embedded Systems Design**	3		2		2								2	

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 20__ – 20__)		
Name of the Program:	B.Tech	**Semester:**	VI
Paper Title:	**Embedded Systems Design**	**Paper Code:**	**ECE11025**
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A **Answer All the Questions (5 x 1 = 5)**			
1	Write two difference between General Purpose Computing System and Embedded System.	**U**	**CO1**
2	Discuss purpose of Embedded systems design.	**Ap**	**CO1**
3	Differentiate Assembler and Compiler.	**U**	**CO2**
4	Write any two difference between microprocessor and microcontroller?	**R**	**CO3**
5	8051 microcontroller is RISC or CISC based processor and justify?	**R**	**CO2**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Explain different Onboard Communication Interfaces.	**U**	**CO3**
(OR)			
6 b)	Discuss high level language to machine level language process in Embedded system?	**U**	**CO3**
7 a)	Explain the internal RAM structure 8051 Microcontroller.	**R**	**CO4**
(OR)			
7 b)	Explain significance of Watchdog Timer with diagram.	**U**	**CO2**
8 a)	Discuss high level language to machine level language process in Embedded system?	**U**	**CO3**
(OR)			
8 b)	Explain FSM model for Automatic Tea/Coffee Vending Machine.	**Ap**	**CO2**
9 a)	Differentiate PIC microcontroller and ARM processor	**U**	**CO5**
(OR)			
9 b)	Explain the features of PIC microcontroller..	**U**	**CO5**

10 a)	Discuss about Embedded Firmware.	**U**	**CO4**
(OR)			
10 b)	a) Differentiate General Purpose OS and Real Time OS.	**U**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Explain serial communication part of 8051 microcontroller in details.	**R**	**CO4**
(OR)			
11 b)	**Illustrate** Non operational quality attributes of Embedded systems.	**U**	**CO3**
12 a)	**What** is Hard and Soft real time in time management part of Embedded systems**.**	**R**	**CO4**
(OR)			
12 b)	) **Illustrate** the role of ADCON Register to enable A/D Converter module of PIC Microcontroller	**U**	**CO1**
13 a)	**Why** ARM is so popular in Embedded system market **?**	**R**	**CO5**
(OR)			
13 b)	**Analyze** different Interrupts of PIC18F4455 with help of INTCON Register.	**A**	**CO4**
14 a)	**Construct** Super Loop based structure of Embedded firmware design	**A**	**CO4**
(OR)			
14 b)	Give the application of PLA?	**U**	**CO3**
15 a)	Explain the concept of MOSFET as switches?	**Ap**	**CO4**
(OR)			
15 b)	Mention the defects that occur in a chip?	**Ap**	**CO4**
16 a)	What is meant by observability? And controllability?	**R**	**CO2**
(OR)			
16 b)	What is fault sampling?	**Ap**	**CO5**
17 a)	**Explain** in detail Sequential Program Model for seat belt warning system.	**U**	**CO1**
(OR)			
17 b)	**What** are the major elements in Embedded system design? **Explain** the role of Watchdog Timer in Embedded System?	**U**	**CO4**

ECE11026	**Prof. Core- XII (Control Systems)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. 12^{th} level Mathematics 2. Knowledge of Signals and Systems				
Co-requisites	1. Understanding of analog circuit 2. Understanding of Signal Processing				

Course Objectives

1. To understand the functionality of control systems.
2. To study the different time stability analysis.
3. To compare different types of linear and non-linear control system.
4. To explain the use of frequency domain analysis.
5. To enable and acquire the knowledge of the state space analysis.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the basics of control systems.
CO2. **Explain** working of time response analysis.
CO3. **Analyze** different stability of different systems.
CO4. **Explain** working of frequency domain analysis
CO5. **Summarize** the concept of the state space analysis

Catalog Description

A **control system** manages, commands, directs, or regulates the behavior of other devices using control loops. It can range from a single home heating controller using a thermostat controlling a domestic boiler to large Industrial control systems which are used for controlling processes or machines. For continuously modulated control, a feedback controller is used to automatically control a process or operation. The control system compares the value or status of the process variable being controlled with the desired value or setpoint, and applies the difference as a control signal to bring the process variable output of the plant to the same value as the setpoint. As an example of control system viz. sequential and combinational logic, software logic, such as in a programmable logic controller.

Course Content

Unit I: 9 lecture hours

Introduction and Basic Elements of Control System:

Open loop and Closed loop systems, Differential equation, Transfer function, Mathematical modelling of Electrical, Mechanical and Electro-mechanical elements, Block diagram reduction Techniques, Signal flow graph, Mason's Gain Formula

Unit II: 9 lecture hours

Time Response Analysis:

Type & order of System, Asymptotic and BIBO stability; Significance of poles and eigen values; Internal stability; Standard Test Signals (Step Input, Ramp Input, Parabolic Input & Impulse Input), Time response analysis of First Order Systems, Impulse and Step Response analysis of second order systems, Time Response Specifications, Steady state errors, Effect of adding Poles & Zeros to Transfer Function, P, PI, PD and PID controllers.

Unit III: 9 lecture hours

Stability Analysis:

The Concept of Stability, Necessary Condition for Stability, Routh-Hurwitz Criterion, Root Locus Technique, Construction of Root Locus, Stability, Dominant Poles, Application of Root Locus Diagram, Illustration of the effect of addition of a zero and a pole. Nyquist Stability Criterion, Relative Stability Analysis

Unit IV: 9 lecture hours

Frequency Domain Analysis:

Bode Plot, Polar Plot, Nyquist Plot, Frequency Domain specifications from the plots, Nichol's Chart, Series, Parallel, series-parallel Compensators, Lead, Lag, Lag-lead and Lead-lag Compensators

Unit V: 9 lecture hours

State Space Analysis:

State space representation of Continuous Time systems, State equations, Transfer function from State Variable Representation, Solutions of the state equations, Concepts of Controllability and Observability, State space representation for Discrete time systems, Sampling Theorem, Sample & Hold, Open loop & Closed loop sampled data systems.

Text Books:

1. J. Nagrath and M. Gopal, "Control System Engineering", New Age International Publishers, 5th Edition, 2007. C.Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall, 1984
2. Katsuhiko Ogata, "Modern Control Engineering", Pearson, 5th Edition, 2010.

Reference Books:

1. Benjamin. C. Kuo, "Automatic Control Systems", Prentice Hall of India, 7th Edition, 1995.
2. Norman S. Nise, "Control System Engineering", 7th Edition, Wiley Publication.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Illustrate** the basics of control systems	PO1, PO2, PO3, PO4, PSO1
CO2	**Explain** working of time response analysis	PO1, PO2, PO3, PO4, PSO1
CO3	**Analyze** different stability of different systems.	PO1, PO2, PO3, PO4, PO5, PSO1
CO4	**Explain** working of frequency domain analysis	PO1, PO2, PO3, PO4, PO5, PSO1
CO5	**Summarize** the concept of the state space analysis	PO1, PO2, PO3, PO4, PO5, PSO1

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE11026	Control Systems	3	3	3	3	2		-	-	-	-	-		3	

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE11026 – Control Systems

Program: B.Tech. (ECE) **Semester: VI**
Time: 03 hrs. **Max. Marks:50**

Instructions:
Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**Name** few piezoelectric materials suitable for bio sensing.	**Ap**	**CO1**
2	**Name** the types of bio-sensors.	**R**	**CO4**
3	**What** are the fundamentals of surfaces and interfaces?	**U**	**CO2**
4	Write down the essential components of Biosensor devices.	**U**	**CO3**
5	**Define** micro-fluidics.	**R**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Write a note and **explain** with diagrams the fundamental types of Biosensors.	**R**	**CO1, CO3**
(OR)			
6 b)	Write a brief note on a) Lithography and; b) Etching.	**R**	**CO2**
7 a)	**Explain** Modification of bio recognition molecules for selectivity and sensitivity.	**U**	**CO1, CO2**
(OR)			
7 b)	**Explain** the working principle of FET based biosensors with examples and applications.	**U, Ap**	**CO4**
8 a)	Write a brief note on a) Lithography and; b) Etching.	**R**	**CO2**
(OR)			
8 b)	**Explain** Modification of bio recognition molecules for selectivity and sensitivity.	**U**	**CO1, CO2**
9 a)	**Explain** the working principle of FET based biosensors with examples and applications.	**U, Ap**	**CO4**
(OR)			
9 b)	**Explain** Modification of bio recognition molecules for selectivity and sensitivity.	**U**	**CO1, CO2**
10 a)	Write a note and **explain** with diagrams the fundamental types of	**R**	**CO1,**

	Biosensors.		**CO3**
(OR)			
10 b)	**Explain** the working principle of FET based biosensors with examples and applications.	**U, Ap**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Highlight the differences between Bulk micromachining and Surface micromachining, with relevant examples.	**U**	**CO2, CO5**
(OR)			
11 b)	**What** do you understand by Molecular reorganization in context to Enzymes, Antibodies and DNA?	**U**	**CO2, CO3**
12 a)	Highlight the differences between Bulk micromachining and Surface micromachining, with relevant examples.	**U**	**CO2, CO5**
12 b)	Highlight the differences between Bulk micromachining and Surface micromachining, with relevant examples.	**U**	**CO2, CO5**
13 a)	Write a brief note on various MEMS types and their medical applications, with examples.	**R, Ap**	**CO1**
(OR)			
13 b)	Highlight the differences between Bulk micromachining and Surface micromachining, with relevant examples.	**U**	**CO2, CO5**
14 a)	Write a brief note on a) Lithography and; b) Etching.	**R**	**CO2**
(OR)			
14 b)	Write a note and **explain** with diagrams the fundamental types of Biosensors.	**R**	**CO1, CO3**
15 a)	Write a brief note on various MEMS types and their medical applications, with examples.	**R, Ap**	**CO1**
(OR)			
15 b)	**What** do you understand by Molecular reorganization in context to Enzymes, Antibodies and DNA?	**U**	**CO2, CO3**
16 a)	Write a brief note on various MEMS types and their medical applications, with examples.	**R, Ap**	**CO1**
(OR)			
16 b)	Highlight the differences between Bulk micromachining and Surface micromachining, with relevant examples.	**U**	**CO2, CO5**
17 a)	Write a brief note on various MEMS types and their medical applications, with examples.	**R, Ap**	**CO1**
(OR)			
17 b)	**What** do you understand by Molecular reorganization in context to Enzymes, Antibodies and DNA?	**U**	**CO2, CO3**

ECE11027	**Prof. Core- XIII** **Microwave Engineering**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Electromagnetic Theory & Semiconductor Device Theory				
Co-requisites	---				

Course Objectives

1. Students will understand basics concept of Microwave Engineering
2. Students will learn the principle of wave propagation through microwave transmission lines and waveguides
3. Students will learn the working principle of different microwave test & measurement instruments.
4. Students will learn about the working principle of active & passive microwave devices.
5. Students will think about different real-life problems associated microwave systems and learn about the safety measures to be taken.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Explain** the basics concept of Microwave Engineering
CO2. **Explain** the principle of wave propagation through microwave transmission lines and waveguides
CO3. **Experiment with** different microwave test and measurement instruments
CO4. **Examine** performance criteria of different active & passive microwave devices
CO5. **Explain** the working principle of different real-life microwave systems and demonstrate the safety measures to the users.

Catalog Description

Microwave is a term used to identify electromagnetic waves above 10^3 Megahertz (1 Giga Hertz) up to 300 Gigahertz because of the short physical wavelengths of these frequencies. Microwave engineering pertains to the study and design of microwave circuits, components, and systems. Fundamental principles are applied to analysis, design and measurement techniques in this field. The short wavelengths involved distinguish this discipline from Electronic engineering. This is because there are different interactions with circuits, transmissions and propagation characteristics at microwave frequencies. Some theories and devices that pertain to this field are antennas, radar, transmission lines, space-based systems (remote sensing), measurements, microwave radiation hazards and safety measures. The microwave engineering discipline has become relevant as the microwave domain moves into the commercial sector, and no longer only applicable to 20th and 21st century military technologies. Inexpensive components and digital communications in the microwave domain have opened up areas pertinent to this discipline. Some of these areas are radar, satellite, wireless radio, optical communication, faster computer circuits, and collision avoidance radar.

Course Content

Module 1: Introduction to Microwaves (2 Lecture Hours)

History of Microwaves, Microwave Frequency bands. Applications of Microwaves: Civil and Military, Medical, EMI/EMC.

Module 2: Mathematical model of Microwave Transmission (4 Lecture Hours)

Concept of Mode. Characteristics of TEM, TE and TM Modes. Losses associated with microwave transmission. Concept of Impedance in Microwave transmission. Scattering or S-parameter representation of microwave circuits, properties of S-parameters.

Module 3: Analysis of RF and Microwave Transmission Lines (5 Lecture Hours)

Coaxial Line. Rectangular Waveguide, Circular waveguide. Stripline. Microstrip Line.

Module 4: Microwave Network Analysis (3 Lecture Hours)

Equivalent Voltages and currents for non-TEM lines. Network parameters for microwave Circuits. Scattering Parameters.

Module 5: Passive and Active Microwave Devices (5 Lecture Hours)

Microwave Passive components: Directional Coupler, Power Divider, Microwave Passive components: Magic Tee, attenuator, resonator. Microwave Active components: Diodes, Transistors. Microwave Active components: oscillators, mixers. Microwave Semiconductor Devices: Gunn Diodes, IMPATT diodes, Schottky Barrier diodes, PIN diodes. Microwave tubes: Klystron, TWT, Magnetron.

Module 6: Microwave Design Principles (7 Lecture Hours)

Impedance transformation. Impedance Matching. Microwave Filter Design. RF and Microwave Amplifier Design. Microwave Power Amplifier Design. Low Noise Amplifier Design, Microwave Mixer Design. Microwave Oscillator Design.

Module 7: Microwave Antenna (6 Lecture Hours)

Microwave Antenna Parameters. Microwave antenna for ground-based systems. Microwave antenna for airborne based systems. Microwave antenna for satellite borne systems. Microwave Planar Antenna.

Module 8: Microwave Measurements (4 Lecture Hours)

Power, Frequency and impedance measurement at microwave frequency. V.S.W.R method, Reflectometer technique, Use of Smith chart, Bridge method. Network Analyzer and measurement of scattering parameters. Spectrum Analyzer and measurement of spectrum of a microwave signal. Noise at microwave frequency and measurement of noise figure. Measurement of Microwave antenna parameters.

Module 9: Microwave Systems (2 Lecture Hours)

Radar Systems. Cellular Phone. Satellite Communication. RFID. GPS.

Module 10: Modern Trends in Microwaves Engineering (7 Lecture Hours)

Effect of Microwaves on human body. Medical and Civil applications of microwaves, Electromagnetic interference/Electromagnetic Compatibility (EMI/EMC). Monolithic Microwave IC fabrication. RF MEMS for microwave components. Microwave Imaging.

Text Books:

1. S. Y. Liao, "Microwave Devices and Circuits", Prentice Hall of India - 3rd Edition (2003).

2. A. Das and S. K. Das, "Microwave Engineering", Tata McGraw-Hill (2000) (UNIT V).

References:

1. R.E. Collin, "Foundations for Microwave Engineering", IEEE Press Second Edition (2002).

2. D. M. Pozar, "Microwave Engineering", John Wiley & Sons - 2nd Edition (2003).

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** the basics concept of Microwave Engineering	**PO1, PSO1, PSO2**
CO2	**Explain** the principle of wave propagation through microwave	**PO1, PO2,**

	transmission lines and waveguides	**PO3, PO4, PSO1, PSO2**
CO3	**Experiment with** different microwave test and measurement instruments	**PO1, PO2, PO3, PO4, PSO1, PSO2**
CO4	**Examine** performance criteria of different active & passive microwave devices	**PO1, PO2, PO3, PO4, PSO1, PSO2**
CO5	**Explain** the working principle of different real-life microwave systems and demonstrate the safety measures to the users.	**PO1, PO2, PO3, PO4, PO12**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11027	Microwave Engineering	3	3	3	3									3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

	ADAMAS UNIVERSITY **END-SEMESTER EXAMINATION MARCH 2022** (Academic Session: 2021 – 22)		
Name of the Program:	B. Tech. ECE	**Semester:**	VI
Paper Title:	Microwave Engineering	**Paper Code:**	ECE11027
Maximum Marks:	40	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
	10. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **11.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **12.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**What** is S_{11}?	**[R]**	**CO4**
2	**Find** the wavelength corresponding to 12 GHz.	**[R]**	**CO1**
3	**What** is the frequency band from 8-12 GHz known as?	**[R]**	**CO1**
4	**Explain** lossless transmission line.	**[U]**	**CO2**
5	**What** will be the equivalent value of 10 dB in Neper?	**[R]**	**CO2**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Illustrate** the equivalent circuit of a section of transmission line and **explain** its different components.	**C**	**CO2**
(OR)			

6 b)	Discuss how the microwave spectrum is categorized into different bands	**AP**	**CO1**
7 a)	**What** do you mean by microwave hybrid circuit? **What** are the different types of microwave hybrid circuits? **What** do you mean by waveguide Tee-junction?	**AN**	**CO2**
	(OR)		
7 b)	Derive the expressions for the field components due to TM waves in rectangular wave guide	**AP**	**CO3**
8 a)	**Explain** the limitation of conventional vacuum tubes in microwave amplification.	**AN**	**CO3**
	(OR)		
8 b)	Explain the wave impedance of a rectangular waveguide and derive the expression for the wave impedance of TE and TM modes.	**R,U**	**CO4**
9 a)	Calculate the cut-off frequency of the following modes in a square waveguide 4 cm × 4 cm TE10, TM11 and TE22.	**AP**	**CO5**
	(OR)		
9 b)	Derive the expressions of field components in a rectangular waveguide.	**U**	**CO5**
10 a)	A waveguide having dimensions a = 5 cm, b = 2 cm. The signal applied to waveguide is10GHz. Determine the modes that are propagating in the waveguide.	**U**	**CO1**
	(OR)		
10 b)	Derive the expressions for the field components due to TE waves in rectangular wave guide.	**R**	**CO2**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	A transmission line has the following parameters: R = 2 Ω/m, G= 0.5 mili mho/m, L= 8 nH/m, C= 0.23 pF/m, f= 1 GHz. **Find** out i) propagation constant (ii) characteristic impedance of transmission line.	**AN, AP**	**CO1**
	(OR)		
11 b)	For a wave guide having cross section 3cm × 2cm, compute the cut-off frequency in the TE01 mode. Also, calculate the phase velocity and guide wavelength at a frequency equal to 50% above the cut-off frequency	**U**	**CO2**
12 a)	**Interpret** the physical significance of Maxwell’s four equations in brief.	**AN**	**CO3**
	(OR)		
12 b)	Why TEM modes are not possible in hollow rectangular waveguide? Prove it.	**C**	**CO2**
13 a)	When dominant mode propagated in air filled circular waveguide diameter is 4cms. Find cut-off wavelength, cut-off frequency and guide wavelength.	**U**	**CO3**
	(OR)		

13 b)	**Illustrate** the structural diagram of an E-plane Tee and indicate different ports (or arms). **Derive** its S-matrix.	**U**	**CO3**
14 a)	Derive the equation for resonant frequency in circular cavity resonator .	**C**	**CO3**
(OR)			
14 b)	Derive the equation for Resonant frequency in rectangular cavity resonator.	**AP**	**CO4**
15 a)	Calculate resonant frequency of rectangular cavity filled with dielectric with €r=4 and having dimensions a=5cm b=4cm and d=15cm.	**C**	**CO5**
(OR)			
15 b)	Discuss in detail about Q factor of cavity Resonator.	**C**	**CO5**
16 a)	A wave guide operating in TE10 mode has dimensions a = 2.26 m and b = 1 cm. The measured guide wave length is 4 cm. Find i. :ut off frequency of the propagating mode ii. The frequency of peration iii. Maximum frequency of propagation in this mode	**C**	**CO5**
(OR)			
16 b)	When dominant mode propagated in air filled circular waveguide diameter is 4cms. Find cut-off wavelength, cut-off frequency and guide wavelength.	**U**	**CO4**
17 a)	Derive the equation for resonant frequency in circular cavity resonator .	**AP**	**CO3**
(OR)			
17 b)	Define Cavity Resonator. Draw Diagrams of Rectangular & circular cavity Resonators.	**C**	**CO3**

ECE11028	**Sensors and Actuators for IoT**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Physics				
Co-requisites	Electronics Measurement, Basic Networking				

Course Objectives

11. To study basic concepts of various sensors and actuators.
12. To develop knowledge in selection of suitable sensor based on requirement and application.
13. To understand the operation of resistive, inductive, capacitive, magnetic, thermal, radiation and piezoelectric sensors for the identification of appropriate sensors.
14. To introduce the concept of M2M (machine to machine) with necessary protocols.
15. To introduce the Raspberry PI platform, that is widely used in IoT applications.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Identify** the appropriate sensor, including powering ofthe sensor and signal conditioning (electrical and Calculation conversions).
CO2. **Learn** the operation of strain gauge and different types of sensors.
CO3. **Identify** different actuators to monitor and control the behaviour of a process or product.
CO4. **Explore and learn about** Internet of Things with the help of preparing projects designed for Raspberry Pi.
CO5. **Understand** IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules.

Catalog Description

The course is intended to give knowledge about modern electrical sensors for measuring non-electrical variables. The course is oriented towards physical phenomena used to sense such variables as: displacement, temperature, radiation, pressure, etc. In particular, issues related to modern micro-sensors made in silicon, fiber, and film technology are treated.

Course Content

Module 1: Introduction: **7 lecture hours**

Definition, classification, static and dynamic parameters, Characterization – Electrical, mechanical, thermal, optical, biological and chemical, Classification of errors – Error analysis, Static and dynamic characteristics of transducers, Performance measures of sensors.

Module 2: Sensors: **12 lecture hours**

Classification of sensors basic working principles, Displacement Sensor - Linear and rotary potentiometers, LVDT and RVDT, incremental and absolute encoders. Strain gauges. Force/Torque – Load cells. Temperature – Thermocouple, Bimetallic Strips, Thermistor, RTD. Accelerometers, Velocity sensors Tachometers, Proximity and Range sensors – Eddy current sensor, ultrasonic sensor, laser interferometer transducer, Hall Effect sensor, inductive proximity switch. Light sensors – Photodiodes, phototransistors, Flow sensors – Ultrasonic sensor, laser

Doppler anemometer tactile sensors – PVDF tactile sensor, micro-switch and reed switch Piezoelectric sensors, vision sensor.

Module 3: Actuators: **10 lecture hours**

Electrical Actuators: Solenoids, relays, diodes, thyristors, TRIACS, BJT, FET, DC motor, Servo motor, BLDC Motor, AC Motor, stepper motors. Hydraulic & Pneumatic devices – Power supplies, valves, cylinder sequencing. Design of Hydraulic & Pneumatic circuits. Piezoelectric actuators, Shape memory alloys.

Module 4: Physical Devices and Endpoints: **6 lecture hours**

Introduction to Arduino and Raspberry Pi- Installation, Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

Module 5: Introduction to IoT and M2M: **10 lecture hours**

Introduction to Internet of Things- Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates.
Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

Text Books

7. Ernest Doebelin and Dhanesh N. Manik, Doebelin's Measurement Systems, 6th Ed., McGraw Hill Education, 2017.
8. Ian Sinclair, Sensors and Transducers, Elsevier, 2011.
9. D. Patranabis, Sensors and Transducers, 2nd Ed., Prentice Hall of India Learning Pvt. Ltd., 2003.
10. Internet of Things - A Hands-on Approach, Ars deep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
11. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Reference Books

3. Sawhney.A.K, Puneeth sawhney, "A Course in Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai Publications, 2012.
4. Ernest O. Doeblin, "Measurement System, Application and Design", Tata McGraw Hill Publishing Company Ltd., 5th Edition, 2008
5. Ronald K. Jurgen, Sensors and Transducers (Progress in Technology), 2nd Ed., SAE International, 2003.
6. S. M. Sze, Semiconductor Sensors, Willy –Interscience Publications.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Identify** the appropriate sensor, including powering of the sensor and signal conditioning (electrical and Calculation conversions).	**PO1, PO2, PO3, PSO1**
CO2	**Learn** the operation of strain gauge and different types of sensors.	**PO1, PO2, PO3, PO6, PSO1**
CO3	**Identify** different actuators to monitor and control the behaviour of a process or product.	**PO1, PO2, PO4, PSO2**
CO4	**Explore and learn about** Internet of Things with the help of preparing projects designed for Raspberry Pi.	**PO1, PO2, PO3, PO5, PSO1**
CO5	**Understand** IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, and sensing modules.	**PO1, PO2, PO3, PO5, PO10, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE11 028	Sensors and Actuators For IOT	3	3	3	1	1	1				1			3	2

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech ECE	**Semester:**	V
Paper Title:	Sensors and Actuators For IOT	**Paper Code:**	ECE11028
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	Briefly explain the principles of sensors.	**R**	**CO1**
2	Mention the sensors which are used in industrial applications.	**U**	**CO1**
3	Define sensor. Classify different types of sensors.	**C**	**CO2**
4	What are the semiconductor strain gauges? Explain them in detail.	**Ap**	**CO4**
5	Mention the different types of Actuation systems.	**An**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Define thermal sensor. Classify various temperature sensors.	**R**	**CO1**
(OR)			
6 b)	What is the principle of gas thermometric sensors? Briefly explain about gas thermometric sensors	**R**	**CO1**
7 a)	Explain the working principle of thermal expansion type thermometric sensors.	**U**	**CO2**
(OR)			
7 b)	Explain in brief about the magnetic thermometer	**U**	**CO2**
8 a)	Explain in brief about the types of junction semiconductor.	**Ap**	**CO3**
(OR)			
8 b)	Explain the working principle of nuclear quadrupole resonance thermometer.	**C**	**CO3**
9 a)	Discuss the basic characteristics of radiation sensors.	**Ap**	**CO4**
(OR)			
9 b)	Describe the basic construction and operation of an electrochemical cell.	**Ap**	**CO4**
10 a)	Discuss some aspects of “smart transmitter” development in	**An**	**CO5**

	recent years.		
(OR)			
10 b)	Explain about the Phototransistors and Photo FETs.	**An**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	What is basically the concept of “smart sensors”? Explain the essential elements of a “Smart sensor” unit with a neat diagram	**R**	**CO1**
(OR)			
11 b)	Describe with the help of diagram, how the primary sensors are being integrated with signal processing ensembles.	**R**	**CO1**
12 a)	Draw the sketch of a pyroelectric IR sensor and explain its operation as it is used in microwave oven.	**U**	**CO2**
(OR)			
12 b)	How is the water level sensed in washing machines? Sketch the sensor and explain its operation.	**U**	**CO2**
13 a)	How is static pressure measured in aerospace studies? Explain with a graph that how it is dependent on total pressure, isentropic ratio and match number.	**C**	**CO3**
(OR)			
13 b)	Explain the following with neat a neat block diagram. i) Pneumatic system power supply ii) Hydraulic system power supply	**C**	**CO3**
14 a)	Explain about the different mechanisms used in rotary actuators	**Ap**	**CO4**
(OR)			
14 b)	What are mechanical actuation systems? Explain the important functions of mechanical actuation systems.	**Ap**	**CO4**
15 a)	Draw and explain how bearing mechanisms used as mechanical actuation systems.	**Ap**	**CO4**
(OR)			
15 b)	Explain how the gear trains mechanisms are used for transfer and transform rotational motions.	**Ap**	**CO4**
16 a)	Draw the sketch of a laser beam operated system of distance sensing and explain different types of detectors used and their operation.	**An**	**CO5**
(OR)			
16 b)	Mention the different deviations that need be compensated in sensor system	**An**	**CO5**
17 a)	Write a short note on excitation, amplification and filters.	**An**	**CO5**
(OR)			
17 b)	How is the water level sensed in washing machines? Sketch the sensor and explain its operation	**An**	**CO5**

		L	T	P	C
ECE11029	**Introduction to Artificial Intelligence**	L	T	P	C
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	Basic knowledge in Probability and Linear Algebra				
Co-requisites	----				

Course Objectives

1. Introduce students to the fundamental concepts of Artificial Intelligence (AI), including intelligent agents and problem-solving techniques.
2. Explore automated reasoning methods such as propositional and first-order logic, inference, and deduction.
3. Familiarize students with planning algorithms and reasoning under uncertainty, including probabilistic reasoning and belief networks.
4. Provide students with an understanding of various machine learning approaches, including inductive learning and neural networks.
5. Examine real-world case studies in AI applications across different domains to demonstrate the practical relevance of AI techniques.

Course Outcomes

On completion of this course, the students will be able to

CO1: Develop proficiency in understanding the principles of intelligent agents and problem-solving techniques in AI.
CO2: Apply automated reasoning methods, including propositional and first-order logic, to solve complex problems effectively.
CO3: Implement planning algorithms and demonstrate proficiency in reasoning under uncertainty using probabilistic reasoning and belief networks.
CO4: Utilize machine learning approaches such as inductive learning and neural networks to develop intelligent systems.
CO5: Analyze real-world case studies in AI applications across various domains to evaluate the effectiveness and relevance of AI techniques.

Catalog Description:

This course offers a comprehensive exploration of Artificial Intelligence (AI), covering topics such as intelligent agents, problem-solving, automated reasoning, planning, reasoning under uncertainty, and machine learning. Students will delve into the principles of AI through lectures and hands-on exercises, gaining insights into state-of-the-art techniques and algorithms. Real-world case studies in AI applications across domains like robotics, speech/audio processing, IoT, and healthcare will be analyzed to illustrate the broad impact and potential of AI technologies.

Course Content

Unit I: **8 lecture hours**

Introduction to AI - Intelligent Agents, Problem-Solving Agents,
Automated Problem Solving- State Space, Problem Reduction, Game Playing, Constraint Satisfaction.

Unit II: **10 lecture hours**

Automated Reasoning - Proposition and first order logic, inference and deduction, resolution refutation, answer extraction, knowledge-based systems, logic programming, and constrained logic programming, non-monotonic reasoning.

Unit III: **9 lecture hours**

Planning: State-space, plan space and partial order planning, planning algorithms.

Unit IV: **8 lecture hours**

Reasoning under uncertainty: Probabilistic reasoning, belief networks.

Unit V: **10 lecture hours**

Learning: Inductive learning, decision trees, logical approaches, computational learning theory, neural networks, reinforcement learning, Intelligent agents, natural language understanding, and Applications.

Case studies on AI: Robotics and automation/ Speech and audio processing/ Signal processing and pattern recognition/Internet of Things (IoT) applications/ Wireless Communication and Networking/ Embedded Systems and Edge Computing/ Circuit Design and Optimization/ Energy Efficiency and Power Management/ Healthcare.

Text Books

1. Artificial Intelligence : A Modern Approach (Paperpack). Stuart Russell and Peter Norvig. Pearson; 3 edition. 2010 ISBN-13: 978-0132071482
2. Fundamentals of the New Artificial Intelligence. Toshinori Munakata. Springer Science & Business Media. ISBN 978-1-84628-839-5
3. Pattern Recognition and Machine Learning. Christopher Bishop. Springer. 2006. ISBN-13 978-0-387-31073-2.\
4. Artificial Intelligence (Third Edition).Elaine Rich,Kevin Knight,Shivashankar B. Nair. Tata McGraw-Hill Education Pvt. Ltd.. 2008. ISBN 13: 9780070087705
5. Reinforcement Learning: An Introduction. Richard S. Sutton Andrew G. Barto . MIT Press, 2017. ISBN-13: 9780262332767

Reference Books

1. Genetic Algorithms in Search, Optimization, and Machine Learning. David E. Goldberg. Pearson Education, 2006. ISBN-13: 9788177588293.
2. Principles Of Artificial Intelligence. N.J. Nilsson. Narosa Book Distributors. 2002.ISBN-13: 978-8185198293
3. Probabilistic Programming & Bayesian Methods for Hackers. Addison-Wesley Data and Analytics. ISBN-13: 978-0133902839.
4. Introduction to Information Retrieval South Asian Edition. Christopher D. Manning, Hinrich Schütze, and Prabhakar Raghavan. Cambridge University Press. 2008. ISBN-13: 978-1107666399.

5. Teaching statistics a bag of tricks. Andrew Gelman and Deborah Nolan. Oxford University Press, 2002. ISBN-13: 9780198572244.
6. Advanced Methods for Knowledge Discovery from Complex Data. Sanghamitra Bandyopadhyay. Springer Science & Business Media, 2005. ISBN-13: 9781852339890.
7. Hands-On Machine Learning with Scikit-Learn and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. Aurélien Géron. O'Reilly Media; 1 edition (April 9, 2017). ISBN-13: 978-1491962299.
8. Deep Learning. Ian Goodfellow, Yoshua Bengio, Aaron Courville. The MIT Press, 2016. ISBN-13: 978-0262035613.
9. Bayesian Data Analysis. Andrew Gelman, John Carlin, Hal Stern, David Dunson, Aki Vehtari, and Donald Rubin. Third Edition. 2013. ISBN-13: 978-1439840955.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Develop** proficiency in understanding the principles of intelligent agents and problem-solving techniques in AI.	**PO1, PO2, PO5**
CO2	**Apply** automated reasoning methods, including propositional and first-order logic, to solve complex problems effectively.	**PO1, PO2 PO4, PO5**
CO3	**Implement** planning algorithms and demonstrate proficiency in reasoning under uncertainty using probabilistic reasoning and belief networks.	**PO1, PO2, PO4, PO5, PO6**
CO4	**Utilize** machine learning approaches such as inductive learning and neural networks to develop intelligent systems.	**PO1, PO2, PO4, PO5, PO7**
CO5	**Analyze** real-world case studies in AI applications across various domains to evaluate the effectiveness and relevance of AI techniques.	**PO1, PO2, PO4, PO5, PO9, PO10**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE110 29	Intro- duction to Artificial Intell- igence	3	3		3	3	2	2		2	2			3	2

1=weakly mapped

2= moderately mapped

3=strongly mapped

		L	T	P	C
ECE11030	**Wireless Communication**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. Knowledge of analog and digital communication 2. Basic understanding of radio communication				
Co-requisites	1. Understanding of how TCP/IP networks operate 2. Understanding of circuit-switched networks and signalling protocols				

Course Objectives

1. An understanding on functioning of wireless communication system and evolution of different wireless communication systems and standards.
2. To expose the students to understand mobile radio communication principles and to study the recent trends adopted in cellular systems.
3. To study the type and appropriate model of wireless fading channel based on the system parameters and the property of the wireless medium.
4. To explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies of GSM, GPRS etc. used in Wireless Communication Networks.
5. To study the various multiple access techniques and an ability to explain the architecture, functioning, protocols, capabilities and application of various wireless communication networks.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Compare** the evolution of mobile communication generations from 1G to 4G with different characteristics and limitations.
CO2. **Apply** cellular concepts to evaluate the signal reception performance in a cellular network and traffic analysis to design cellular network with given quality of service constraints.
CO3. **Explain** different types of fading, indoor and outdoor propagation models and calculate losses.
CO4. **Analyze** the measures to increase the capacity in GSM systems and the entire protocol architecture of GSM- communication protocols for radio resource management and mobility management
CO5. **Explore** the various concepts of wireless communication, its design with respect to fading and link performance

Catalog Description

The wireless telecommunications industry has grown tremendously since the first cellular system was deployed in 1983. Digital techniques were introduced in 1993 to accommodate the huge boom in U.S. subscribers of portable telephone service in the mid 1990's. The same growth has occurred in Europe and Japan. Systems evolved from providing voice (2G) to all-IP data service (4G), creating a need for researchers and engineers with knowledge about cellular radio systems and digital wireless communication techniques. Wireless systems that provide personal and machine-to-machine communication constitutes a major research area of vital importance. This Course is to expose the students to the most recent technological developments in Mobile communication systems. The Course considers the basic concepts of cellular system. Following this, various propagation effects and propagation models used in mobile communication are included in the course. It deals with various methodologies to improve the received signal quality in mobile communication. The Course provides various multiple access techniques and Standards in Cellular mobile Communication.

Course Content

Unit I: 6 lecture hours

Introduction to Wireless Communication System:
Evolution of mobile communications, Mobile Radio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Trend in Cellular radio and personal communication. Second generation Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL), Wireless Local Area network (WLAN), Bluetooth and Personal Area Networks.

Unit II: 11 lecture hours

The Cellular Concept- System Design Fundamentals:
Cellular system, Hexagonal geometry cell and concept of frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio, Channel & co-channel interference reduction factor, S/I ratio consideration and calculation for Minimum Cochannel and adjacent interference, Handoff Strategies, Umbrella Cell Concept, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular System-cell splitting, Cell sectorization, Repeaters, Micro cell zone concept, Channel antenna system design considerations.

Unit III: 9 lecture hours

Characteristics of wireless channels:
Different Multi-path propagation mechanisms, propagation over water or flat open area, propagation near in distance, long distance propagation, point to point prediction model – characteristics, free space propagation model, two ray ground reflection model. Multi-path effects on mobile communication, Fading, different types of fading, small and large-scale fading, slow and fast fading, narrowband and wideband fading, inter symbol interference, fast fading model, Doppler effect due to velocity of mobiles, Rayleigh envelop.

Unit IV: 9 lecture hours

Wireless Systems:
Mobile Wireless Systems, 2G network GSM, Architecture, Protocols, Air Interface, GSM Multiple Access, GSM Channel Organization, GSM Call Set up Procedure, GSM Protocols and Signaling, Location Update Procedure, Routing a call to a Mobile Subscriber, The concept of packet data services - 2.5G GPRS networks: The 2.5 G General Packet Radio Services, GPRS Networks Architecture. Session Management and PDP Context, GPRS Location Management Procedures, GPRS Interfaces and Related Protocols, GPRS Applications, IS-136 (Digital-AMPS), Mobile Management, Voice signal processing, FDMA, TDMA, and CDMA.

Unit V: 10 lecture hours

Improvement on Link performance:

Introduction to diversity, equalization and capacity, Space and scanning diversity, Maximal ratio combiner, Equal gain diversity, Rake Receiver, Capacity in AWGN, Capacity of flat fading channels, Equalizer and its mode, Adaptive equalizer block diagram, Types of Equalizers - elementary level only, Introduction to MIMO antennas

Text Books

1. William, C. Y. Lee, “Mobile Cellular Telecommunications”, 2nd Edition, McGraw Hill, 1990.
2. Schiller, "Mobile Communications", Pearson Education Asia Ltd., Reprint 2012’
3. Theodore S Rappaport, “Wireless Communication Principles and Practice”, 2nd Edition, Pearson, 2002.
4. A. Goldsmith, Wireless Communications, Cambridge University Press, 2005.

Reference Books

1. Mischa Schwartz, “Mobile Wireless Communications”, Cambridge University Press, UK, 2005.
2. William Stallings, “Wireless Communication Networks and Systems”, 2nd Edition, PPH, 2005.
3. TRAI, “Information paper On Effects of Electromagnetic Field Radiation from Mobile Towers and Handsets”, 30th July, 2014
4. Andreas.F.Molisch., "Wireless Communications", Wiley, 2nd Edition-2005, Reprint-2014.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Compare** the evolution of mobile communication generations from 1G to 4G with different characteristics and limitations.	**PO1, PO3, PO10, PSO1, PSO2**
CO2	**Apply** cellular concepts to evaluate the signal reception performance in a cellular network and traffic analysis to design cellular network with given quality of service constraints.	**PO1, PO2, PO3, PO10, PSO1, PSO2**
CO3	**Explain** different types of fading, indoor and outdoor propagation models and calculate losses.	**PO1, PO2, PO10, PSO1, PSO2**

CO4	**Analyze** the measures to increase the capacity in GSM systems and the entire protocol architecture of GSM- communication protocols for radio resource management and mobility management	**PO1, PO2, PO10, PSO1, PSO2**
CO5	**Compare** the characteristics of different multiple access techniques, various wireless networks and examine the effects of EMF radiation from mobile towers and handsets.	**PO2, PO3, PO10, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO2
ECE11030	Wireless Communication	3	3	3							3			3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name:

Enrolment No:

ADAMAS UNIVERSITY
PURSUE EXCELLENCE

Course: ECE11030– Wireless Communication

Program: B.Tech. (ECE) **Semester: VII**
Time: 03 hrs. **Max. Marks:50**

Instructions:
Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**What** is the importance of EIRP?	**[U]**	**CO**
2	**Explain** the process of making a call to Cellular Mobile user.	**[R]**	**CO**
3	**Determine** the distance from the nearest co-channel cell for a cell having a radius of 0.64 km and a co-channel reuse factor of 12.	**[U]**	**CO**
4	**What** are the types of persistence method?	**[U]**	**CO**
5	**What** is the difference between soft and hard hand-off?	**[R]**	**CO**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**a)What** are the various types of control channel for mobile communication? **b)What** is Half-rate and Full-rate traffic channels? **c)** Compute the total time duration allotted for one TDMA frame.	**[U+R]**	**CO**
	(OR)		
6 b)	**a)** A geographical area of a cellular system is 4200 km^2. A total of 1001 radio channels are available for handling traffic. Suppose the area of a cell is 12 km^2. **i) How** many times would the cluster of size 7 have to be replicated in order to cover the entire service area? Calculate the number of channels per cell and the system capacity. **ii)** If the cluster size is decreased from 7 to 4, then does it result into increase in system capacity? **b) What** are Umbrella cells? **c) Which** modulation technique is used in GSM?	**[Ap]**	**CO & CO**
7 a)	**a) How** is data transfer handled in GPRS architecture? **b) How** is data routing done and in what respect is it different from voice routing?	**[Ap]**	**CO**
	(OR)		
7 b)	**a)What** are the various types of control channel for mobile communication? **b)What** is Half-rate and Full-rate traffic channels? **c)** Compute the total time duration allotted for one TDMA frame.	**[U+R]**	**CO**
8 a)	**Explain** the evolution from 2G to 3G cellular networks using neat block diagram.	**[U]**	**CO**

	What do you mean by Doppler shift?		& CO
(OR)			
8 b)	**What** do you mean by Gain margin and Phase margin of a closed loop system?	**Understand**	**CO**
9 a)	Draw and **explain** the Bode plot for a PID controller.	**Analyse**	**CO**
(OR)			
9 b)	**a) How** is data transfer handled in GPRS architecture? **b) How** is data routing done and in what respect is it different from voice routing?	**[Ap]**	**CO**
10 a)	**Explain** the evolution from 2G to 3G cellular networks using neat block diagram. What do you mean by Doppler shift?	**[U]**	**CO & CO**
(OR)			
10 b)	**a)** A geographical area of a cellular system is 4200 km^2. A total of 1001 radio channels are available for handling traffic. Suppose the area of a cell is 12 km^2. **i) How** many times would the cluster of size 7 have to be replicated in order to cover the entire service area? Calculate the number of channels per cell and the system capacity. **ii)** If the cluster size is decreased from 7 to 4, then does it result into increase in system capacity? **b) What** are Umbrella cells? **c) Which** modulation technique is used in GSM?	**[Ap]**	**CO & CO**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**a)What** are the various types of control channel for mobile communication? **b)What** is Half-rate and Full-rate traffic channels? **c)** Compute the total time duration allotted for one TDMA frame.	**[U+R]**	**CO**
(OR)			
11 b)	State and **explain** Mason's gain formula using SFG.	**Understand**	**CO**
12 a)	**a)** A geographical area of a cellular system is 4200 km^2. A total of 1001 radio channels are available for handling traffic. Suppose the area of a cell is 12 km^2. **i) How** many times would the cluster of size 7 have to be replicated in order to cover the entire service area? Calculate the number of channels per cell and the system capacity. **ii)** If the cluster size is decreased from 7 to 4, then does it result into increase in system capacity? **b) What** are Umbrella cells? **c) Which** modulation technique is used in GSM?	**[Ap]**	**CO & CO**
12 b)	**Explain** the evolution from 2G to 3G cellular networks using neat block diagram. What do you mean by Doppler shift?	**[U]**	**CO & CO**
13 a)	**a) How** is data transfer handled in GPRS architecture? **b) How** is data routing done and in what respect is it different from voice routing?	**[Ap]**	**CO**
(OR)			

13 b)	**a) Describe** the PDP context activation procedure in GPRS system. **b)** Give one example of migration process from IPv4 to IPv6 and explain using suitable diagram. **c) What** is the wireless broadband Wi-max technology? How is it different from wireless LAN technology? **d) Describe** some applications of GPRS network.	**[Ap+ R]**	**CO & CO**
14 a)	**a) Derive** an expression formobile point to point propagation model (two-ray model) to determine the received signal power. Explain the use of two-ray model to justify mobile radio path loss and antenna height effects. **b)** Mention the Uplink and Downlink frequencies allotted for GSM 900 frequency band. **c)Why** the uplink frequency for GSM is less than the downlink frequency?	**[Ap+U+R]**	**CO & CO**
(OR)			
14 b)	Sketch and **explain** the Bode plot for $$G(s)H(s) = \frac{64(s+2)}{s(s^2+3.2s+64)(s+0.5)}$$	**Analyse**	**CO**
15 a)	System matrix, $A = \begin{pmatrix} -1 & 1 & 0 \\ 0 & 4 & 2 \\ 0 & 0 & -10 \end{pmatrix}$, Input matrix,$B = \begin{pmatrix} 1 \\ 0 \\ -1 \end{pmatrix}$, Output matrix, $C = (1 \quad 0 \quad 1)$ Transmission matrix, D=0 **Determine** whether the system is stable or not?	**Evaluate**	**CO**
(OR)			
15 b)	**Obtain** the state equation for a parallel RLC circuit.	**Evaluate**	**CO**
16 a)	**a)Show** the relationship between frequency reuse ratio q and cluster size K. (where, $K=i^2+j^2+i*j$). **b)** Prove that sectoring increases signal to co-channel interference ratio.	**[U]**	**CO**
(OR)			
16 b)	**a) Derive** an expression for mobile point to point propagation model (two-ray model) to determine the received signal power. Explain the use of two-ray model to justify mobile radio path loss and antenna height effects. **b)** Mention the Uplink and Downlink frequencies allotted for GSM 900 frequency band. **c)Why** the uplink frequency for GSM is less than the downlink frequency?	**[Ap+U+R]**	**CO & CO**
17 a)	**a) Describe** the PDP context activation procedure in GPRS system. **b)** Give one example of migration process from IPv4 to IPv6 and explain using suitable diagram.	**[Ap+ R]**	**CO & CO**

	c) What is the wireless broadband Wi-max technology? How is it different from wireless LAN technology? **d) Describe** some applications of GPRS network.		
(OR)			
17 b)	**a) Derive** an expression for mobile point to point propagation model (two-ray model) to determine the received signal power. Explain the use of two-ray model to justify mobile radio path loss and antenna height effects. **b)** Mention the Uplink and Downlink frequencies allotted for GSM 900 frequency band. **c)Why** the uplink frequency for GSM is less than the downlink frequency?	**[Ap+U+R]**	**CO & CO**

ECE11031	**Data Acquisition**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. Communication Systems-II 2. Data Communication and Computer Networks				
Co-requisites	Sensors, Devices & Actuators				

Course Objectives

16. To understand concepts of acquiring the data from transducers/input devices.
17. To familiarize with different data transfer techniques.
18. To provide knowledge of different data acquisition systems used in industry.
19. To understand fundamental programming logic transferable to other programming languages.
20. Use data acquisition software and hardware to collect and analyze data from a physical system.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Understand** the principles of operation of commonly used sensors, transducers, and instruments
CO2. **Understand** terminologies associated with instrumentation systems (e.g., range, sensitivity, dynamic response, calibration, hysteresis, error, accuracy, precision, data uncertainty, mean and standard deviation)
CO3. **Elucidate** the elements of data acquisition techniques.
CO4. **Design** and simulate signal conditioning circuits.
CO5. **Gain** experience in developing computerized instrumentation systems for industrial processes using multiple sensors, interface electronics, data acquisition card, and GPIB and serial instruments.

Catalog Description

Data acquisition (commonly abbreviated as DAQ or DAS) is the process of sampling signals that measure real-world physical phenomena and converting them into a digital form that can be manipulated by a computer and software.

Data Acquisition is generally accepted to be distinct from earlier forms of recording to tape recorders or paper charts. Unlike those methods, the signals are converted from the analog domain to the digital domain and then recorded to a digital medium such as ROM, flash media, or hard disk drives.

The primary purpose of a data acquisition system is to acquire and store the data. But they are also intended to provide real-time and post-recording visualization and analysis of the data. Furthermore, most data acquisition systems have some analytical and report generation capability built-in. A recent innovation is the combination of data acquisition and control, where a high-quality DAQ system is connected tightly and synchronized with a real-time control system. You can read more about this topic in the related article: “Merging Data Acquisition with a Real-Time Control System”.

Engineers in different applications have various requirements, of course, but these key capabilities are present in varying proportion:

- Data recording
- Data storing
- Real-time data visualization
- Post-recording data review
- Data analysis using various mathematical and statistical calculations
- Report generation

Data acquisition systems or DAQ devices are essential in the testing of products, from automobiles to medical devices - basically, any electromechanical device that people use.

Course Content

Module 1: Introduction: 6 lecture hours

Generalized instrumentation system, PC-Based instrumentation system, Principles of data acquisition, Generalized data acquisition system, S/H circuits, Multi-channel data acquisition systems.

Module 2: Principles of PC based Data Acquisition: 8 lecture hours

Interpolation, PC-bus based data acquisition system, Analog and digital isolation, Types of sampling, Data transfer methods, Data acquisition configurations, Expansion buses and I/O ports, Local data acquisition: Plug-in data acquisition, Parallel port data acquisition.

Module 3: Data Acquisition with Op-Amps: 10 lecture hours

Operational Amplifiers, CMRR, Slew Rate, Gain, Bandwidth. Zero crossing detector, Peak detector, Window detector. Difference Amplifier, Instrumentation Amplifier AD 620, Interfacing of IA with sensors and transducer, Basic Bridge amplifier and its use with strain gauge and temperature sensors, Filters in instrumentation circuits.

Module 4: Networked Data Acquisition: 10 lecture hours

Hierarchy model for industrial automation, Network data communication: Analog communication, Hybrid communication, Digital communication, Local area networks, OSI model, LAN characteristics, LAN types, Internet protocol, Network devices, HART communication, Network connection, Communication modes, Protocol layers Field buses – MODBUS, PROFIBUS.

Module 5: Data Acquisition using GPIB and Serial Interfaces: 11 lecture hours

GPIB system, Pins and signals, Handshake protocol, GPIB commands: Primary commands, Secondary commands, Expanding GPIB, Sharing GPIB device.
Features of Serial communication, Serial communication formats, Serial communication modes, Serial interface standards, USB, IEEE1394, Remote I/O modules.

Text Books

12. Coughlin, R.F., Operational Amplifiers and Linear Integrated Circuits, Pearson Education (2006).
13. Kalsi, H.S., Electronic Instrumentation, Tata McGraw Hill (2002).
14. Gayakwad, R.A., Op-Amp and Linear Integrated Circuits, Pearson Education (2002).
15. N. Mathivanan, PC-Based Instrumentation: Concepts and Practice, Prentice-Hall of India, New Delhi, 2016

Reference Books

7. Ananad, M.M.S., Electronic Instruments and Instrumentation Technology, Prentice Hall of India Private Limited (2004).
8. Murthy, D.V.S., Transducers and Instrumentation, Prentice Hall of India Private Limited (2006).
9. D. Bailey, E. Wright, Practical SCADA for Industry, Newnes

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Mid Term	Class Assessment	End Term
Weightage (%)	**20**	**30**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the principles of operation of commonly used sensors, transducers, and instruments	**PO1, PO2, PO3, PO10, PSO1**
CO2	**Understand** terminologies associated with instrumentation systems (e.g., range, sensitivity, dynamic response, calibration, hysteresis, error, accuracy, precision, data uncertainty, mean and standard deviation)	**PO1, PO2, PO3, PO5, PO10, PSO2**
CO3	**Elucidate** the elements of data acquisition techniques.	**PO1, PO2, PO5, PO10, PSO1, PSO2**
CO4	**Design** and simulate signal conditioning circuits.	**PO1, PO2, PO3, PO5, PO10, PSO1**
CO5	**Gain** experience in developing computerized instrumentation systems for industrial processes using multiple sensors, interface electronics, data acquisition card, and GPIB and serial instruments.	**PO1, PO2, PO3, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE11 031	Data Acquisition	3	3	3		3					3			3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

ECE11032	**Advanced Machine Learning**	L	T	P	C
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of Probability and Linear Algebra				
Co-requisites	Introduction to Machine Learning				

Course Objectives

1. Introduce students to the history and foundational concepts of Deep Learning, including McCulloch Pitts Neuron and Multilayer Perceptrons (MLPs).
2. Explain various activation functions and optimization techniques used in Deep Learning, such as Gradient Descent and Principal Component Analysis.
3. Explore the principles of autoencoders and regularization methods in Deep Learning, including their applications in denoising and sparse autoencoders.
4. Discuss advanced Deep Learning models like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), along with their architectures and applications.
5. Examine real-world applications of Deep Learning in image processing, natural language processing, speech recognition, and video analytics.

Course Outcomes

On completion of this course, the students will be able to

CO1: Gain proficiency in understanding the historical background and fundamental concepts of Deep Learning, including McCulloch Pitts Neuron and Multilayer Perceptrons (MLPs).
CO2: Apply various activation functions and optimization techniques, such as Gradient Descent and Principal Component Analysis, to train Deep Learning models effectively.
CO3: Implement autoencoders and regularization methods in Deep Learning, including denoising and sparse autoencoders, to improve model performance.
CO4: Analyze and evaluate advanced Deep Learning models like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) in terms of architecture and applications.
CO5: Demonstrate the ability to apply Deep Learning techniques to real-world problems in image processing, natural language processing, speech recognition, and video analytics.

Catalog Description:

This course provides a comprehensive understanding of Deep Learning, covering topics such as neural network architectures, activation functions, optimization techniques, autoencoders, regularization methods, and advanced Deep Learning models. Students will learn about the history and development of Deep Learning, explore various techniques for model training and optimization, and analyze real-world applications in image processing, natural language processing, speech recognition, and video analytics. Through lectures and hands-on exercises, students will gain practical skills in designing and implementing Deep Learning models using modern tools and techniques.

Course Content

Unit I: **8 lecture hours**

Introduction:

History of Deep Learning, McCulloch Pitts Neuron, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Sigmoid Neurons, Feed Forward Neural Networks, Backpropagation

Unit II: **10 lecture hours**

Activation functions and parameters:

Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, Principal Component Analysis and its interpretations, Singular Value Decomposition, Parameters v/s Hyper-parameters

Unit III: **9 lecture hours**

Auto-encoders & Regularization:

Auto encoders and relation to PCA, Regularization in autoencoders, Denoising autoencoders, Sparse auto encoders, Regularization: Bias Variance Tradeoff, L2 regularization, Early stopping, Dataset augmentation, Encoder Decoder Models, Attention Mechanism, Attention over images, Batch Normalization

Unit IV: **8 lecture hours**

Deep Learning Models:

Introduction to CNNs, Architecture, Convolution/pooling layers, CNN Applications, LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet. Introduction to RNNs, Back propagation through time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, GRU, LSTMs

Unit V: **10 lecture hours**

Deep Learning Applications:

Image Processing, Natural Language Processing, Speech recognition, Video Analytics

Laboratory/ Practicals (if any):

1. Implementation of the following deep learning algorithms in Python using TensorFlow: Convolution Neural Network
2. Implementation of the following deep learning algorithms in Python using TensorFlow: Recurrent Neural Network
3. Project work involving the application of Deep Learning

Text Books

1. Ian Goodfellow, YoshuaBengio, Aaron Courville. Deep Learning, the MIT Press, 2016
2. Bengio, Yoshua. " Learning deep architectures for AI." Foundations and Trends in Machine Learning 2.1, Now Publishers, 2009
3. Deep Learning, Rajiv Chopra, Khanna Book Publishing, Delhi 2020.
4. https://nptel.ac.in/courses/106/106/106106184/
5. https://www.coursera.org/specializations/deep-learning

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Gain proficiency in understanding** the historical background and fundamental concepts of Deep Learning, including McCulloch Pitts Neuron and Multilayer Perceptrons (MLPs).	**PO1, PO2, PO5**
CO2	**Apply** various activation functions and optimization techniques, such as Gradient Descent and Principal Component Analysis, to train Deep Learning models effectively.	**PO1, PO2 PO4, PO5, PO6**
CO3	**Implement** autoencoders and regularization methods in Deep Learning, including denoising and sparse autoencoders, to improve model performance.	**PO1, PO2, PO4, PO5, PO6**
CO4	**Analyze and evaluate** advanced Deep Learning models like Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs) in terms of architecture and applications.	**PO1, PO2, PO4, PO5, PO6, PO9, PO10**
CO5	**Demonstrate** the ability to apply Deep Learning techniques to real-world problems in image processing, natural language processing, speech recognition, and video analytics.	**PO1, PO2, PO6, PO7, PO8, PO9, PO10**

Course Code	Course Title	PO1 Engineering Knowledge	PO2 Problem analysis	PO3 Design/development of solutions	PO4 Conduct investigations of complex problems	PO5 Modern tool usage	PO6 The engineer and society	PO7 Environment and sustainability	PO8 Ethics	PO9 Individual and team work	PO 10 Communication	PO 11 Project management and finance	PO 12 Life-long Learning	PSO1 An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	PSO2 An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
ECE110 32	**Advanced Machine Learning**	3	3		3	3	3	3	3	3	3			3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

ECE11033	Information Theory and Coding	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Mathematics, Basic knowledge of Digital Communication				
Co-requisites					

Course Objectives

1. To define and apply the basic concepts of information theory (entropy, channel capacity)
2. To analyze the process of coding for analog and discrete sources and the mathematical model for information sources.
3. To learn the principles and applications of information theory in communication systems.
4. To understand the theoretical framework upon which error-control codes are built.
5. To study various data compression methods and describe the most common such methods.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Quantify** the notion of information in a mathematically sound way.
CO2. **Calculate** entropy, joint entropy, relative entropy, conditional entropy, and channel capacity of a system.
CO3. **Differentiate** between lossy and lossless compression techniques**.**
CO4. **Explain** the significance of the quantitative measure and efficient data compression scheme for a given information source in the communications systems.
CO5. **Explain** the impact of feedback and/or many senders or receivers on the communication systems.

Catalog Description

Information theory underlies the mathematical theory of communication. However, since its introduction several decades back, information theory has been extended to several other fields, such as computer science, economics, and statistics. The first half of this course will introduce the basic notions of information theory, and relate it to primarily communication system concepts, with some examples of its application in other fields. Coding theory, which is the practical realization of the communication limits specified by information theory, will be covered in the second half of the course. However, a generalized treatment of coding theory needs knowledge of finite field algebra, therefore, the course will concentrate on binary coding schemes, which nonetheless are very widely used. A class project, involving independent reading, will allow students to investigate any advanced topic related to information theory and coding. Students will be encouraged to choose non-traditional applications of information theory or coding for the course research project.

Course Content

Module 1: Information Theory: 10 lecture hours

Concept of amount of information, information units Entropy: marginal, conditional, joint and relative entropies, relation among entropies Mutual information, information rate, channel capacity, redundancy and efficiency of channels Discrete channels – Symmetric channels, Binary Symmetric Channel, Binary Erasure Channel, Noise-Free Channel, Channel with independent I/O, Cascaded channels, repetition of symbols, Binary asymmetric channel, Shannon theorem.

Module 2: Source Coding: **10 lecture hours**

Encoding techniques, Purpose of encoding, Instantaneous codes, Construction of instantaneous codes, Kraft's inequality, Coding efficiency and redundancy, Source coding theorem. Construction of basic source codes – Shannon Fano coding, Shannon Fano Elias coding, Huffman coding, Minimum variance Huffman coding, Adaptive Huffman coding, Arithmetic coding, Dictionary coding – LZ77, LZ78, LZW, ZIP coding Channel coding, Channel coding theorem for DMC.

Module 3: Codes for error detection and correction: **10 lecture hours**

Parity check coding, Linear block codes, Error detecting and correcting capabilities, Generator and Parity check matrices, Standard array and Syndrome decoding, Hamming codes.

Cyclic codes – Generator polynomial, Generator and Parity check matrices, encoding of cyclic codes, Syndrome computation and error detection, Decoding of cyclic codes.

Module 4: BCH and Convolutional Codes: **8 lecture hours**

BCH Codes: Primitive elements, minimal polynomials, generator polynomials in terms of minimal polynomials, examples of BCH codes.

Convolutional Codes: Tree codes, trellis codes, polynomial description of convolutional codes, distance notions for convolutional codes, the generating function, matrix representation of convolutional codes, decoding of convolutional codes, distance and performance bounds for convolutional codes, examples of convolutional codes, Turbo codes, Turbo decoding.

Module 5: Compression: **7 lecture hours**

Lossless and lossy; Huffman codes; Binary Image compression schemes; Run – length Encoding; CCITT group-3 1D compression; CCITT group-3 2D compression; CCITT group-4 2D compression.

Video Image Compression: Requirement of full motion video compression; CCITT H 261 video coding algorithm; MPEG compression methodology; MPEG-2 compression; Audio (Speech) compression.

Text Books

16. Ranjan Bose, "Information Theory, Coding and Cryptography", Tata McGraw-Hill, Second Edition, 2002.
17. P. S. Satyanarayana, "Concepts of Information Theory and Coding", Dynaram Publication, 2005.
18. R. Togneri, C.J.S deSilva, Fundamentals of Information Theory and Coding Design, Taylor and Francis
19. Digital Image Processing by Gonzales & Woods, Pearson

Reference Books

7. Richard B. Wells, "Applied Coding and Information Theory for Engineers", Pearson Education, LPE, First Indian Reprint, 2004.
8. Richard E. Blahut, "Algebraic Codes for Data Transmission", Cambridge University Press, 2003.
9. Shu Lin and Daniel J.Costello, "Error Control Coding – Fundamentals and Applications", Second Edition, 2004.
10. Thomas M Cover and Joy A Thomas, "Elements of Information Theory" MGH 2006.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Quantify** the notion of information in a mathematically sound way.	**PO1, PO2, PO4, PO12, PSO2**
CO2	**Calculate** entropy, joint entropy, relative entropy, conditional entropy, and channel capacity of a system.	**PO1, PO2, PO3, PO10, PO12, PSO1, PSO2**
CO3	**Differentiate** between lossy and lossless compression techniques**.**	**PO2, PO3, PO5, PSO1, PSO2**
CO4	**Explain** the significance of the quantitative measure and efficient data compression scheme for a given information source in the communications systems.	**PO1, PO2, PO3, PO5, PO10, PSO1, PSO2**
CO5	**Explain** the impact of feedback and/or many senders or receivers on the communication systems.	**PO1, PO2, PO3, PO10, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE11033	Information Theory and Coding	3	3	3	1	2					3		1	3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

Name:

Enrolment No:

Course ECE11033– Information Theory and Coding

Program: B.Tech. (ECE) **Semester: VI**

Time: 03 hrs. **Max. Marks:50**

Instructions:

Attempt all the questions from **Section A** (each carrying 1 marks); all the questions from **Section B** (each carrying 2 marks)**.** all the questions from **Section C** (carrying 5 marks)**.**

Group A **Answer All the Questions (5 x 1 = 5)**			
1	Explain the necessary and sufficient conditions for a code to be instantaneous. Give examples.	**[U]**	**CO**
2	Explain the significance of Shannon-Hartley's theorem.	**[R]**	**CO**
3	Define standard array.	**[U]**	**CO**
4	What is a perfect code?	**[U]**	**CO**
5	What is free distance of a convolutional code?	**[R]**	**CO**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	A zero memory source has a source alphabet, S = {s1, s2, s3} with P = {0.5, 0.3, 0.2}. Find the entropy of the source. Find the entropy of its second extension and verify	**[U+R]**	**CO**
(OR)			
6 b)	Prove that the entropy of a discrete memory less source S is upper bounded by average code word length L for any distortion less source encoding scheme.	**[Ap]**	**CO2** **CO**
7 a)	Given a binary source with two symbols x1 and x2. Given x2 is twice as long as x1 and half as probable. The duration of x1 is 0.3 seconds. Calculate the information rate of the source.	**[Ap]**	**CO**
(OR)			
7 b)	Consider a source with 8 alphabets, a to h with respective probabilities 0.2, 0.2, 0.18, 0.15, 0.12, 0.08, 0.05 and 0.02. Construct a minimum redundancy code and determine the code efficiency.	**[U+R]**	**CO**
8 a)	Define standard array. How is it used in syndrome decoding? Explain with an example.	**[U]**	**CO1** **CO**
(OR)			
8 b)	What are the properties to be satisfied by a linear block code?	**Understand**	**CO**
9 a)	b) The parity matrix for a (6,3) systematic linear block code is given by ⎢ ⎢ ⎢ ⎦ ⎤ ⎥ ⎥ ⎥ ⎣ ⎡ = 1 1 0 1 0 1 0 1 1 P (i) Find all code words. (ii) Find generator and parity check matrix. (iii) Draw encoding circuit. (iv) Draw syndrome circuit.	**Analyse**	**CO**
(OR)			
9 b)	A communication system employs a continuous source. The	**[Ap]**	**CO**

	channel noise is white and Gaussian. The bandwidth of the source output is 10 MHz and signal to noise power ratio at the receiver is 100. (i) Determine the channel capacity.		
10 a)	What is the capacity of a channel of infinite bandwidth?	**[U]**	**CO CC**
(OR)			
10 b)	Define the minimum distance of a code. How is it important in error detection and correction?	**[Ap]**	**CO2 CC**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**a)What** are the various types of control channel for mobile communication? **b)What** is Half-rate and Full-rate traffic channels? **c)** Compute the total time duration allotted for one TDMA frame.	**[U+R]**	**CC**
(OR)			
11 b)	State and **explain** Mason's gain formula using SFG.	**Understand**	**CC**
12 a)	Explain maximum likelihood decoding of convolutional codes.	**[Ap]**	**CO2 CC**
12 b)	**Explain** the evolution from 2G to 3G cellular networks using neat block diagram. What do you mean by Doppler shift?	**[U]**	**CO CC**
13 a)	**a) How** is data transfer handled in GPRS architecture? **b) How** is data routing done and in what respect is it different from voice routing?	**[Ap]**	**CC**
(OR)			
13 b)	Define Channel Capacity theorem and Shannon limit. Discuss Bandwidth-S/N trade off.	**[Ap+ R]**	**CO3 CC**
14 a)	How do we use Parity Matrix in Block Coding?	**[Ap+U+R]**	**CO3 CC**
(OR)			
14 b)	What do you understand by linear block codes? Briefly comment on the BCH codes.	**Analyse**	**CC**
15 a)	Design a Huffman code for the following alphabet and find the average code-word length, efficiency and redundancy: A = {a, b, c, d, e, f, g}, PA = {0.46, 0.26, 0.12, 0.06, 0.05, 0.03, 0.02}.	**Evaluate**	**CC**
(OR)			
15 b)	**Obtain** the state equation for a parallel RLC circuit.	**Evaluate**	**CC**
16 a)	What is the significance of the syndromes of a (6, 3) systematic cyclic code? Give a complete list codes and syndromes.ratio.	**[U]**	**CC**
(OR)			
16 b)	**a) Derive** an expression for mobile point to point propagation model (two-ray model) to determine the received signal power. Explain the use of two-ray model to justify mobile radio path loss and antenna height effects.	**[Ap+U+R]**	**CO3 CC**

	b) Mention the Uplink and Downlink frequencies allotted for GSM 900 frequency band. **c)Why** the uplink frequency for GSM is less than the downlink frequency?		
17 a)	Explain the following terms : a) Viterbi Coder. b) Lempel Ziv coding.	**[Ap+ R]**	**CO3 CO**
(OR)			
17 b)	Briefly explain Hamming Sphere.	**[Ap+U+R]**	**CO3 CO**

		L	T	P	C
.CSE11251	**Object Oriented Programming**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**C Programming**				
Co-requisite	**Logical Ability**				

Course Objectives:

1. Introduce the fundamental concept of object oriented programming
2. Emphasize the importance of classes and objects in developing and implementing efficient programs.
3. Describe common applications using object oriented concepts.

Course Outcomes:

On the completion of this course the student will be able to

CO1. Interpret fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
CO2. Construct programming solutions with exception handling and multi-threading concept
CO3. Develop programming solutions using database connection
CO4. Solve GUI program with proper event handling techniques
CO5. Develop programming solutions to real world problems effectively.

Course Description:

This course investigates object-oriented methods including object-oriented programming methodologies and techniques. Current methodology is emphasized. The use of object-oriented features such as encapsulation, information hiding, inheritance and polymorphism is reinforced by class assignments and programming exercises. The importance of multi-threading and exception handling is introduced in this course.

Course Content:

Unit-I	**09 Lecture Hours**
OOP Concepts - Data Abstraction, Encapsulation, Inheritance, Benefits of Inheritance, Polymorphism, Classes and Objects, Procedural and OOP Paradigms. Introduction To Java, Data Types, Variables & Constants, Scope & Life Time Of Variables, Precedence Of Operator, Expressions, Type Casting, Enumerated Types, Block Scope, Control Flow, Conditional Statements, Loops, Break & Continue Statements, Arrays, Console Input/Output, Formatting Output, Constructors Methods, Parameter Passing, Static Fields & Methods, Access Control, "This" Reference, Method Overloading, Recursion, Garbage	

Collection, Building Strings, String Class.	
Unit-II	**09 Lecture Hours**
Exception Handling - Dealing With Errors, Advantages Of Exception Handling, The Classification - Exception Hierarchy, Checked And Unchecked Exceptions, Try, Catch, Throw, Throws And Finally, Exceptions-Throwing, Exception Specification, Built In Exceptions, Creating Exception Sub Classes. **Multithreading -** Difference Between Multiple Processes And Multiple Threads, Thread States, Creating And Interrupting Threads, Thread Priorities, Synchronizing Threads, Inter-Thread Communication, Procedure Consumer Pattern.	
Unit-III	**09 Lecture Hours**
Collection Framework - Introduction, Generics and Common Use Of Collection Classes, Array List, Vector, Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, Calendars And Properties. **Files -** Streams - Byte Streams, Character Streams, Text Input/Output, Binary Input/Output, Random Access of File Operations, File Management. **Connecting To Database –** JDBC / ODBC Type 1 To 4 Drivers, Connection And Handling Databases With JDBC.	
Unit-IV	**09 Lecture Hours**
GUI Programming - The AWT Class Hierarchy, Introduction To Swing, Swing Vs, AWT, Hierarchy Of Swing Components, Containers - Jframe, Japplet, Jdialog, Jpanel, Overview Of Swing Components: Jbutton, Jlabel, Jtextfield, Jtextarea, Swing Applications, Layout Management - Types - Border, Grid And Flow **Event Handling -** Events, Sources, Classes, Listeners, Event Sources And Listeners, Delegation Event Model, Examples. Handling Mouse Events, Adapter Classes. **Applets -** Inheritance Hierarchy For Applets, Differences Between Applets And Applications, Life Cycle, Passing Parameters To Applets, Applet Security Issues.	
Unit-V	**09 Lecture Hours**
Application Development: Design of real life GUI applications using Swing/AWT/JDBC for Employee management system, Hotel management system, Hospital management system etc.	

Text Books:
1. Java Fundamentals - A Comprehensive Introduction, Illustrated Edition ByDaleskrien, Herbert Schildt, Mcgraw-Hill Education.
Reference Books:
2. Java For Programmers, 2nd Edition By Paul Deitel And Harvey Deitel, Pearson Education.
3. Thinking In Java, Low Price Edition By Bruce Eckel, Pearson Education

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		Mapped Program Outcomes
CO1	**Interpret** fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.	PO1, PO3, PO4
CO2	**Construct** programming solutions with exception handling and multi-threading concept	PO1,PO2, PO3, PO4
CO3	**Develop** programming solutions using database connection	PO1,PO2, PO3, PO4
CO4	**Solve** GUI program with proper event handling techniques	PO1,PO2, PO3, PO4
CO5	**Develop** programming solutions to real world problems effectively.	PO1,PO2, PO3, PO4

Course Code	Course Title	PO 1 Engineering knowledge	PO 2 Problem analysis	PO 3 Design/development of solutions	PO 4 Conduct investigations of complex problems	PO 5 Modern tool usage	PO 6 The engineer and society	PO 7 Environment and sustainability	PO 8 Ethics	PO 9 Individual and team work	PO 10 Communication	PO 11 Project management and finance	PO 12 Life-long learning	PSO 1	PSO 2	PSO 3
.CSE11251	Object Oriented Programming	3	3	3	3	-	-	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(EVEN SEMESTER 2022)**		
Name of the Program:	B. Tech (Computer Science and Engineering) / B.Tech (Hons) Computer Science and Engineering (Artificial Intelligence and Machine Learning) / B.Tech (Hons) Computer Science and Engineering (Cyber Security and Forensics)	**Semester:**	IV
Paper Title:	Object Oriented Programming	**Paper Code:**	.CSE11251
Maximum Marks:	50	**Time duration:**	3 Hrs.
Total No. of Questions:	17	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**28.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam. **29.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **30.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	**What** is the difference between blocking and stopping a thread?	**Remember**	**CO1**
2	**What** is a final keyword?	**Remember**	**CO2**
3	**Define** Hierarchical inheritance.	**Remember**	**CO3**
4	**Distinguish** between final, finally and finalize ( ).	**Analyze**	**CO4**
5	**List** the various sections of a web page.	**Remember**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**Distinguish** between static and non-static variable.	**Analyze**	**CO1**
	(OR)		
6 b)	**What** is the difference between multiprocessing and multithreading?	**Remember**	**CO5**
7 a)	**How** can we declare a 2-D array in java having unequal column size?	**Remember**	**CO2**
	(OR)		
7 b)	**How** do applet differ from application programs?	**Remember**	**CO5**
8 a)	**What** is final variable, final method and final class?	**Remember**	**CO4**
	(OR)		

8 b)	**What** is synchronization? **When** do we use it?	**Remember**	**CO5**
9 a)	**List** the different levels of access protection available in Java.	**Remember**	**CO1**
(OR)			
9 b)	**What** is the use of "this" and "super" keyword?	**Remember**	**CO2**
10 a)	**Define** multilevel inheritance with a suitable block diagram.	**Remember**	**CO3**
(OR)			
10b)	**What** is the difference between an abstract class and an interface?	**Remember**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	i) **Define** constructor with a suitable example. ii) **Develop** a java program to implement the concept of nesting of methods. **[2 + 3]**	**Remember** **Apply**	**CO1**
(OR)			
11 b)	**Develop** a java program to sort a list of student's name of a class in alphabetical order.	**Apply**	**CO1**
12 a)	i) **What** is method overriding? ii) **Develop** a java program to make method overriding compulsory. **[1 + 4]**	**Remember** **Apply**	**CO2**
(OR)			
12 b)	**Develop** a java program to extract a portion of a character string and print the extracted string. Assume that 'm' characters are extracted, string starting with the nth character.	**Apply**	**CO1**
13 a)	i) **What** is multiple inheritance? ii) **Develop** a java program to implement the concept of multiple inheritance. **[1 + 4]**	**Remember** **Apply**	**CO3**
(OR)			
13 b)	**Explain** compile time polymorphism and run time polymorphism with suitable example.	**Analyze**	**CO3**
14 a)	i) **What** is an exception? ii) **Develop** a java program to throw your own exception. **[1 + 4]**	**Remember** **Apply**	**CO4**
(OR)			
14 b)	**Develop** a java program to set and retrieve the priority in a thread.	**Apply**	**CO4**
15 a)	i) **Construct** a try block that is likely to generate three types of exception and then incorporate necessary catch blocks to catch and handle them appropriately. ii) **Develop** a java program to create a thread by implementing runnable interface.	**Apply**	**CO4**
(OR)			
15	**Explain** the different stages in the life cycle of an applet with a	**Understand**	**CO4**

b)	suitable block diagram.		
16 a)	i) **Interpret** three different ways of drawing polygons. ii) **Explain** three different ways by which a running thread may relinquish its control to another thread.	**Evaluate** **Understand**	**CO5**
(OR)			
16 b)	**Develop** an applet to draw a circle inside a square.	**Apply**	**CO5**
17 a)	**Develop** an applet that receives three numeric values as input from the user and then displays the largest of the three on the screen. **Design** a HTML page and test the applet.	**Apply** **Create**	**CO5**
(OR)			
17 b)	**Develop** a java program that counts the number of characters, words and lines in a file. Use exceptions to check whether the file you are reading exist or not. Take file name as command line argument.	**Apply**	**CO4**

CEE11030	**Dream House Construction**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure					
Co-requisites					

Course Objectives

1. To obtain knowledge about principle of planning.
2. To make students aware of significance of scientific orientation and various building components.
3. To acquire information related to various properties of construction materials.
4. To have clear understand about different construction practices.
5. To give a detailed idea about incorporation of MEP systems in buildings.

Course Outcomes

On completion of this course, the students will be able to

CO1. Explain the principles of building planning that helpful for installation of various systems in building regarding accessibility and facilities.

CO2. Infer the importance of various building by laws for different types of buildings as well as rules and regulations.

CO3. Distinguish various tests available for different construction material properties used to construct different type of structures.

CO4. Show knowledge about how to apply different type of construction practices of structures related to superstructure and substructure.

CO5. Identify the various types of functional requirements and services in residential and commercial buildings.

Catalog Description

This course deals with fundamental idea about dream house construction. In this course contents basic principles of planning related to architectural arrangements, seismic resistant design consideration and suitable installation of facility based systems in building is discussed. Study related to building rules and regulations which need to be followed judicious manner during any construction is done over here. Also way of investigating and determining construction materials properties that are used to construct this type of house are discussed here. Various construction practices like masonry, arches, flooring, foundations etc related to dream construction is also discussed here. The users of this type of building should enjoy different facilities for which various advantageous as well as systems and services required. This course is designed keeping those type of aspects in mind.
Classroom activities will be planned to encourage students to play an active role building of their knowledge from the beginning of the course that is from planning to installation of advanced facilities in building prior to the first use of occupants/users. Based on requirements power point presentation will be also provided to make the course much more interesting.
Students will be subjected to class tests, assignments and tutorials problems and solving by course coordinator. Through these teaching methods students will have a strong understand regarding the fundamental concepts of this course and will be able apply these concepts in the working field in future.

Course Content

Module I: 9 Lecture Hours

Principles of Planning: Introduction to buildings, Type of buildings, Principles of building planning, Principles of architecture composition, Planning of earthquake resistant building considering symmetry, simplicity, continuity, consideration of locating staircase and overhead water tank, most sensitive to earthquake.

Unit II: 9 Lecture Hours
Scientific orientation of building and building components: Building by–laws as per National Building Code, Standards for residential buildings, Building by–laws of local authority, and standards for industrial, public, commercial and institutional buildings.

Unit III: 9 Lecture Hours

Construction materials and properties:

Stone– Classification and quarrying, properties, structural requirements, dressing,

Bricks –Composition of Brick earth, manufacture and structural requirements, Fly ash, Ceramics.

Cement and Aggregates**-**Different grades of cement, Classification of aggregate based on article shape & texture, strength & other mechanical properties of aggregate, Different tests of aggregates, grading curves, Grading of fine & coarse Aggregates.

Concrete& Its Properties – Workability, Factors affecting workability, Measurement of workability by different tests, Water / Cement ratio, Abram’s Law, curing, lab tests for harden concrete, Fundamentals of concrete Mix design, Admixtures in Concrete.

Unit IV: 9 Lecture Hours

Construction Practices: Construction of Masonry structures(brick, stone, load bearing walls), Flooring (selection of materials, types- brick, cement concrete, terrazzo, tiled, marble flooring, upper floors), Lintels, Arches, Roofs, Framed structures, Concept of shallow and deep foundations.

Unit V: 9 Lecture Hours

MEP in building: Ventilations - Functional requirements systems of ventilations, Fire protection - Fire Hazards, Classification of fire resistant materials and constructions, Elevators, escalators, and heating and air-conditioning systems - Essentials and Types, Acoustics – characteristic, absorption, basics of Acoustic design, Plumbing Services -Water Distribution, Sanitary – Lines & Fittings.

Text Books

1. National Building Code-2005, New Delhi
2. Planning, designing building byY. S. Sane, Allies Book Stall
3. Architecture-Form, Space and Order by Francis D.K. Ching

Reference Books

4. Building Construction by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) ltd., New Delhi.
5. Concrete Technology by M. S. Shetty. – S. Chand & Co.
6. Building Materials by P. C. Varghese, PHI.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Explain the principles of building planning that helpful for installation of various systems in building regarding accessibility and facilities.	PO1,PO4, PO6, PO9, PO12
CO2	Infer the importance of various building by laws for different types of buildings as well as rules and regulations.	PO1, PO3, PO4,PO6,PO7, PO9, PO11
CO3	Distinguish various tests available for different construction material properties used to construct different type of structures.	PO1, PO2, PO3, PO6, PO7
CO4	Show knowledge about how to apply different type of construction practices of structures related to superstructure and substructure.	PO1, PO4, PO7, PSO1
CO5	Identify the various types of functional requirements and services in	PO1, PO3, PO5,

	residential and commercial buildings.	**PO7, PSO2**

Course Code	Course Title	Engineering Knowledge PO1	Problem analysis PO2	Design/development of solutions PO3	Conduct investigations of complex problems PO4	Modern tool usage PO5	The engineer and society PO6	Environment and sustainability PO7	Ethics PO8	Individual or team work PO9	Communication PO10	Project management and finance PO11	Life-long Learning PO12	Competitive Examination Preparation PSO1	Technical Competency PSO2
CEE11030	Dream House Construction	3	2	3	3	2	3	3	-	2	-	2	2	2	2

1=weakly mapped 2= moderately mapped 3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION**		
Name of the Program:	B.Tech in _____	**Semester:**	VI
Paper Title:	Dream House Construction	**Paper Code:**	CEE11030
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)	**31.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **32.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **33.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**State** at least two types of Building.	**R**	**CO1**
2	**What** is the best location of staircase in a building?	**U**	**CO2**
3	**Mention** three quarrying techniques.	**U**	**CO3**
4	**What** is the effect of water cement ratio in concrete?	**R**	**CO4**
5	**Estimate** the maximum height of a shallow foundation.	**An**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Why** torsional resistance is an effective parameter for a building?	**U**	**CO1**
(OR)			
6 b)	**How** structural redundancy can be measured?	**U**	**CO1**
7 a)	**List** at least four objectives of Building Orientation.	**R**	**CO2**
(OR)			
7 b)	**Discuss** 2 factors that affect Orientation of Building	**R**	**CO2**
8 a)	**What** do you mean by 'Workability of Concrete'?	**U**	**CO3**
(OR)			
8 b)	**Define** the term Co-efficient of Uniformity.	**R**	**CO3**
9 a)	**Differentiate** between Shallow and Deep foundation.	**An**	**CO4**
(OR)			
9 b)	**What** is the laying procedure of a Marble Flooring?	**R**	**CO4**
10 a)	**Name** a few available fire resistant materials in the present days.	**R**	**CO5**
(OR)			
10 b)	**Write** down few basics of Acoustic design.	**U**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Write** down the principle of building planning.	**U**	**CO1**

(OR)			
11 b)	**List** the principles of Conceptual Design of Earthquake Resistant Structures.	**R**	**CO1**
12 a)	**What** are the rules of orientation for thermal comfort for a residential complex?	**R**	**CO2**
(OR)			
12 b)	**Describe** shortly the standards of residential building as per NBC.	**R & App**	**CO2**
13 a)	**Describe** classification of aggregates.	**R**	**CO3**
(OR)			
13 b)	**What** is good brick earth? State the classification of earthen bricks.	**App**	**CO3**
14 a)	**Write** down the characteristics of a Flag Stone Flooring.	**An**	**CO4**
(OR)			
14 b)	**Discuss** the grinding procedure of Terrazzo flooring.	**U**	**CO4**
15 a)	**Explain** deep foundation.	**U**	**CO4**
(OR)			
15 b)	**Differentiate** between stone masonry and brick masonry. Describe different types of arches.	**An**	**CO4**
16 a)	**What** are the properties of Fire Bricks?	**R**	**CO5**
(OR)			
16 b)	**State** the functional requirements of ventilation system.	**R**	**CO5**
17 a)	**Explain** different types of building materials used for noise cancellation.	**U**	**CO5**
(OR)			
17 b)	During fire, **what** are the exit requirements as per NBC of India?	**R**	**CO5**

SDS11511	**Probability and Statistics**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours - 45**	3	0	0	3
Pre-requisites/Exposure	Engineering Mathematics -I & II				
Co-requisites	--				

Course objectives:

1. To use the techniques of statistical analysis, which are commonly applied to understand and analyse business problems.
2. To enhance the fundamental knowledge of probability where the true essence of statistics lies.
3. To understand the calculation and interpretation of errors in numerical methods, and numerical solutions of nonlinear equations with one variable
4. To enable students, acquire concept of numerical integration and differentiation, numerical solution of ordinary and partial differential equations

Course Outcomes

On completion of this course, the students will be able to

CO1. Define different measurements of statistical data and diagrammatic representation of data.

CO2. Illustrate the basic concept of correlation and regression of bivariate data

CO3. Classify classical, statistical and axiomatic definition of probability and use Bay's theorem to measure happening of an event and compare discrete distribution, continuous distribution of random variables with their fundamental properties.

CO4. Find the errors in numerical methods, and numerical solutions of nonlinear equations with single variable.

CO5. **Define** finite differences, interpolation, numerical differentiation and integration and solve the ordinary differential equations by several numerical methods.

CO6. Illustrate the solution procedure of system of linear algebraic equations.

Course Description:

This course introduces several techniques of statistical analysis, which are commonly applied to understand and analyse business problems. The course deals with simple tools and techniques, which will help a student in data collection, presentation, and to understand the basic descriptive properties of the data. This course introduces the concept of bivariate data and their application in several areas.

Numerical analysis is the subject of study to find the numerical solutions of mathematical problems by computational methods. It studies the numerical solutions to the problems involving nonlinear equations, system of linear algebraic equations, interpolation and approximation, empirical laws for curve fitting, differences, integrals, ordinary and partial differential equations, finite differences, etc. Numerical methods are normally being used to find the solution to a problem whose analytical solution is difficult to achieve, thus it is felt that a study in applied sciences and engineering is essential and found wide applications in all areas of science and engineering.

Course Content:

Unit 1: **[15 L]**

Descriptive statistics:

Measures of central tendency - mean, median and mode, geometric and harmonic means and their limitations, Measure of variations - quantiles, percentiles, quartiles, variance and standard deviation, standard errors of estimates, inter-quartile range, skewness, moment.

Correlation and Regression: Introduction to correlation analysis, Karl Pearson correlation coefficient, Rank Correlation, Regression Analysis, fitting straight lines, method of least square, regression coefficients, properties of regression coefficients and applications.

Unit 2: [15L]

Introduction to probability: Events and their probabilities, Rules of probability, Combinatorics, Conditional probability and independence, Total probability, Bayes' rule and applications.

Probability Distributions: Random variables, Distribution of a random variable, expectation, variance and standard deviation of probability distribution, standard discrete distributions – Bernoulli, binomial, geometric, Poisson, Poisson approximation of binomial distribution. Probability density function, Cumulative distribution function, standard continuous distribution – uniform, exponential, normal distribution. Bivariate distribution.

Unit 3: [15 L]

Sampling : Population and Sample, Sampling with and without replacement, Random samples, Population parameters, Sample statistics, Sampling distribution of means, Sampling distribution of variances, Case where population variances is unknown.

Statistical inference: Point estimate and Interval Estimates, Unbiased estimates and efficient estimates, Confidence Interval estimates of population parameters, Maximum likelihood estimates.

Text Books:

1. Fundamentals of Statistics- vol. I, A. M. Gun, M. K. Gupta, B. Dasgupta, world Press.
2. Vijay K. Rohatgi, A.K. Md. Ehsanes Saleh, An Introduction to Probability and Statistics, Second edition, Wiley.
3. T N Srivastava and ShailagaRego, Statistics for Management, McGraw Hill Education.

Reference Books:

1. Statistical Methods (Volume I & II), N. G. Das, Mc GrawHill Education
2. Fundamentals of Mathematical Statistics, S.C. Gupta, V. K. Kapoor, Sultan Chand & Sons.

Modes of Examination: Assignment/Quiz/Project/Presentation/Written Exam
Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs)
Mapping between COs, POs and PSOs

Course Outcomes (COs)		Mapped POs and PSOs
CO1	**Define** different measurements of statistical data and diagrammatic representation of data.	PO2,PO12,PSO2
CO2	**Illustrate** the basic concept of correlation and regression of bivariate data	PO1,PO2, PO12, PSO1
CO3	**Classify** classical, statistical and axiomatic definition of probability and use Bayes' theorem to measure happening of an event, and compare discrete distribution and continuous distribution of random variables with their fundamental properties.	PO3,PO12.PSO2
CO4	**Find** the errors in numerical methods, and numerical solutions of nonlinear equations with single variable.	PO2,PO3, PO12, PSO1, PSO2
CO5	**Define** finite differences, interpolation, numerical differentiation and integration and solve the ordinary differential equations by several numerical methods.	PO1,PO2,PO12, PSO2
CO6	**Illustrate** the solution procedure of system of linear algebraic equations.	PO2,PO3,PO12, PSO2

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
SDS11511	Probability, Statistics and Numerical Methods	2	3	2	-		-	-	-	-	-	-	3	2	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech.	**Semester:**	VI
Paper Title:	Probability, Statistics and Numerical Methods	**Paper Code:**	SDS11511
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**34.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **35.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **36.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	If the first quartile is 142 and the semi-interquartile range is 18 what if the third quartile?	**R**	**CO1**
2	Explain class limits and class boundaries. Give suitable examples.	**R**	**CO1**
3	What is coefficient of variation? Write its importance in statistical study.	**R**	**CO1**
4	A and B are two independent events such that $P(\bar{A}) = 0.7$, $P(\bar{B}) = k \; and \; P(A \cup B) = 0.8$, then find the value of k.	**R**	**CO3**
5	What is an interpolation? How it differ from extrapolation.	**R**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	The mean age of a combined group of men and women is 30 years. If the mean age of the group of men is 32 and that of the group of women is 27, find out the percentage of men and women in the group.	**R**	**CO1**
	(OR)		
6 b)	The following data give the number of finished articles turned out per day by different number of workers in a factory:	**R**	**CO1**

<table>
<tr><td></td><td><table><tr><td>No. of articles:</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td></tr><tr><td>No. of workers:</td><td>3</td><td>7</td><td>11</td><td>14</td><td>18</td><td>17</td><td>13</td><td>8</td><td>5</td><td>4</td></tr></table>Find the median and mode of daily output of finished articles.</td><td></td><td></td></tr>
<tr><td>7 a)</td><td>A and B throw alternatively with a pair of balanced dice. A wins if he throws a sum of 6 before B throws a sum of 7 while B wins if he throws 7 before A throws 6. if A begins the game, show that the probability of A win the game is $\frac{30}{61}$.</td><td>R</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>7 b)</td><td>In a bolt factory, the machines M1, M2, M3 manufacture respectively 25, 35 and 40 per cent of the total product. Out of their output 5, 4, and 2 percent respectively are defective bolts. One bolt is drawn at random from the product. What is the probability that bolt is defective?</td><td>R</td><td>CO3</td></tr>
<tr><td>8 a)</td><td>In a shooting competition, the probability of a man hitting a target is 1/5. If the fires 5 times, what it is the probability of hitting the target at least twice.</td><td>R</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>8 b)</td><td>The standard deviation of a Poisson distribution is 2. Find the probability that x=3.</td><td>R</td><td>CO3</td></tr>
<tr><td>9 a)</td><td>Explain null hypothesis, critical region and level of significance.</td><td>U</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>9 b)</td><td>Explain region of acceptance, Type I and Type II error in connection with testing of hypothesis.</td><td>U</td><td>CO5</td></tr>
<tr><td>10 a)</td><td>Apply i) Trapezoidal rule ii) Simpson’s 1/3rd rule to evaluate the integral $\int_{0.5}^{0.7} \sqrt{x}\, e^{-x} dx$ taking $n=6$.</td><td>Ap</td><td>CO6</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>10 b)</td><td>The following are data from steam table. Apply Newton’s divided difference interpolation formula to find the pressure of steam for a temperature of $142^0 C$.<table><tr><td>Temp.in ^{0}c</td><td>140</td><td>150</td><td>160</td><td>170</td></tr><tr><td>Pressure Kgf/cm^2</td><td>3.685</td><td>4.854</td><td>6.302</td><td>8.076</td></tr></table></td><td>Ap</td><td>CO6</td></tr>
<tr><td colspan="4">Group C
Answer All the Questions (7 x 5 = 35)</td></tr>
<tr><td>11 a)</td><td>Find mean and median for the following data, and comment on the shape of the distribution:<table><tr><td>Weight (in kg)</td><td>36-40</td><td>1-45</td><td>46-50</td><td>51-55</td><td>56-60</td><td>61-65</td><td>66-70</td></tr><tr><td>No of person</td><td>14</td><td>26</td><td>40</td><td>53</td><td>50</td><td>37</td><td>25</td></tr></table></td><td>R</td><td>CO1</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>11 b)</td><td>Determine the correlation coefficient between X and Y from the following observations:</td><td>R</td><td>CO1</td></tr>
</table>

<table>
<tr><td></td><td><table><tr><td>X</td><td>2.52</td><td>2.49</td><td>2.47</td><td>2.42</td><td>1.69</td><td>3.43</td><td>4.72</td></tr><tr><td>Y</td><td>550</td><td>610</td><td>730</td><td>870</td><td>880</td><td>930</td><td>400</td></tr></table>Also find the regression lines.</td><td></td><td></td></tr>
<tr><td>12 a)</td><td>There are two identical urns containing respectively 4 white, 3 red balls and 3 white, 7 red balls. An urn is chosen at random and three balls is drawn from it. Find the probability that two white and one red balls drawn. If the drawn balls are red, what is the probability that it is from the second urn.</td><td>R</td><td>CO2</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>12 b)</td><td>A panel of men and a panel of women are asked by a consumer testing organisational to rank 8 brands of tea according to test. A rank 1 was given to the best testing tea and a rank of 8 to the worst.<table><tr><td>Brand</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td></tr><tr><td>Panel of women (X)</td><td>5</td><td>4</td><td>3</td><td>6</td><td>7</td><td>8</td><td>1</td><td>2</td></tr><tr><td>Panel of men (Y)</td><td>4</td><td>5</td><td>6</td><td>3</td><td>8</td><td>7</td><td>2</td><td>1</td></tr></table>Determine how closely men’s and women’s tastes in tea are related.</td><td>R</td><td>CO2</td></tr>
<tr><td>13 a)</td><td>The following data shows the Advertisement expenditure (Rs. Lakhs) and Sales turnover (Rs. Crore) in a company. Calculate the coefficient of correlation between following data and interpret the value.<table><tr><td>Advertisement expenditure</td><td>10</td><td>12</td><td>13</td><td>23</td><td>27</td><td>30</td></tr><tr><td>Sales turnover</td><td>40</td><td>42</td><td>46</td><td>48</td><td>50</td><td>56</td></tr></table></td><td>R</td><td>CO2</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>13 b)</td><td>In a laboratory experiment on correlation research study, the equations to the two regression lines were to be $2X - Y + 1 = 0, 3X - 2Y + 7 = 0$. Find (i) the means of X and Y. Also calculate the values of the regression coefficients and the coefficient of correlation between the two variables X and Y.</td><td>R</td><td>CO2</td></tr>
<tr><td>14 a)</td><td>The probability of a man hitting a target is $\frac{1}{3}$.
(i) what is the probability of his hitting the target at least twice if he fires 5 times?
(ii) How many times must he fire so that the probability of his hitting the target at least once is more than 90% ?</td><td>U</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>14 b)</td><td>An aptitude test for selecting officers in a bank was conducted on 1000 candidates, the average score is 42 and the standard deviation of scores is 24. Assuming normal distribution for the scores, find: (a) the number of candidates whose scores exceeds 58, (b) the number of candidates whose score lies between 30 and 66.</td><td>R</td><td>CO3</td></tr>
<tr><td>15 a)</td><td>Use fixed point iteration method to find a real positive root of the equation $x^3 + x^2 - 100 = 0$ correct up to four places of decimal point.</td><td>R</td><td>CO4</td></tr>
</table>

(OR)			
15 b)	Find a real positive root of the equation $\cos x - xe^{x} = 0$ correct to five places of decimal point by Newton-Raphson Method	**R**	**CO4**
16 a)	The amount A of a substance remaining in a reacting system after an interval of time t in a certain chemical experiment is given in the following table <table><tr><td>t</td><td>2</td><td>5</td><td>8</td><td>14</td></tr><tr><td>A</td><td>94.8</td><td>87.9</td><td>81.3</td><td>68.7</td></tr></table>Apply suitable interpolation method to evaluate the value of A when $t = 11$.	**Ap**	**CO5**
(OR)			
16 b)	Apply (i) 2-point and (ii) 3-point Gauss Quadrature formula to evaluate the integral $I = \int_0^2 \frac{dx}{x^3 + x + 1}$ correct up to 4 decimal places.	**Ap**	**CO5**
17 a)	Check whether the system of equation is diagonally dominant or not $x_1 + x_2 + 54x_3 = 110,\ 27x_1 + 6x_2 - x_3 = 85,\ 6x_1 + 15x_2 + 2x_3 = 72$ and hence Solve it by Gauss Seidel method correct up to 2 decimal places.	**Ap**	**CO6**
(OR)			
17 b)	Solve the initial value problem $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ with $y(0) = 1$ in the interval [0, 0.4] using Runge-Kutta 4^{th} order method taking $h = 0.2$.	**Ap**	**CO6**

ECE12034	**Prof. Core- IX Lab (Embedded Systems Design Lab)**	L	T	P	C
Version 2.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	Digital Electronics, Microprocessor and Microcontroller				
Co-requisites	--				

Course Objectives

1. To have experimental knowledge about the basic functioning of a microcontroller system and its programming in assembly and C language.

2. To provide practical knowledge to integrate hardware and software for microcontroller applications systems.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** embedded system experiments including hardware/software interfaces.
CO2. **Compose** C programming using ECLIPSE IDE.
CO3. **Find** the hardware connection of embedded systems
CO4. **Find** the debug process of the compiled code to the predesigned embedded hardware.
CO5. **Design** project on Embedded system.

Catalog Description

To make the students understand Microcontroller in order to provide them with the necessary tools for the analysis of Electronic equipment in the field of microcontroller &Embedded systems to be used in industries, research field and in commercial field applications.

Course Content

List of experiments:

1. Write a C program for Interfacing LED and turn on multiple LEDs using 8051 Microcontroller.
2. Write a C program for Interfacing LED and turn on all LEDs using 8051 Microcontroller.
3. Write a C program for Interfacing LED and blink LEDs using 8051 Microcontroller.
4. Write a C program for Interfacing Keys with LEDs using 8051 Microcontroller.
5. Write a C program for Interfacing Relay with Key using 8051 Microcontroller.
6. Write a C program for Interfacing single seven segment display using 8051 Microcontroller.
7. Write a C program for Interfacing two seven segment display using 8051 Microcontroller.
8. Write a C program for Interfacing LCD display using 8051 Microcontroller.
9. Write a C program for Interfacing scrolling LCD display using 8051 Microcontroller.
10. Write a C program for Interfacing LED and turn on multiple LEDs using PIC Microcontroller.
11. Write a C program for Interfacing LED and turn on all LEDs using PIC Microcontroller.
12. Write a C program for Interfacing LED and blink LEDs using PIC Microcontroller.
13. Write a C program for Interfacing Keys with LEDs using PIC Microcontroller.
14. Write a C program for Interfacing Relay with Key using PIC Microcontroller.
15. Write a C program for Interfacing single seven segment display using PIC Microcontroller.
16. Write a C program for Interfacing two seven segment display using PIC Microcontroller.
17. Write a C program for Interfacing LCD display using PIC Microcontroller.
18. Write a C program for Interfacing scrolling LCD display using PICMicrocontroller.
19. Write a C program to use ADC conversion using ARM processor.
20. Write a C program to display Real Time and Date using ARM processor.

Text Books

1. Steve heath, ―Embedded system design, 2nd edition 2003, elsevier
2. Rajkmal, Embedded system, 2nd edition.
3. SantanuChattopadhyay, -- Embedded System Design,2ndedition, PHI Learning

Reference Books

1. Shibu. K.V, ―Introduction to Embedded systems‖, mcgraw hill 2009
2. Frank Vahid, Embedded systems.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** embedded system experiments including hardware/software interfaces.	**PO1,PO3,PO9,PSO1**
CO2	**Compose** C programming using ECLIPSE IDE.	**PO1,PO3,PO9,PSO1**
CO3	**Find** the hardware connection of embedded systems	**PO1, PO3,PO5, PO9**
CO4	**Find** the debug process of the compiled code to the predesigned embedded hardware.	**PO1, PO3,PO5, PO9,PSO1**
CO5	**Design** project on Embedded system.	**PO1, PO3,PO5, PO9**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE12034	Embedded Systems Design Lab	3		3		2		-	-	3	-	-		3	

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: Prof. Core- IX Lab ECE12034 (Embedded Systems Design Lab)
Program: B. TECH (ECE) **Time: 03 Hrs.**
Semester: V 2020-21 **Max. Marks: 50**

1	Write a C program for Interfacing LED and turn on multiple LEDs using 8051 Microcontroller	**Ap**	**CO1, CO2**
2	Write a C program for Interfacing LED and turn on all LEDs using 8051 Microcontroller.	**Ap**	**CO1, CO2**
3	Write a C program for Interfacing LED and blink LEDs using 8051 Microcontroller	**Ap**	**CO1, CO2**
4	Write a C program for Interfacing Keys with LEDs using 8051 Microcontroller .	**Ap**	**CO2, CO3**
5	Write a C program for Interfacing Relay with Key using 8051 Microcontroller	**Ap**	**CO2, CO3**
6	Write a C program for Interfacing single seven segment display using 8051 Microcontroller	**Ap**	**CO2, CO3**
7	Write a C program for Interfacing two seven segment display using 8051 Microcontroller	**Ap**	**CO2, CO3**
8	Write a C program for Interfacing LCD display using 8051 Microcontroller	**Ap**	**CO2, CO3**
9	Write a C program for Interfacing scrolling LCD display using 8051 Microcontroller	**Ap**	**CO2, CO3**
10	Write a C program for Interfacing LED and turn on multiple LEDs using PIC Microcontroller .	**Ap**	**CO4**
11	Write a C program for Interfacing LED and turn on all LEDs using PIC Microcontroller	**AP**	**CO4**
12	Write a C program for Interfacing LED and blink LEDs using PIC Microcontroller	**AP**	**CO4**
13	Write a C program for Interfacing Keys with LEDs using PIC Microcontroller	**Ap**	**CO4**
14	Write a C program for Interfacing Relay with Key using PIC Microcontroller.	**Ap**	**CO4**
15	Write a C program for Interfacing single seven segment display using PIC Microcontroller.	**Ap**	**CO4**
16	Write a C program for Interfacing two seven segment display using PIC Microcontroller.	**Ap**	**CO4**
17	Write a C program for Interfacing LCD display using PIC Microcontroller	**Ap**	**CO4**
18	Write a C program for Interfacing scrolling LCD display using PICMicrocontroller	**Ap**	**CO4**
19	Write a C program to use ADC conversion using ARM processor	**Ap**	**CO5**
20	Write a C program to display Real Time and Date using ARM processor	**Ap**	**CO5**

ECE12035	**Prof. Core- XII Lab (Control Systems Lab)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	1. 12^{th} level Mathematics 2. Knowledge of Signals and Systems				
Co-requisites	1. Understanding of analog circuit 2. Understanding of Signal Processing				

Course Objectives

1. To understand the functionality of control systems.
2. To study the frequency response analysis.
3. To study the different parameters and the State Error for a Lead Compensator
4. To explain the use of the State Error and other parameters for a unity feedback control system
5. To enable and acquire the knowledge of the practical position control system.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the basics of control system.
CO2. **Analyze** the frequency response of a control system.
CO3. **Evaluate** the State Error and other parameters for a Lead Compensator.
CO4. **Illustrate** the State Error and other parameters for a unity feedback control system.
CO5. **Utilize** the practical position control system

Catalog Description

A **control system** manages, commands, directs, or regulates the behavior of other devices using control loops. It can range from a single home heating controller using a thermostat controlling a domestic boiler to large Industrial control systems which are used for controlling processes or machines. For continuously modulated control, a feedback controller is used to automatically control a process or operation. The control system compares the value or status of the process variable being controlled with the desired value or setpoint, and applies the difference as a control signal to bring the process variable output of the plant to the same value as the setpoint. As an example of control system viz. sequential and combinational logic, software logic, such as in a programmable logic controller.

Course Content

List of experiments:

1.Determination of PI, PD, PID Controller Action of First Order Simulated Process

2. Determination of Approximate Transfer Function Experimentally from Bode Plot.
3. Evaluation of Steady State Error, Setting Time, Percentage Peak Overshoot, Gain Margin, Phase Margin with Addition of Lead Compensator.
4. Evaluation of Steady State Error, Setting Time, Percentage Peak Overshoot, Gain Margin, Phase Margin by Compensator in Forward Path Transfer Function for Unity Feed Back Control System.
5. Study of a practical position control system and determination of control system specifications for variation of system parameters interfaces

Text Books:

1. S. Haykin, Adaptive filter theory, Prentice Hall, 1986.
2. C.Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall, 1984
3. Control System Lab Manual

Reference Books:

1. A. H. Sayed, Adaptive Filters, John Wiley & Sons, 2008.
2. Alexander D. Poularikas, Zayed M. Ramadan, Adaptive filtering primer with MATLAB, CRC Press, 2006.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and Pos		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the basics of control system.	**PO1, PO2, PO3, PSO1**
CO2	**Analyze** the frequency response of a control system.	**PO1, PO2, PO3, PO6, PSO1, PSO2**
CO3	**Evaluate** the State Error and other parameters for a Lead Compensator.	**PO1, PO2, PO3, PO4, PO5, PSO1**
CO4	**Illustrate** the State Error and other parameters for a unity feedback control system	**PO1,PO2, PO3, PO4,PO5, PSO1**
CO5	**Utilize** the practical position control system	**PO1, PO2, PO3, PO5, PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE12035	Control Systems Lab	3	3	3	2	2		-	-	-	-	-		3	-

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE12035– Control Systems Lab

Program: B.Tech. (ECE) **Semester: EVEN 2020-21**
Time: 03 hrs. **Max. Marks:50**

Write a MATLAB-program to

1.	**Determine** the transfer function of PI, PD, PID Controller of First Order Simulated Process	**U**	**CO1**
2	**Determine** Approximate Transfer Function Experimentally from Bode Plot.	**U**	**CO2**
3	**Evaluate** Steady State Error, Setting Time, Percentage Peak Overshoot, Gain Margin, Phase Margin with Addition of Lead Compensator.	**R**	**CO3**
4	**Evaluate** Steady State Error, Setting Time, Percentage Peak Overshoot, Gain Margin, Phase Margin by Compensator in Forward Path Transfer Function for Unity feedback Control System.	**R**	**CO4**
5	**Show** a practical position control system and **determine** of control system specifications for variation of system parameters interfaces.	**U**	**CO5**

ECE12036	**Prof. Core- XIII Lab (Microwave Engineering Lab)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	Electromagnetic Theory & Semiconductor Device Theory				
Co-requisites	---				

Course Objectives

1. Students will understand basics concept of Microwave Engineering
2. Students will learn the principle of wave propagation through microwave transmission lines and waveguides
3. Students will learn the working principle of different microwave test & measurement instruments.
4. Students will learn about the working principle of active & passive microwave devices.
5. Students will think about different real-life problems associated microwave systems and learn about the safety measures to be taken.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Explain** the basics concept of Microwave Engineering
CO2. **Explain** the principle of wave propagation through microwave transmission lines and waveguides
CO3. **Experiment with** different microwave test and measurement instruments
CO4. **Examine** performance criteria of different active & passive microwave devices
CO5. **Explain** the working principle of different real-life microwave systems and demonstrate the safety measures to the users.

Catalog Description

Microwave is a term used to identify electromagnetic waves above 10^3 Megahertz (1 Giga Hertz) up to 300 Gigahertz because of the short physical wavelengths of these frequencies. Microwave engineering pertains to the study and design of microwave circuits, components, and systems. Fundamental principles are applied to analysis, design and measurement techniques in this field. The short wavelengths involved distinguish this discipline from Electronic engineering. This is because there are different interactions with circuits, transmissions and propagation characteristics at microwave frequencies. Some theories and devices that pertain to this field are antennas, radar, transmission lines, space-based systems (remote sensing), measurements, microwave radiation hazards and safety measures. The microwave engineering discipline has become relevant as the microwave domain moves into the commercial sector, and no longer only applicable to 20^{th} and 21^{st} century military technologies. Inexpensive components and digital communications in the microwave domain have opened up areas pertinent to this discipline. Some of these areas are radar, satellite, wireless radio, optical communication, faster computer circuits, and collision avoidance radar.

Course Content

List of experiments:

1. Study of Different Components of a Microwave Test Bench (3 Laboratory Hours).
2. Measurement of Standing Wave Ratio (SWR) and Reflection Coefficient in Microwave Transmission Line (3 Laboratory Hours).
3. Measurement of Frequency of a Microwave Source and Verification of Relationship among Waveguide Dimensions, Free Space Wavelength and Guide Wavelength (3 Laboratory Hours).
4. Study of Horn Antenna Radiation Pattern and Beamwidth (3 Laboratory Hours).
5. Study of Gunn Diode and Gunn Oscillator (3 Laboratory Hours).
6. Study of Reflex Klystron Oscillator (3 Laboratory Hours).
7. Study of E Plane Tee/ H Plane Tee/ Magic Tee (3 Laboratory Hours).
8. Measurement of Coupling Factor, Directivity, Insertion Loss and Isolation of a Directional Coupler (3 Laboratory Hours).
9. Measurement of Insertion Loss and Isolation of a 3-Port Circulator/ Isolator (3 Laboratory Hours).
10. Measurement of Dielectric Constant of Material (3 Laboratory Hours).

Text Books:

1. S. Y. Liao, “Microwave Devices and Circuits”, Prentice Hall of India - 3rd Edition (2003).

2. A. Das and S. K. Das, “Microwave Engineering”, Tata McGraw-Hill (2000) (UNIT V).

References:

1. R.E. Collin, “Foundations for Microwave Engineering”, IEEE Press Second Edition (2002).

2. D. M. Pozar, “Microwave Engineering”, John Wiley & Sons - 2nd Edition (2003).

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** the basics concept of Microwave Engineering	**PO1, PSO1, PSO2**
CO2	**Explain** the principle of wave propagation through microwave transmission lines and waveguides	**PO1, PO2, PO3, PO4, PSO1, PSO2**
CO3	**Experiment** with different microwave test and measurement instruments	**PO1, PO2, PO3, PSO1, PSO2**
CO4	**Examine** performance criteria of different active & passive microwave devices	**PO3, PO4, PSO1, PSO2**
CO5	**Explain** the working principle of different real-life microwave systems and demonstrate the safety measures to the users.	**PO2, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE12036	Microwave Engineering Lab	3	3	3	3									3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Name of the Program: B. Tech	Semester: V
Stream: ECE	
PAPER TITLE: Microwave Engineering Lab	**PAPER CODE: ECE12036**
Maximum Marks: 50	Time duration: 3 Hours
Total No of questions: 10	Total No of Pages: 01

Section A (Answer any one Question)

1.	Study Different Components of the given Microwave Test Bench.	**U**	**CO1**
2	**Measure** Standing Wave Ratio (SWR) and Reflection Coefficient in Microwave Transmission Line.	**U**	**CO1**
3	**Measure** Frequency of the given Microwave Source and verify the Relationship among Waveguide Dimensions, Free Space Wavelength and Guide Wavelength.	**R**	**CO3**
4	Study Horn Antenna Radiation Pattern and Beamwidth.	**R**	**CO4**
5	Study Gunn Diode and Gunn Oscillator.	**U**	**CO4**
6	Study the given Reflex Klystron Oscillator and find out the Electronic Tuning Sensitivity.	**U**	**CO5**
7	Study the given E Plane Tee/ H Plane Tee/ Magic Tee.	**U**	**CO5**
8	**Measure** Coupling Factor, Directivity, Insertion Loss and Isolation of the given Directional Coupler.	**Ap**	**CO2**
9	**Measure** Insertion Loss and Isolation of the given 3-Port Circulator/ Isolator.	**Ap**	**CO2**
10	**Measure** Dielectric Constant of the given Material.	**Ap**	**CO5**

ECE12037	Sensors and Actuators for IOT Lab	L	T	P	C
Version 1.0		0	0	3	2
Pre-requisites/Exposure	Sensors and Transducers				
Co-requisites	--				

Course Objectives

1. This course provides a rigorous introduction to the theory of sensors and transducers.
2. The objective of the course is to understand the operation of resistive, inductive, capacitive, magnetic, thermal, radiation and piezoelectric sensors for the identification of appropriate sensors.

Course Outcomes

On completion of this course, the students will be able to
CO1. **Identify** the appropriate sensor, including powering of the sensor and signal conditioning (electrical and calculation conversions).
CO2. **Learn** the operation of strain gauge and different types of inductive sensors.
CO3. **Learn** the operation of piezoelectric and capacitive sensors.
CO4. **Understand** the operation thermal sensors.
CO5. **Learn** the operation of magnetic and radiation sensors.

Catalog Description

The course is intended to give knowledge about modern electrical sensors for measuring non-electrical variables. The course is oriented towards physical phenomena used to sense such variables as: displacement, temperature, radiation, pressure, etc. In particular, issues related to modern micro-sensors made in silicon, fiber, and film technology are treated.

Course Content

1. Strain guage transducer experiment setup.
2. Force/Weight Measurement using Piezo Transducer Experiment setup.
3. Piezo Resistive Transducer for Pressure Measurement Experiment setup.
4. Angular Measurement using Rotary Pot Experiment Setup.
5. Humidity Measurement using Polymer Hybrid Sensor Experiment Setup.
6. Sound Sensing Transducers Experiment Setup.
7. Light Sensing Transducers Experiment Setup.
8. Temperature Sensing Transducers Experiment Setup.
9. Vibration Sensor and Air Flow Sensor Experiment Setup.
10. Speed Sensing Transducers Experiment Setup.

11. Impulse Response of First Order and Second Order Systems.

Text Books:

- Alan V. Oppenheim and Ronald W. Schafer, *Digital Signal Processing*, 1st Ed., Pearson Education, 2015.
- S. Salovahanan, *Digital Signal Processing*, 3rd Ed., McGraw Hill Education, 2017.

Reference Books:

John G. Proakis and Dimitris G. Manolakis, *Digital Signal Processing: Principles, Algorithms, and Applications,* 4th Ed., Pearson Education, 2007.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Identify** the appropriate sensor, including powering of the sensor and signal conditioning (electrical and calculation conversions).	**PO1, PO2, PO6, PSO1**
CO2	**Learn** the operation of strain gauge and different types of inductive sensors.	**PO1, PO2, PO6, PSO1, PSO2**
CO3	**Learn** the operation of piezoelectric and capacitive sensors.	**PO1, PO2, PO6, PSO1, PSO2**
CO4	**Understand** the operation thermal sensors.	**PO1, PO6, PSO2**
CO5	**Learn** the operation of magnetic and radiation sensors.	**PO1, PO2, PO6, PSO2**

	Course Code	ECE12037
	Course Title	Sensors and Actuators for IOT Lab
Engineering Knowledge	PO1	3
Problem analysis	PO2	3
Design/development of solutions	PO3	-
Conduct investigations of complex problems	PO4	-
Modern tool usage	PO5	-
The engineer and society	PO6	3
Environment and sustainability	PO7	-
Ethics	PO8	-
Individual or team work	PO9	-
Communication	PO10	-
Project management and finance	PO11	-
Life-long Learning	PO12	-
To educate students in Electrical Engineering domain and guide their instincts towards....	PSO1	3
To provide quality knowledge on Sustainable Energy that can be used for solving problems...	PSO2	3
To see our students as ethical and responsible engineering professionals...	PSO3	-

ECE12038	**Introduction to Machine Learning Lab**	L	T	P	C
Version 1.0	**Contact Hours - 45**	0	0	2	2
Pre-requisites/Exposure	Basic knowledge in Probability and Linear Algebra				
Co-requisites	----				

Course Objectives

1. Introduce students to Python programming fundamentals and their application in machine learning.
2. Familiarize students with essential Python libraries for mathematical computing and data manipulation.
3. Enable students to implement basic machine learning models using Python for data analysis and predictive modeling tasks.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement basic machine learning algorithms using Python.
CO2: Apply Python libraries for mathematical computation and data manipulation.
CO3: Develop proficiency in handling exceptions and accessing databases in Python.
CO4: Demonstrate understanding of fundamental programming concepts and their application in machine learning.

Catalog Description:

This course introduces Python programming tailored for machine learning applications, covering basics like loops, conditions, and functions. Students learn to handle exceptions, access databases, and utilize Python libraries such as NumPy, Matplotlib, Pandas, TensorFlow, and Keras for mathematical computing. Through practical exercises, they develop proficiency in implementing basic machine learning models like SVM, KNN, K-Means, Logistic Regression, and Linear Regression. By the end, students acquire essential Python programming skills and the ability to apply machine learning algorithms to real-world data analysis tasks effectively.

Course Content

1. Python Introduction

2. Loops and Conditions and other preliminary stuff,

3. Functions, Classes and Modules,

4. Exceptions, Database access,

5. Mathematical computing with Python packages like: numpy, Mat- plotLib, pandas Tensor Flow, Keras

6. Implement basic ML models like SVM, KNN, K-Means, Logistic Regression, Linear Regression

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Implement** basic machine learning algorithms using Python.	**PO1, PO5**
CO2	**Apply** Python libraries for mathematical computation and data manipulation.	**PO2, PO4**
CO3	**Develop** proficiency in handling exceptions and accessing databases in Python.	**PO3, PO6, PO8, PO9**
CO4	**Demonstrate** understanding of fundamental programming concepts and their application in machine learning.	**PO10, PO11, PO12**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1
ECE12038	Intro-duction to Machine Learning Lab	3	3	3	2	2	2			2	2			3

1=weakly mapped
2= moderately mapped
3=strongly mapped

ECE12039	**Prof. Elective- III Lab (Wireless Communication Lab)**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	Analog and Digital communication				
Co-requisites					

Course Objectives

1. To expose the students to understand mobile radio communication principles and
2. To study the recent trends adopted in cellular systems and wireless standards.

Course Outcomes

On completion of this course, the students will be able to

CO1**. Explain** the basic physical and technical settings functioning of mobile communications systems.
CO2. **Test for** mobile communication equipment for the technical functionality.
CO3. **Apply** cellular concepts and analyze 1G, 2G and 3G cellular systems, viz. GSM and CDMA systems.
CO4. **Make use of** AT commands for configuring DTEs and analyze the process of VoIP implementation on VOIP Trainer kit.
CO5. **Evaluate** the impact of different propagation conditions in estimation of received signal power.

Catalog Description

This course presents the basic principles of wireless communication technology. Topics covered include: transmission fundamentals, noise and interference in wireless communication networks; Diversity techniques in wireless systems; multiple access schemes etc. The goal of this course is to provide students with the working knowledge of the broad range of wireless communication such as waveform propagation models, antenna types, path-loss models, hand-off in cellular system, time diversity, frequency diversity, space diversity, Multiple-in Multiple-outetc.

Course Content

List of experiments:

1. Study different types of transmission media.
2. Study and configure the MODEM in computers.
3. Study and analyze the behavior of the PSTN TST switch on Trainer kit.
4. Intro to CDMA trainer and PC interfacing using serial port.
5. Study and analyze the behavior of the CDMA Trainer kit designed to provide experimental knowledge of CDMA Direct Sequence Spread Spectrum Modulation/Demodulation technique.
6. Study and analyze the Mobile phone on its trainer kit.
7. Study and analyze the behavior of 3G network using cellular phone on the 3G mobile trainer kit.
8. Intro to GSM trainer and PC interfacing using serial port.
9. Study and use the AT commands using GSM trainer kit to make voice call and send messages.
10. Study of DTMF tones and application using GSM module.
11. Study the VoIP implementation on VOIP Trainer kit.
12. Free space Propagation – Path Loss model to determine the free space loss and the power received using MATLAB program.

Text Books

1. William, C. Y. Lee, “Mobile Cellular Telecommunications”, 2nd Edition, McGraw Hill, 1990.
2. Theodore S Rappaport, “Wireless Communication Principles and Practice”, 2nd Edition, Pearson, 2002.
3. A. Goldsmith, Wireless Communications, Cambridge University Press, 2005.

Reference Books

1. Mischa Schwartz, “Mobile Wireless Communications”, Cambridge University Press, UK, 2005.
2. William Stallings, “Wireless Communication Networks and Systems”, 2nd Edition, PPH, 2005.
3. Jochen Schiller, "Mobile Communications", 2nd Edition, Addison-Wesley (An imprint of Pearson Education), 2003
4. TRAI, “Information paper On Effects of Electromagnetic Field Radiation from Mobile Towers and Handsets”, 30th July, 2014
5. Andreas. F. Molisch, “Wireless Communications”, John Wiley – India, 2006.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Explain** the basic physical and technical settings functioning of mobile communications systems.	PO1, PO10, PSO1
CO2	**Test** for mobile communication equipment for the technical functionality.	PO1, PSO1, PSO2
CO3	**Apply** cellular concepts and analyze 1G, 2G and 3G cellular systems, viz. GSM and CDMA systems.	PO5, PO10, PSO1
CO4	**Make use of** AT commands for configuring DTEs and analyze the process of VoIP implementation on VOIP Trainer kit	PO2, PO5, PO10, PSO1, PSO2
CO5	**Evaluate** the impact of different propagation conditions in estimation of received signal power.	PO2, PO5, PO10, PSO1, PSO2

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE1 2039	Wireless Communication Lab	2	2			3					3			3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: ECE12039 – Prof. Elective- III Lab (Wireless Communication Lab)

Program: B.Tech. **Semester: ODD 2020-21**
Time: 03 hrs. **Max. Marks: 50**

	Questions		
1.	a) Study and configure the MODEMs in computers. b) **Explain** the evolution from 2G to 3G cellular networks using neat block diagram.	**[U+ Ap]**	**CO1+CO4**
2.	a) Study and analyze the behavior of the PSTN TST switch on Trainer kit. b) **What** are the methods to reduce co-channel interference? Explain each.	**[R+ An+ U]**	**CO2+CO4**
3.	a) Study the CDMA trainer and PC interfacing using serial port. b) Describe the PDP context activation procedure in GPRS system.	**[U+ An+ R]**	**CO1+CO2+CO3**
4.	a) Study and analyze the behavior of the CDMA Trainer kit designed to provide experimental knowledge of CDMA Direct Sequence Spread Spectrum Modulation/Demodulation technique. b) Describe some applications of GPRS network.	**[U]**	**CO2+CO3+CO5**
5.	a) Study and analyze the behavior of 3G network using cellular phone on the 3G mobile trainer kit. b) **What** are the relative advantages and disadvantages of persistent and non-persistent CSMA?	**[U+ R]**	**CO2+CO3**
6.	a) Study and use the AT commands using GSM trainer kit to make voice call and send messages. b) Prove that sectoring increases signal to co-channel interference ratio. (E)	**[R+ Ap+ U]**	**CO2+CO3+CO4**
7.	a) Study of DTMF tones and application using GSM module. (U)+(Ap) b) **Why** the uplink frequency for GSM is less than the downlink frequency? (R)	**[U+ Ap+ R]**	**CO2+CO3+CO4**
8.	a) Study the VoIP implementation on VOIP Trainer kit. b) **What** are the factors affecting small scale fading? Discuss each factor.	**[U+ Ap+ U]**	**CO1+CO2+CO4**
9.	a) Free space Propagation – Path Loss model to determine the free space loss and the power received using MATLAB program. b) **Explain** the use of two-ray model to justify mobile radio path loss and antenna height effects.	**[U]**	**CO1+CO2+CO5**
10.	a) Study the GSM trainer and PC interfacing using serial port. (U)+(Ap) b) **What** are the various GSM control channels? Discuss. (R)	**[U+ Ap+ R]**	**CO2+CO3**

MGT11402	**HSSM –V (Industrial Management)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	12th level Mathematics				
Co-requisites	--				

Course Objective:

1. To enable students to understand operational complexities of a business.
2. To enable students to conceptualize the process, functions and theories of management.
3. To enable students to provide knowledge about quality control processes.
4. To enable students to conceptualize different strategies relating to people management

Course Outcome:

At the end of the course, the student will be able to:

CO1 **Illustrate** the concepts related to operations management.

CO2 **Demonstrate** skills to perform operation planning and control.

CO3 **Define** and analyze the importance of Quality control procedures.

CO4 **Illustrate** different maintenance functions need to be taken and their implications in an industry.

CO5 **Illustrate** the concepts of MIS and implications of the same in business functions.

CO6 **Evaluate** importance of HRM and its implications in staffing which aids to growth of business.

Course Description:

The purpose of this course is to provide an understanding of the theories and principles of modern management and encourage the course participants to make an appreciation of these principles in relation to their own experiences and selected managerial case studies.
The aims of the course is to understand the basic principles of management, and the four major functions of managers e.g. planning, organizing, leading and controlling and how managers actually operate. Students will be required to think critically and strategically about management theories and issues which will enable them to develop their decision-making and analytical skills. They will be involved in application exercises and case studies which will assist them to develop graduate attributes.

Course Content:

Module 1: Classification and Importance of Operations Management [10 Lecture Hours]

Operations Management in corporate profitability & competitiveness; Operations strategy; Types & characteristics of manufacturing systems & service systems.

Module 2: Operations Planning and Control **[10 Lecture Hours]**

Forecasting for operations; Inventory planning & control; Materials requirement planning; Planning production in aggregate terms; Operations scheduling;

Module 3: Quality Assurance **[5 Lecture Hours]**

The quality assurance system; choice of process and reliability; control of quality.

Module 4: Maintenance Function **[5 Lecture Hours]**

Preventive maintenance; Overhaul and replacement.

Module 5: Management Information System **[10 Lecture Hours]**

Need & structure of MIS; Data Processing Systems; Data Sources & Management.

Module 6: Human Resource Management **[5 Lecture Hours]**

Concept and evolution; Manpower planning; recruitment and selection; Motivating personnel; Leadership

Text Books:

1. Yadav, Shashi Kant, Textbook of Industrial Management. Discovery Publishing Pvt. Ltd. ISBN-10: 8183568424 ISBN-13: 978-8183568425.
2. Khanna, O. P., Industrial Engineering and Management, Dhanpat Rai Publications, ISBN-10: 818992835X; ISBN-13: 978-8189928353

Reference Books:

1) Modern Production / Operations Management by Buffa & Sarin, 8th Ed., John Wiley
2) Operations Management by Russell & Taylor (Wiley India Pvt. Ltd.
3) Management Information Systems by Larry Long (Prentice Hall)
4) Enterprise Resource Planning by A. Leon (TMH)
5) Human Resource Management by C. B. Gupta (Sultan Chand).

Modes of Examination: Assignment/Quiz/Project/Presentation/Written Exam
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the concepts related to operations management.	**PO1, PO6, PO9**
CO2	**Demonstrate** skills to perform operation planning and control.	**PO1, PO5, PO6, PO7, PO9**
CO3	**Define** and analyze the importance of Quality control procedures.	**PO1, PO5, PO6, PO7, PO9**
CO4	**Illustrate** different maintenance functions need to be taken and their implications in an industry.	**PO1, PO5, PO6, PO9**
CO5	**Illustrate** the concepts of MIS and implications of the same in business functions.	**PO1, PO5, PO6, PO7, PO9**
CO6	**Evaluate** importance of HRM and its implications in staffing which aids to growth of business.	**PO1, PO6, PO8, PO9**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
MGT11402	HSSM –V (Industrial Management)	3				3	3	3	2	3					

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Course: MGT11402 – HSSM –V (Industrial Management)

Program: B. Tech **Time: 03 Hrs.**
Semester: Even 2020-21 **Max. Marks: 50**

Instructions:
Attempt **Five** questions from **Section A** (each carrying 1 marks); any **Three Questions** from **Section B** (each carrying 5 marks)**. Section C** is Compulsory (carrying 15 marks)**.**

	SECTION A (Answer any Three Questions)		
1.	**Define** productivity.	**R**	**CO1**
2.	**How** Inventory Control can be used effectively?	**R**	**CO2**
3.	**Define** TQM.	**R**	**CO3**
4.	**Explain** the need for maintenance.	**U**	**CO4**
5.	**Define** Recruitment.	**R**	**CO6**
	SECTION B (Attempt any Three Questions)		
6.	**Analyze** in brief the importance of Material Requirement Planning.	**Ap**	**CO2**
7.	**Differentiate** between Data and Information	**Ap**	**CO5**
8.	**Explain** the importance of Quality Management System.	**U**	**CO3**
	Elaborate the importance of Operations Scheduling.	**U**	**CO1**
	SECTION C is Compulsory		
9.	a) **Define** Manpower Planning. b) **Explain** the steps involved in Manpower Planning process	**R**	**CO6**
10.	a) **Define** Quality Circle. b) **Explain** the concept of Six Sigma in business process improvement.	**R**	**CO4**

		L	T	P	C
ECE11040	**Application of Internet of Things**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	1. Computer Networks 2. Sensors, Devices & Actuators 3. Basic programming knowledge				
Co-requisites					

Course Objectives

6. To understand the Architectural Overview of IoT.
7. To understand the IoT Reference Architecture and Real-World Design Constraints.
8. To understand the various IoT Protocols (Datalink, Network, Transport, Session, Service).
9. Build IoT based applications and understand how data flows between things.
10. To understand how connected devices work together to update other applications and the security aspect of IoT devices.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Understand** the IoT architecture and building blocks for various domains.
CO2. **Understand** about the technology behind the IoT and associated technologies in practical domains of society.
CO3. **Illustrate** knowledge about the state-of-the-art methodologies in IoT application domains.
CO4. **Analyze** multidisciplinary case to case modelling and execute wide range of application.
CO5. **Analyze** the need for smart systems in a distributed environment.

Catalog Description

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Content

Module 1: Introduction: 10 lecture hours

Sensing & Actuation Sensor Networks; Design principles of connected devices; IoT Architecture: Reference Models; Physical design of IoT; Logical design of IoT; IoT enabling technologies; IEEE 802.15.4; Zigbee; 6LoWPAN; RPL; IoT and M2M

Machine-to-Machine communication; Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics; Interoperability in IoT; SDN for IoT; IoT physical servers and cloud offerings; Cloud storage models and Fog Computing in IoT environment.

Module 2: IoT Application Development: 11 lecture hours

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization, Application Protocols: MQTT, REST/HTTP, CoAP, MySQL.

Back-end Application Designing: Apache for handling HTTP Requests, PHP & MySQL for data processing, MongoDB Object type Database, HTML, CSS & jQuery for UI Designing, JSON lib for data processing, Security & Privacy during development, Application Development for mobile Platforms: Overview of Android / IOS App Development tools.

Module 3: Building IoT applications and Web of Things: 8 lecture hours

Introduction to Arduino IDE – writing code in sketch, compiling-debugging, uploading the file to Arduino board, role of serial monitor.

Web of Things - Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence.

Module 4: Domain specific applications of IoT: 8 lecture hours

Applications in agriculture: Smart Farming: Weather monitoring, Precision farming, Smart Greenhouse, Drones for pesticides.

Healthcare applications: Architecture of IoT for Healthcare, Multiple views coalescence, SBC-ADL to construct the system architecture. Use Cases: Wearable devices for Remote monitoring of Physiological parameter, ECG, EEG, Diabetes and Blood Pressure.

Module 5: Case Study & advanced IoT Applications: 8 lecture hours

Industrial Internet Application: IIoT Fundamentals and Components, Industrial Manufacturing, Monitoring, Control, Optimization and Autonomy, Introduction to Hadoop and big data analytics.

Applications in IoT enabled Smart Cities: Energy Consumption Monitoring, Smart Energy Meters, Home automation, Smart Grid and Solar Energy Harvesting, Intelligent Parking, Data lake services scenarios.

Text Books

20. Internet of Things - A Hands-on Approach, Ars deep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
21. Rajkumar Buyaa and Amir V Dastjerdi, Internet of things: Principles and Paradigms, Morgan Kaufmann
22. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1st Edition, Academic Press, 2014.

Reference Books

10. Adrian McEwen and Hakim Cassimally, Designing the Internet of Things, Wiley

11. Olivier Hersent, David Boswarthick and Omar Elloumi, The Internet of Things: Key applications and Protocols, Wiley
12. Bernd Scholz-Reiter, Florian Michahelles, “Architecting the Internet of Things”, ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
13. Fadi Al-Turjman, Intelligence in IoT- enabled Smart Cities, 2019, 1st edition, CRC Press, ISBN-10: 1138316849
14. Giacomo Veneri, and Antonio Capasso, Hands-on Industrial Internet of Things: Create a powerful industrial IoT infrastructure using Industry 4.0, 2018, Packt Publishing.
15. Subhas Chandra Mukhopadhyay, Smart Sensing Technology for Agriculture and Environmental Monitoring, 2012, Springer, ISBN-10: 3642276377

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the IoT architecture and building blocks for various domains.	**PO1, PO2, PO3, PO10, PSO1**
CO2	**Understand** about the technology behind the IoT and associated technologies in practical domains of society.	**PO1, PO2, PO3, PO5, PO10, PSO2**
CO3	**Illustrate** knowledge about the state-of-the-art methodologies in IoT application domains.	**PO1, PO2, PO5, PO10, PSO1, PSO2**
CO4	**Analyze** multidisciplinary case to case modelling and execute wide range of application.	**PO1, PO2, PO3, PO5, PO10, PSO1**
CO5	**Analyze** the need for smart systems in a distributed environment.	**PO1, PO2, PO3, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE11 040	Application of IoT	3	3	3		3					3			2	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech ECE	**Semester:**	VII
Paper Title:	Application of IoT	**Paper Code:**	ECE11040
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)	**37.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **38.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **39.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	Which sensor will be applicable for IOT based Agriculture?	**U**	**CO1**
2	Define IOT in Medical Electronics.	**U**	**CO2**
3	Explain M2M communication.	**R**	**CO3**
4	What is information exchange patterns in IoT	**U**	**CO4**
5	Discuss various standard.	**U**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	i)What is supervised learning? ii)Write the mathematical model for multiple regression.	**R**	**CO1**
(OR)			
6 b)	i)What is knowledge representation? ii)Write the mathematical expression to find distance among data points.	**R**	**CO1**
7 a)	Explain the condition where lasso regression and ridge regression techniques are used.	**U**	**CO2**
(OR)			
7 b)	What is Turing Test? Explain its significance.	**R**	**CO2**
8 a)	“Learning is done by viewing, listening, interactions, studying and by experience”. Do you agree with the statement. If yes, Elucidate	**Apply**	**CO3**
(OR)			
8 b)	Explain the libraries that are mostly used in Machine Learning tasks.	**Apply**	**CO3**
9 a)	Explain the significance of Baye’s Theorem.	**U**	**CO4**
(OR)			
9 b)	Explain confusion matrix.	**U**	**CO4**
10 a)	How can you avoid overfitting in machine learning?	**U**	**CO5**
(OR)			
10 b)	Write some ways to handle missing values in dataset while working in machine learning.	**Apply**	**CO5**
Group C			

<table>
<tr><th colspan="4">Answer All the Questions (7 x 5 = 35)</th></tr>
<tr><td>11 a)</td><td>i)What is logistic regression model?
ii)How do you evaluate a logistic regression model?</td><td>R</td><td>CO1</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>11 b)</td><td>i)”It is possible for logistic regression to use more than two classes”. Do you agree with this statement. Justify.
ii)Explain all stages of building a machine learning model.</td><td></td><td>CO1</td></tr>
<tr><td>12 a)</td><td>What are different types of training models in Machine Learning?</td><td>U</td><td>CO2</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>12 b)</td><td>How are covariance and correlation different from one another?</td><td>U</td><td>CO2</td></tr>
<tr><td>13 a)</td><td>Explain any one encoding techniques with code snippet.</td><td>Apply</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>13 b)</td><td>Compare K-nearest neighbour and K-means technique.</td><td>Apply</td><td>CO3</td></tr>
<tr><td>14 a)</td><td>How do you choose a classifier based on training set size?</td><td>Apply & Analyse</td><td>CO4</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>14 b)</td><td>Explain Apriori Algorithm with the help of an example.</td><td>U</td><td>CO4</td></tr>
<tr><td>15 a)</td><td>Consider the given dataset. Apply Naïve Bayes algorithm and predict that if a fruit has the following properties then predict the type of fruit it is Fruit={ Yellow, Sweet, Size}
<table>
<tr><td>Fruit</td><td>Yellow</td><td>Sweet</td><td>Size</td></tr>
<tr><td>mango</td><td>350</td><td>450</td><td>650</td></tr>
<tr><td>banana</td><td>400</td><td>300</td><td>400</td></tr>
<tr><td>others</td><td>50</td><td>100</td><td>150</td></tr>
</table></td><td>Apply</td><td>CO4</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>15 b)</td><td>Explain the techniques of pre-processing of data.</td><td>U</td><td>CO4</td></tr>
<tr><td>16 a)</td><td>Describe the metrices that are used in Decision Trees to find the root node while taking any decision.</td><td>U</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>16 b)</td><td>Explain the goal of feature selection while building a decision tree.</td><td>U</td><td>CO5</td></tr>
<tr><td>17 a)</td><td>Write a basic Machine Learning program to check the accuracy of a model, by importing any dataset using any classifier?</td><td>Apply</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>17 b)</td><td>Consider a situation where a person has a dataset with two variables, area(input) and price(output). He wants to predict the price of a flat based on their area in square feet. What type of algorithm do you suggest to solve his problem?</td><td>Apply</td><td>CO5</td></tr>
</table>

		L	T	P	C
ECE11041	**AI for Robotics**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Discrete Mathematics**				
Co-requisite	**Logical Ability**				

Course Objectives:

2. Introduce the fundamental concept of artificial intelligence
3. Emphasize the importance of artificial intelligence in developing and implementing algorithms for robots.
4. Describe common applications of machine learning techniques in robotics **Course Outcomes:**

Course Outcomes:

On the completion of this course the student will be able to

CO11: Understand basic concepts of robotics.
CO12: Discuss the fundamental concepts of artificial intelligence
CO13: Implement machine learning techniques in robotics
CO14: Formulate image and audio processing algorithms.
CO15: Build deep learning techniques for robots.

Course Description:

The AI in robotics not only helps to learn the model to perform certain tasks but also makes machines more intelligent to act in different scenarios and to understand the scenarios or recognize the various objects, labeled training data is used to train the AI model through machine learning algorithms. There are various functions integrated into robots like computer vision, motion control, grasping the objects, and training data to understand physical and logistical data patterns and act accordingly. From motion sensors to computer vision for object detection, there are multiple sensors providing a sensing technology into changing and uncontrolled environments making the AI possible in the robotics. There are different disciplines of teaching a robot through machine learning. And deep learning is also used to train such models with high-quality training data for a more precise machine learning process. AI in robotics makes such machines more efficient with self-learning ability to recognize the new objects. However, currently, robotics are used at the industrial purpose and in various other fields to perform the various actions with the desired accuracy at higher efficiency, and better than humans. This course aims to introduce the students to the relevant concepts necessary to build smart software for intelligent robots.

Course Content:

Unit-I	5 Lecture Hours
Introduction to Robotics: Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages	
Unit-II	**10 Lecture Hours**
Problem solving and Scope of AI: Introduction to Artificial Intelligence. Applications- Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems. AI techniques- search knowledge, abstraction. **Problem Solving:** State space search; Production systems, search space control: depth-first, breadth-first search. Heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis. LA* Algorithm, L(AO*) Algorithm	
Unit-III :	**15Lecture Hours**
Machine Learning: Types of machine learning techniques, regression, decisions trees, linear and non-linear optimization, Q-Learning, neural networks, dimensionality reduction, clustering, fuzzy systems, evolutionary computation techniques.	
Unit-IV	**10 Lecture Hours**
Robot Vision: Image processing techniques, feature extraction, image enhancement, edge detection, gradient detection, noise removal, filter based approaches, segmentation. **Audio Processing: S**pectrum analysis, fourier transformations, wavelet transformations, noise removal, phonetics processing.	
Unit-V	**5 Lecture Hours**
Deep Learning techniques: Convolutional Neural Networks, LSTMs, time-series analysis, segmentation techniques, object detection and localization techniques, deep learning for multimodal input processing.	
Text Books: 1) E. Rich and K. Knight, “Artificial intelligence”, TMH, 2nd ed., 1992. 2) N.J. Nilsson, “Principles of AI”, Narosa Publ. House, 1990. **Reference Books:** 1)John J. Craig, “Introduction to Robotics”, Addison Wesley publication 2) Richard D. Klafter, Thomas A. Chmielewski, Michael Negin, “Robotic Engineering – An integrated approach”, PHI Publication 3) Tsuneo Yoshikawa, “Foundations of Robotics”, PHI Publication	

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	Understand basic concepts of robotics.	PO1, PO6
CO2	Discuss the fundamental concepts of artificial intelligence	PO1, PO6
CO3	Implement machine learning techniques in robotics	PO1,PO2, PO3, PO4, PO5
CO4	Formulate image and audio processing algorithms.	PO1,PO2, PO3, PO4
CO5	Build deep learning techniques for robots.	PO1,PO2, PO3, PO4, PO5

Course Code	Course Title	Engineering knowledge PO 1	Problem analysis PO 2	Design/development of solutions PO 3	Conduct investigations of complex problems PO 4	Modern tool usage PO 5	The engineer and society PO 6	Environment and sustainability PO 7	Ethics PO 8	Individual and team work PO9	Communication PO 10	Project management and finance PO 11	Life-long learning PO 12	PSO 1	PSO 2	PSO 3
ECE11041	AI for Robotics	3	3	3	3	2	2	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech ECE	**Semester:**	VII
Paper Title:	AI for Robotics	**Paper Code:**	ECE11041
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)	**40.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **41.** All parts of a Question should be answered consecutively. Each Answer		

	should start from a fresh page. **42.** Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A **Answer All the Questions (5 x 1 = 5)**			
1	What makes any system artificially intelligent?	**U**	**CO1**
2	Define Intelligence.	**U**	**CO2**
3	Explain the metrices that is used to draw meaningful insights in regression.	**R**	**CO3**
4	What are the algorithms that are used for prediction as well as classification?	**U**	**CO4**
5	Why Machine Learning is a part of AI?	**U**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	i)What is supervised learning? ii)Write the mathematical model for multiple regression.	**R**	**CO1**
(OR)			
6 b)	i)What is knowledge representation? ii)Write the mathematical expression to find distance among data points.	**R**	**CO1**
7 a)	Explain the condition where lasso regression and ridge regression techniques are used.	**U**	**CO2**
(OR)			
7 b)	What is Turing Test? Explain its significance.	**R**	**CO2**
8 a)	“Learning is done by viewing, listening, interactions, studying and by experience”. Do you agree with the statement. If yes, Elucidate	**Apply**	**CO3**
(OR)			
8 b)	Explain the libraries that are mostly used in Machine Learning tasks.	**Apply**	**CO3**
9 a)	Explain the significance of Baye’s Theorem.	**U**	**CO4**
(OR)			
9 b)	Explain confusion matrix.	**U**	**CO4**
10 a)	How can you avoid overfitting in machine learning?	**U**	**CO5**
(OR)			
10 b)	Write some ways to handle missing values in dataset while working in machine learning.	**Apply**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	i)What is logistic regression model? ii)How do you evaluate a logistic regression model?	**R**	**CO1**
(OR)			
11 b)	i)”It is possible for logistic regression to use more than two classes”. Do you agree with this statement. Justify. ii)Explain all stages of building a machine learning model.		**CO1**
12 a)	What are different types of training models in Machine Learning?	**U**	**CO2**
(OR)			
12 b)	How are covariance and correlation different from one another?	**U**	**CO2**
13 a)	Explain any one encoding techniques with code snippet.	**Apply**	**CO3**
(OR)			
13 b)	Compare K-nearest neighbour and K-means technique.	**Apply**	**CO3**
14 a)	How do you choose a classifier based on training set size?	**Apply & Analyse**	**CO4**
(OR)			

<table>
<tr><td>14 b)</td><td>Explain Apriori Algorithm with the help of an example.</td><td>U</td><td>CO4</td></tr>
<tr><td>15 a)</td><td>Consider the given dataset. Apply Naïve Bayes algorithm and predict that if a fruit has the following properties then predict the type of fruit it is Fruit={ Yellow, Sweet, Size}
<table><tr><td>Fruit</td><td>Yellow</td><td>Sweet</td><td>Size</td></tr><tr><td>mango</td><td>350</td><td>450</td><td>650</td></tr><tr><td>banana</td><td>400</td><td>300</td><td>400</td></tr><tr><td>others</td><td>50</td><td>100</td><td>150</td></tr></table></td><td>Apply</td><td>CO4</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>15 b)</td><td>Explain the techniques of pre-processing of data.</td><td>U</td><td>CO4</td></tr>
<tr><td>16 a)</td><td>Describe the metrices that are used in Decision Trees to find the root node while taking any decision.</td><td>U</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>16 b)</td><td>Explain the goal of feature selection while building a decision tree.</td><td>U</td><td>CO5</td></tr>
<tr><td>17 a)</td><td>Write a basic Machine Learning program to check the accuracy of a model, by importing any dataset using any classifier?</td><td>Apply</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>17 b)</td><td>Consider a situation where a person has a dataset with two variables, area(input) and price(output). He wants to predict the price of a flat based on their area in square feet. What type of algorithm do you suggest to solve his problem?</td><td>Apply</td><td>CO5</td></tr>
</table>

ECE11042	**Advanced Communication**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Analog and Digital Communication				
Co-requisites	Fundamentals of Wireless Communication				

Course Objectives

1. To introduce the students to advanced topics in digital communications.
2. To provide an understanding of the fundamental concepts used in the design, performance analysis.
3. To provide an understanding of the fundamental techniques used in the implementation of current communication systems.
4. To study wireless digital communication technique.
5. To enable the students for acquiring the fundamental knowledge of CDMA GPRS.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Illustrate** the basics of Wireless Digital Communication, Carrier and Symbol Synchronization, Broad band Data Network.
CO2. **Demonstrate** and practice the application of CDMA, GPRS, Wireless mobile communication System.
CO3. **Appraise** the application of Cellular mobile network, broadband wireless access in TV bands.
CO4. **Explain** the concept of Spread spectrum communication, PN sequences, jamming.
CO5. **Illustrate** the Cognitive radio communication techniques and algorithms, Radio frequency spectrum, GNU radio etc.

Catalog Description

Communication systems are at the heart of today’s information driven economy and support our modern-day lifestyles and even our very existence. Today’s life is widely depends upon cell phones, wireless networks, and Internet, as well as radio, television, cable and satellite systems, we now rely on electrical communication systems in almost all aspects of our lives. The course focuses on the technologies underlying these systems, which constitute the field of advance communications. The course is intended for graduate/senior undergraduate level students. While the course is intended to serve as an advance communications, the pre-requisites/co-requisites listed are absolutely necessary.

Course Content

Module 1: 10 lecture hours

Wireless Digital Communication; Transmission over band limited channels-Introduction,
Error Rate in a Matched-Filter Receiver, Inter-symbol Interference, Ideal Nyquist Pulse, Raised-Cosine Spectrum, Square-Root Raised-Cosine Spectrum, Eye Pattern, Adaptive Equalization, Broad band Data Network: Capacity of AWGN Channel, Partitioning of

Continuous-Time Channel, Constrained Optimization Problem (Water-Filling Interpretation).
Carrier and Symbol Synchronization: importance in signal demodulation, carrier frequency and phase estimation – decision directed and power of N methods, timing estimation - spectral line, MMSE, and ML methods, joint carrier and symbol synchronization.

Module 2: 10 lecture hours

Transmission over Fading Channels- Introduction, Propagation Effects, Jakes Model, Statistical Characterization of Wideband Channels , FIR Modelling of Doubly Spread Channels, Effects of Flat Fading, Diversity Techniques, Space Diversity-on-Receive, Space
Diversity-on-Transmit, Multiple-Input, Multiple-Output: Basic Considerations, MIMO Capacity for Channel, Orthogonal Frequency Division Multiplexing.

Module 3: 10 lecture hours

Cellular Mobile Networks- Introduction, Frequency Reuse, Co-channel and Adjacent channel interferences, Mobile antenna system.
Mobile Wireless Communication Systems- 2G network GSM, Architecture, Protocols, Air
Interface, GSM Multiple Access, GSM Channel Organization, Traffic Channel Multi frame, Control (Signalling) Channel Multi-frame, GSM Call Set up Procedure, GSM Protocols and Signalling, Location Update Procedure, Routing a call to a Mobile Subscriber,
The concept of packet data services - 2.5G GPRS networks: The 2.5 G General Packet Radio Services, GPRS Networks Architecture. Session Management and PDP Context, Data Transfer Through GPRS Network and Rout, GPRS Location Management Procedures,
GPRS Roaming, the IP Internetworking Model, GPRS Interfaces and Related Protocols, GPRS Applications.

Module 4: 8 lecture hours

Spread Spectrum Communications: model, Direct sequence SS, PN sequences, Frequency hopped SS, synchronization, jamming.
Overview of CDMA systems: IS-95 Networks and The Universal Mobile Telecommunication System (UMTS) (3G) architecture: CDMA based IS-95 Systems, forward link and reverse link for IS-95, handoff process in CDMA based IS-95 network, UMTS Network Architecture –Release 99, UMTS Interfaces.

Module 5: 7 lecture hours

Cognitive radio: Introduction, Cognitive radio communication techniques and algorithms,
Radio frequency spectrum and regulation, Digital communication fundamentals for cognitive radio, Spectrum sensing and identification, Spectrum access and sharing, Dynamic Spectrum access, Cognitive radio for broadband wireless access in TV bands: The
IEEE 802.22 standards, GNU radio for cognitive radio experimentation.

Text Books:

1. "Wireless Networks, Applications and Protocols", by T.S. Rappaport, Pearson Education
2. "Modern Digital and Analog Communication Systems", by B.P. Lathi and Zhi Ding, 4th Edition,
Oxford University Press, 2009.
3. Communication Systems, 4th ed. – A. Bruce Carlson, Paul B. Crilly, Janet C. Rutledge, MGH International edition.
4. Digital Communications, 2nd ed. – Bernard Sklar, Pearson Education.
5. Electronic Communications, 4th ed. – Dennis Roddy, John Coolen, PHI

Reference Books:

1. "Cognitive Radio Communications and Networks Principles and Practice" by A M. Wyglinski, M.
N. Nekovee, and Y. T. Hou, Academic Press

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Illustrate** the basics of Wireless Digital Communication, Carrier and Symbol Synchronization, Broad band Data Network.	**PO1, PO2, PO10, PSO1, PSO2**
CO2	**Demonstrate** and practice the application of CDMA, GPRS, Wireless mobile communication System.	**PO1, PO2, PO3, PO10, PSO1, PSO2**
CO3	**Appraise** the application of Cellular mobile network, broadband wireless access in TV bands.	**PO1, PO2, PO3, PO10, PSO2**
CO4	**Explain** the concept of Spread spectrum communication, PN sequences, jamming.	**PO1, PO2, PO10, PSO2**
CO5	**Illustrate** the Cognitive radio communication techniques and algorithms, Radio frequency spectrum, GNU radio etc.	**PO1, PO2, PO3, PO10, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
ECE11 042	Advanced Communic ation	3	3	3							3			2	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 20__ – 20__)		
Name of the Program:	B.Tech	**Semester:**	VII
Paper Title:	Advanced Communication	**Paper Code:**	ECE11042
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	

CO16: At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
CO17: All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
CO18: Assumptions made if any, should be stated clearly at the beginning of your answer.

Group A
Answer All the Questions (5 x 1 = 5)

1	To avoid aliasing, **what** is the nyquist rate of this signal x(t) = 8cos100πt? a) 25 Hz b) 50 Hz c) 100 Hz d) 200 Hz	**U**	**CO2**
2	For a BPSK system, the bit error probability is given by, **b)** $\frac{1}{2}erfc\left(\sqrt{\frac{E_b}{2N_0}}\right)$ **b)** $\frac{1}{2}erfc\left(\frac{1}{2}\sqrt{\frac{E_b}{2N_0}}\right)$ **c)** $\frac{1}{2}erfc\left(\sqrt{\frac{E_b}{N_0}}\right)$ **d)** $\frac{1}{2}erfc\left(\frac{1}{2}\sqrt{\frac{E_b}{N_0}}\right)$	**U**	**CO4**
3	In **which** modulation technique redundant bits should be reduced a) ADM b) DPCM c) PCM d) None of these	**U**	**CO2**
4	Auto correlation function of a random process is defined as, a) R (t1, t2) = E(XY) = ∬ xyp(x,y)dxdy b) E (XY) = ∬ x2 y2dxdy c) R (t1, t2) = ∬ x2 y2dxdy d) None of these	**R**	**CO1**
5	The bit rate of a digital communication system is 34 Mbps. The modulation scheme is QPSK. The baud rate of the system is, a) 68 Mbps b) 34 Mbps c) 17 Mbps d) 8.5 Mbps	**U**	**CO4**

Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	a) For a PAM transmission of voice signal having maximum frequency 3 KHz, calculate the transmission bandwidth. It is given that f_S = 8 KHz and the pulse duration $\tau = 0.1\ T_S$	**U**	**CO2**
(OR)			
6 b)	Briefly describe the compressor and expander characteristics of companding.	**U**	**CO2**
7 a)	Represent QPSK signals in the signal space and **find** distance between them. What is the significance of each? Explain briefly.	**AP**	**CO4**
(OR)			
7 b)	**What** is the difference between coherent and non-coherent digital modulation techniques? (R) What is the bandwidth of BFSK signal?	**U**	**CO3**
8 a)	State the comparison between FHSS & DSSS/CDMA.	**U**	**CO2**
(OR)			
8 b)	**How** can OFDM (Orthogonal Frequency Division Multiplexing) achieve high data rates?	**U**	**CO5**
9 a)	Briefly describe the 'Nyquist Criterion for distortion less baseband transmission' by using time and frequency domain representation.	**AP**	**CO3**
(OR)			
9 b)	**What** is the remedy to reduce ISI?	**U**	**CO3**
10 a)	Consider the binary sequence [0 1 0 0 1 0 1 1]. Draw the waveforms for the following i) Split phase Manchester format ii) Polar RZ signal iii) AMI RZ signal	**U**	**CO4**
(OR)			
10 b)	Draw the block diagram of a QPSK reception and **explain** its principle of operation.	**U**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Highlight the **compare** between Narrow Band and Wide Band FM.	**U**	**CO1, CO5**
(OR)			
11 b)	**What** are the properties of line coding techniques?	**U**	**CO1, CO2**
12 a)	**What** is the remedy to reduce ISI?	**U**	**CO1**
(OR)			
12 b)	Briefly describe the compressor and expander characteristics of companding.	**U**	**CO1**

13 a)	**What** is the difference between coherent and non-coherent digital modulation techniques? (R) What is the bandwidth of BFSK signal?	**Ap**	**CO2**
(OR)			
13 b)	Explain demodulation of DSBSC with simple diagram.	**Ap**	**CO2**
14 a)	Draw the block diagram of a QPSK reception and **explain** its principle of operation.	**U**	**CO3**
(OR)			
14 b)	**Explain** and calculate the probability of error in a BPSK signal.	**U**	**CO3**
15 a)	A television signal having a bandwidth of 10.2 MHz is transmitted using binary PCM system. Given that the number of quantization levels is 512. Determine: i) Code word length, ii) Transmission bandwidth	**Ap**	**CO4**
(OR)			
15 b)	Prove that the difference between fH and fL is minimum in MSK technique.	**Ap**	**CO4**
16 a)	**What** is companding in digital baseband transmission system? c) A Delta Modulation (DM) system is designed to operate at five times the nyquist rate for a signal having a bandwidth equal to 3 KHz. Calculate the maximum amplitude of a 2 KHz input sinusoid for which the DM does not have slope overload. Given that the quantizing step size is 250 mV.	**R**	**CO2**
(OR)			
16 b)	**What** are ‘Slope Overload Distortion’ and ‘Granular Noise’ in Delta Modulation?	**Ap**	**CO5**
17 a)	A continuous random variable has a Probability Density Function (PDF) expressed as, fX (x) = ae-b|x|, here X be the random variable whose values lie in the range x = -α to α. i) **Determine** the relationship between a & b. ii) The probability that outcome lies between 1 and 2.	**U**	**CO1, CO2**
(OR)			
17 b)	Briefly describe **how** Gaussian MSK (GMSK) is used for GSM wireless communication?	**U**	**CO4**

CSE11253	**Database Management Systems**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisite	**NIL**				

Course Objectives:

6. To understand database concepts, applications, data models, schemas and instances.

7. To implement the relational database design and data modelling using entity-relationship (ER) model.

8. To demonstrate the use of constraints and relational algebra operations and Normalization process

9. To learn the new emerging Technologies and Applications in database.

Course Outcomes:

On the completion of this course the student will be able to

1. **Describe** the characteristics of database and the architecture of Database system.
2. **Model** the elements used in Entity- Relationship diagram.
3. **Summarize** relational model concept and illustrate the relational constraints.
4. **Build** Structured Query Language (SQL) and apply to query a database and **Define** normalization for relational databases.
5. **Develop** some Standalone (Example)/ Mobile/ Web Application DB on real world case studies.

Course Description:

Databases form the backbone of all applications today – tightly or loosely coupled, intranet or internet based, financial, social, administrative, and so on. Database Management Systems (DBMS) based on relational and other models have long formed the basis for such databases. Consequently, Oracle, Microsoft SQL Server, Sybase etc. have emerged as leading commercial systems while MySQL, PostgreSQL etc. lead in open source and free domain. While DBMS's differ in the details, they share a common set of models, design paradigms and a Structured Query Language (SQL). In this background the course examines data structures, file organizations, concepts and principles of DBMS's, data analysis, database design, data modeling, database management, data & query optimization, and database implementation. More specifically, the course introduces relational data models; entity-relationship modeling, SQL, data normalization, and database design. Further it introduces query coding practices using MySQL (or any other open system) through various assignments. Design of simple multi-tier client / server architectures based and Webbased database applications is also introduced.

Course Content:

Unit-I	**9 Lecture Hours**
Overview of database management systems and the relational mode: Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML). Data models: Entity-relationship model, network model, relational and object-oriented data models, integrity constraints, data manipulation operations. ER models: Entity Set, Relation Ship Set, Cardinality Properties, Type of Entities, Type of Keys, Aggregation, Specialization and Generalization.	
Unit-II	**9 Lecture Hours**
Database design: E-R diagrams, constraints, normal forms Relational algebra, Fundamental Operations, Additional Operations. Select, Project, Cartesian Product, UNION, Set difference, Rename. Types of joining operations, Division, Intersection, Aggregate. Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.	
Unit-III	**9 Lecture Hours**
SQL: data definition, data manipulation, queries, views, constraints, triggers: Relational database design: Integrity Constraint, Domain Constrain, Referential Integrity, Functional Dependencies, Closure of Set, Cover and Canonical Cover, Types of Anomalies, Armstrong's axioms, Extended Armstrong's axioms, Assertions and Demons. Data Base Decomposition: Domain and data dependency, Normal forms: 1NF, 2 NF, 3 NF, BCNF, Dependency preservation, Lossless design.	
Unit-IV	**9 Lecture Hours**
Storage and indexing: B-trees, hashing: Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms. Storage strategies: Indices,	

B-trees, B+-trees, hashing, File System, Disk Organization, Physical Storage, Buffer management.	
Unit-V	**9 Lecture Hours**
Case Studies : Standalone (Example)/ Mobile/ Web Application DB: Transaction processing: Failure, Recovery from Failure, Different States of Transaction, Transaction Isolation, ACID property, Serializability of scheduling, Multi-version and optimistic Concurrency Control schemes. Concurrency control: Locking and timestamp-based schedulers, 2-Phase Locking Protocol, Dead Lock, Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. Advanced topics: Distributed databases, Data warehousing and data mining.	
Text Books: 1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill 2. 2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press. **Reference Books:** **1.** "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education **2.** "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley	

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		Mapped Program Outcomes
CO1	**Describe** the characteristics of database and the architecture of Database system.	PO1, PO3, PO4
CO2	**Model** the elements used in Entity- Relationship diagram.	PO1,PO2, PO3, PO4
CO3	**Summarize** relational model concept and illustrate the relational constraints.	PO1,PO2, PO3, PO4
CO4	**Build** Structured Query Language (SQL) and apply to query a database and **Define** normalization for relational databases.	PO1,PO2, PO3, PO4
CO5	Develop some Standalone (Example)/ Mobile/ Web Application DB on real world case studies.	PO1,PO2, PO3, PO4

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning			

Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 11253	Database Management Systems	3	3	3	3	-	-	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

	ADAMAS UNIVERSITY END SEMESTER EXAMINATION (MARCH-2022)		
Name of the Program:	B.Tech	**Semester:**	VII
Paper Title:	Database Management Systems	**Paper Code:**	CSE 11253
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	4
(Any other information for the student may be mentioned here)	**43.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **44.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **45.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A Answer All the Questions (5 x 1 = 5)			
1	Explain Composite Key with example?	**Remember**	**CO1**
2	Explain Multivalued attribute with proper example?	**Remember**	**CO3**

3	What is highest normal form for the given relation R? Explain your answer? R={A,B,C,D,E,F} FDs: A → B,C D →E E → F	**Apply**	**CO2**
4	Who is DBA? What are the responsibilities of DBA?	**Remember**	**CO4**
5	What is View level of abstraction?	**Understand**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Explain the Importance of Check Points in DBMS?	**Remember**	**CO1**
(OR)			
6 b)	Explain Deferred Database modification?	**Remember**	**CO1**
7 a)	Explain Two Phase locking protocol?	**Remember**	**CO2**
(OR)			
7 b)	Explain View Serializability?	**Remember**	**CO2**
8 a)	Explain Sparse Index with example?	**Remember**	**CO3**
(OR)			
8 b)	Define Assertions with proper example?	**Understand**	**CO3**
9 a)	Explain canonical cover of a functional dependency?	**Remember**	**CO4**
(OR)			
9 b)	Discuss about Armstrong axioms?	**Understand**	**CO4**
10 a)	What is functional dependency explain with example?	**Remember**	**CO5**
(OR)			
10 b)	Explain outer join and its types with proper examples?	**Remember**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	You are in a Data Base Designer of a company. You received a project to design a database of XYZ company. To develop an ERD you have the following criteria: i. Your company has many projects under different departments and all employees are under at lease a department. ii. An employee can work for multiple projects iii. Multiple projects can be developed by multiple departments. iv. A project must be under a department at least. Your ERD should have all cardinality and symbols properly mentioned. Justify your answer "Every candidate key is super but every super key is not a candidate key"? 3+2	**Apply**	**CO1**
(OR)			
11 b)	You are in a Data Base Designer of a company. You received a project to design a database for a specific branch of ABC Bank. To develop an ERD you have the following criteria: i. Branch Can have multiple type of customers. ii. Customers hold a Savings and Loan account. iii. A customer can have at least one type of account. iv. A customer can have maximum one account of each type. Your ERD should have all cardinality and symbols properly mentioned. What are different anomalies explain with example? 2+3	**Apply**	**CO1**
12 a)	Consider the following CUSTOMER TABLE and ORDER TABLE **CUSTOMER TABLE**	**Understand**	**CO2**

Customer ID	Customer Name	Contact Name	Address	City	Postal Code	Country
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209	Germany
2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	UK

ORDER TABLE

OrderID	CustomerID	Product	OrderDate	Price(INR)
10248	1	Pen	2020-10-04	30000
10249	1	Books	2020-12-05	10000
10250	4	Staplers	2021-07-30	20000
10251	5	Pen	2020-11-16	15000
10252	2	Rubber band	2019-02-27	25000
10253	2	Glue	2018-03-15	22000
10254	5	Staplers	2021-07-19	21000

Develop Relational Algebra Queries to resolve the following queries?

i. Show the Customer Name and Contact name for the customers from “Mexico”?
ii. Show the Customer Names who had ordered products after October,2020?
iii. Show the Customer name Who stay at the same country as “Berglunds snabbköp”?
iv. Show the Contact Names of the customers who had ordered for more than 20000 INR.

Show the contact Name of the customer who had not ordered any item?

(OR)

12 b) Consider the following CUSTOMER TABLE and ORDER TABLE — **Understand** — **CO2**

CUSTOMER TABLE

CustomerID	CustomerName	ContactName	Address	City	PostalCode
1	Alfreds Futterkiste	Maria Anders	Obere Str. 57	Berlin	12209

2	Ana Trujillo Emparedados y helados	Ana Trujillo	Avda. de la Constitución 2222	México D.F.	05021	Mexico
3	Antonio Moreno Taquería	Antonio Moreno	Mataderos 2312	México D.F.	05023	Mexico
4	Around the Horn	Thomas Hardy	120 Hanover Sq.	London	WA1 1DP	UK
5	Berglunds snabbköp	Christina Berglund	Berguvsvägen 8	Luleå	S-958 22	Sweden

ORDER TABLE

OrderID	**CustomerID**	**Product**	**OrderDate**	**Price (INR)**
10248	1	Pen	2020-10-04	30000
10249	1	Books	2020-12-05	10000
10250	4	Staplers	2021-07-30	20000
10251	5	Pen	2020-11-16	15000
10252	2	Rubber band	2019-02-27	25000
10253	2	Glue	2018-03-15	22000
10254	5	Staplers	2021-07-19	21000

Develop SQL Queries to resolve the following queries?

i. Show the Customer Name and Contact name for the customers from “Mexico”?
ii. Show the Customer Names who had ordered products after October,2020?
iii. Find the product name for highest price?
iv. Show the Contact Names of the customers who had ordered for more than 20000 INR?
v. Increase the price by INR 3000/- with all the orders? And show the entire Order table?

13 a)	Explain Shadow Copy with proper example? Explain the importance of the selection of Victims in deadlock recovery protocol? 3+2	**Understand**	**CO1**
	(OR)		
13 b)	Explain Shadow paging with proper example? What can be done if a transaction can no longer continue its regular execution? 3+2	**Understand**	**CO1**
14 a)	Define Deadlock? What are the mechanisms used for Deadlock Prevention? 1+4	**Understand**	**CO4**
	(OR)		
14 b)	Write Short note on B Tree?	**Understand**	**CO4**
15 a)	Explain ACID Property with proper example?	**Remember**	**CO4**
	(OR)		
15 b)	Explain Various file organizational techniques?	**Remember**	**CO4**
16 a)	Explain Transaction State Diagram?	**Remember**	**CO5**

(OR)			
16 b)	Explain fundamental operators of Relational algebra?	**Remember**	**CO5**
17 a)	Explain Normalization with Proper example?	**Remember**	**CO5**
(OR)			
17 b)	Discuss about the anomalies for a relational Data Base with proper example?	**Understand**	**CO5**

CSE11254	**Big Data Tools and Techniques**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisite	**NIL**				

Course Objectives:

1. To understand the Big Data Platform and its Use cases
2. To provide an overview of Apache Hadoop/ Apache Spark
3. To provide HDFS Concepts and Interfacing with HDFS
4. To understand Map Reduce Jobs
5. To provide hands on Hadoop and Spark Eco System
6. To apply analytics on Structured, Unstructured Data.
7. To explore different algorithms for mining massive datasets

Course Outcomes:

On the completion of this course the student will be able to

CO6: Identify Big Data and its Business Implications
CO7: List the components of Hadoop Eco-System
CO8: List the components of Spark Eco-System
CO9: Develop and Execute the Database for unstructured data.
CO10: Analyze problems appropriate to mining data streams

Course Description:

Massive Datasets and its mining techniques provides a basic introduction to big data and corresponding quantitative research methods. The objective of the course is to familiarize students with big data analysis as a tool for addressing substantive research questions. The course begins with a basic introduction to big data and discusses what the analysis of these data entails, as well as associated technical, conceptual and ethical challenges. Strength and limitations of big data research are discussed in depth using real-world examples. Students then engage in case study exercises in which small groups of students develop and present a big data concept for a specific real-world case. This includes practical exercises to familiarize students with the format of big data. It also provides a first hands-on experience in handling and analyzing large, complex data structures. The block course is designed as a primer for anyone interested in attaining a basic understanding of what big data analysis entails.

Course Content:

Unit-I:	5 Lecture Hours
Introduction to Massive Dataset : What is Data Mining?, Statistical Modelling, Machine Learning, Computational Approaches to Modelling, Feature Extraction, Statistical Limits on Data Mining, Big Data Definition, Characteristic Features, Structure, Applications - Big Data vs Traditional Data - Risks of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools.	
Unit-II:	**10 Lecture Hours**
Hadoop Framework : Distributed File Systems, Physical Organization of Compute Nodes, Large-Scale File-System Organizatio, Transparencies, Master-Slave/Master-Worker Architecture, HDFS concepts, MapReduce, Hadoop YARN, Details of MapReduce Execution, Algorithms using MapReduce, Computing Natural Join by MapReduce, Grouping and Aggregation by MapReduce, Union, Intersection, and Difference by MapReduce, Matrix-Vector Multiplication, Extensions to MapReduce, Communication Cost Model, Complexity Theory for MapReduce.	
Unit-III:	**10 Lecture Hours**
Data Analysis Spark Framework: Introduction To Streams Concepts, Stream Data Model and Architecture, Stream Computing - Sampling Data in a Strea, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Basic entity classes and objects in Scala. Apache Spark: -Resilient Distributed Datasets -Creating RDDs, Lineage and Fault tolerance, DAGs, Immutability, task division and partitions, transformations and actions, lazy evolutions and optimization -Formatting and housing data from spark RDDs--Persistence. Data frames, datasets, Setting up a standalone Spark cluster-: spark-shell, basic API, Modules-Core, Key/Value pairs and other RDD features, MLlib-examples.	
Unit-IV:	**10Lecture Hours**
Mining Data Streams Introduction to NoSQL: Data Frames and Datasets revisited. NoSQL data bases and ACID concept. Data Frames and Datasets. Creating data frames from RDDs. Introduction to Spark SQL to query data frames. Streaming data and Spark Streaming Big Time series data representations- Traditional Database systems and	

Indexing issues: The NoSQL advantage, Index vs Computation. Dealing with timeseries data: Skewing techniques, creating overlapping and non-overlap windows using joins and group by, creating Henkel matrices from univariate time series., Pushing data to DataFrames and NoSQL/ ACID databases (Cassandra/MongoDB), Some popular file formats for large data sets, Aggregate Data Models – Hbase: Data Model and Implementations –. Cassandra: Data Model – Hadoop Integration. Pig Models developing and testing Pig Latin scripts. Hive Data Types and File Formats – HiveQL Data Definition – HiveQL Data Manipulation – HiveQL Queries.	
Unit-V:	**10 Lecture Hours**
Introduction to NoSQL Algorithm to Mine Massive Dataset : Finding Similar Items, Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Locality-Sensitive Hashing for Documents, The Theory of Locality-Sensitive Functions, Distance Measures, LSH Families for Other Distance Measures, Applications of Locality-Sensitive Hashing, Methods for High Degrees of Similarity, Mining Data Streams, Introduction To Streams Concepts, Stream Data Model and Architecture, Stream Computing - Sampling Data in a Streaming, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Link Analysis, PageRank, Efficient Computation of PageRank, Frequent Itemsets, Association Rule Mining, Mining Social-Network Graphs, Large-Scale Machine Learning	
Text Books: 1. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012 2. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007. 3. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013 Reference Books: 3. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015 4. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015	

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Describe** the characteristics of database and the architecture of Database system.	PO1, PO3, PO4
CO2	**Model** the elements used in Entity- Relationship diagram.	PO1,PO2, PO3, PO4
CO3	**Summarize** relational model concept and illustrate the relational constraints.	PO1,PO2, PO3, PO4
CO4	**Build** Structured Query Language (SQL) and apply to query a database and **Define** normalization for relational databases.	PO1,PO2, PO3, PO4
CO5	Develop some Standalone (Example)/ Mobile/ Web Application DB on real world case studies.	PO1,PO2, PO3, PO4

		Engineering knowledge	nalysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning			
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 11254	Big Data Tools and Techniques	3	3	3	3	-	-	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

Name:

Enrolment No:

ADAMAS UNIVERSITY
PURSUE EXCELLENCE

Course Code: CSE11254 **Course Name:Big Data Tools and Techniques**

Program: B.Tech. (CSE) **Semester: Odd 2021-22**
Time: 03 Hrs. **Max. Marks: 40**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks)**.** Any **Two Questions from Section C** (Each Carrying 10 Marks)**.**

SECTION A (Answer All Questions)			
1.a	**Discuss** the characteristics of unstructured data.	**Creating**	**CO1**
b	**What** are the 4 components of Hadoop? State their utility in 2 sentences each.	**Remembering**	**CO2**
c	**Discuss** a situation where the linear regression model is not applicable and logical regression has to be used.	**Understanding**	**CO3**
d	**Why** is real-time processing necessary to handle analytics on data streams?	**Remembering**	**CO4**
e	**Why** are NoSQL databases required for processing unstructured data?	**Remembering**	**CO5**
SECTION B (Attempt any **Three Questions)**			
2.	**Justify the statement** that ‘a Big Data Analytics system can be built using a Distributed architecture’. Draw a representational architecture to **illustrate.**	**Evaluating & Understanding**	**CO1**
3.	**Examine** a real-life example of how a system becomes unreliable with the replication management feature of Hadoop**. How** would you implement it in Hadoop?	**Analyzing**	**CO2**
4.	**Develop** a flowchart to implement the ‘Least Mean Square’ technique used in regression.	**Creating**	**CO3**
5.	a) **How** is the architecture of a real-time stream data analysis model different from that of a static data analysis model? b) For a particular application, unstructured data is stored in the below format: { “Book Name”: “Big Data & Analytics”	**Analyzing** **Analyzing**	**CO4** **CO5**

	"Publisher": "Wiley India" "Year of publication": "2019" } **Classify** the kind of data store for the above example. **Give** an additional example of data stored in the same data store type.		
	SECTION C (Attempt any **Two Questions)**		
6.	a) **Differentiate between** a traditional BI system and a modern Big Data Analytics System with a diagram b) **Explain** the process of block and node allocation in the HDFS architecture illustrating all its daemons	**Analyzing** **Evaluating**	**CO1** **CO2**
7.	a) **What** are support vectors? **Develop** an algorithm to implement the usage of SVM to fit a hyperplane. b) **How** would you decide the type of unstructured data store that needs to be used for a given dataset**? Illustrate** the step-by-step process for the same.	**Remembering / Creating** **Analyzing**	**CO3** **CO5**
8.	Take an example of the examination system of Adamas University. **Design** a Data Warehouse for this system assuming that 3 years of data needs to be stored in the OLTP at any point of time.	**Creating**	**CO4**

CSE11255	**Python for Data Analysis**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**10+2 Level Mathematics, Knowledge of Basics of Computer**				
Co-requisite	**NIL**				

Course Objectives:

1. To understand the concept of programming using python
2. To apply numerical computations using numpy
3. To apply scientific computations using scipy
4. To visualize trends in data using matplotlib
5. To perform machine learning operations using sklearn

Course Outcomes:

On the completion of this course the student will be able to

CO1 :	Understand the basic concepts of python
CO2 :	Apply numerical computation with python
CO3 :	Compare scientific computation methods with python
CO4 :	Visualize trends in the data with python
CO5 :	Implement machine learning models with python.

Course Description:

Data is the new Oil. This statement shows how every modern IT system is driven by capturing, storing and analysing data for various needs. Be it about making decision for business, forecasting weather, studying protein structures in biology or designing a marketing campaign. All of these scenarios involve a multidisciplinary approach of using mathematical models, statistics, graphs, databases and of course the business or scientific logic behind the data analysis. So we need a programming language which can cater to all these diverse needs of data science. Python shines bright as one such language as it has numerous libraries and built in features which makes it easy to tackle the needs of Data science. In this course we will cover these the various techniques used in data science using the Python programming language.

Course Content:

Unit I: **9 lecture hours**

Introduction to Python : Datatypes**, e**xpressions, statements, conditions, loops, classes, objects, functions, data structures, I/O, packages.

DataFrames, Series, loading and saving, alignment, missing data, reshaping, pivoting, slicing, indexing, subsetting, insertion/deletion, merge and join, time series.

Unit II: **9 lecture hours**

Numerical computation: ndarrays, datatypes, mathematical and logical operations, linear algebra, fourier transforms, random, searching, sorting, import and export data.

Unit III: **9 lecture hours**

Scientific computations: Physical and mathematical constants, Fourier transform, Integration routines, Interpolation, Data input and output, Linear algebra routines, Optimization, Signal processing, Sparse matrices, Spatial data structures and algorithms, Any special mathematical functions, Statistics

Unit IV **9 lecture hours**

Data visualization: Chart properties, styling, box plots, heatmaps, scatterplots, bubble charts, 3d charts, time series, geographical data, graph data.

Unit V **9 lecture hours**

Machine Learning: Classification, Regression, Clustering, Dimensionality Reduction, Feature Extraction.

Text Books:

1. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython - Wes McKinney – O'Reilly

2. Machine Learning with Python Cookbook: Practical Solutions from Preprocessing to Deep Learning – Chris Albon- O'reilly

Reference Books:

1. Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas C. Müller, Sarah Guido-O'Reilly

2. Learning Python: Powerful Object-Oriented Programming, Mark Lutz- O'Reilly

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	Understand the basic concepts of python	PO1, PO3, PO4

CO2	Apply numerical computation with python	PO1,PO2, PO3, PO4
CO3	Compare scientific computation methods with python	PO1,PO2, PO3, PO4
CO4	Visualize trends in the data with python	PO1,PO2, PO3, PO4
CO5	Implement machine learning models with python.	PO1,PO2, PO3, PO4

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning			
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 11255	Python for Data Analysis	3	3	3	3	-	-	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

	ADAMAS UNIVERSITY END SEMESTER EXAMINATION (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech ECE	**Semester:**	VII
Paper Title:	Python for Data Analysis	**Paper Code:**	CSE 11255
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	CO19: At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. CO20: All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. CO21: Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	The txt=My name is John, and I am {age}.By using which function developer can insert age 36 in output give the code. .	**R**	**CO1**
2	Write a code to create an 2X3 array by using Numpy.	**U**	**CO2**

3	for val in "string":
	    if val == "i":
	        break
	    print(val)
	
	print("The end")
	
	What is the output for it.
		C	**CO3**

4	How to check a word"best" in the string **txt = "The best things in life are free!".**Write a code for it.	**Ap**	**CO4**
5	How casting operation is done in Python what is the value returned in this below example z = float("3") w = int(4.2).	**An**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	i)The string is given as " sunny, Day" if we apply upper(),lower(),strip() and replacing T with F in Tree ,Write all these code in Python?	**R**	**CO1**
	(OR)		

6 b)	i)Explain the role of Format and Concat operation in Python with example ii)Give a brief overview of zfill(),If we want to print seven zeros before the number 40 how to write the code for it in zfill().	**R**	**CO1**
7 a)	Write a program in Python to return Boolean value to Print a message based on Greater than condition between a and b: a = 300 b = 35 .	**U**	**CO2**
(OR)			
7 b)	x = 15.5 y = 2 apply floor () **for value stored in ‘x’**, exponentiation()**between ‘x‘and ‘y’** write code for it in Python.	**U**	**CO2**
8 a)	Write a program in Python a person is eligible for vote or not(Voting age in India is 18 years or above)	**Ap**	**CO3**
(OR)			
8 b)	Analyze Why Indentation is needed in Python	**C**	**CO3**
9 a)	Write a program, in Python to print 6 to 36 by using for loop.	**Ap**	**CO4**
(OR)			
9 b)	students = ['Emma', 'Jessa', 'Kelly'] school = 'ABC School' Apply len() function on **students** and **schoo**l ,which feature of Object oriented programming **len() use** give your understanding in this**.**	**Ap**	**CO4**
10 a)	Analyze the need of raise ,finally keyword in python.	**An**	**CO5**
(OR)			
10 b)	Give a brief usage of Count(4) and index (3) in tuple, the tuple is given as **number=(1,2,3,8,9,13,12).**	**An**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	i)Explain default arguments and keyword arguments in Python with example. ii) The List is given as list1 = ["pineapple", "potato", "peanut”, “mango"]. • Add “guava” to end of the list • Insert a “olive” at second position of the list • removes the specified item for example-“potato” from the list.	**R**	**CO1**
(OR)			
11 b)	i) If a person’s mark is greater than 30 then person will pass otherwise not Pass Write it with Python. ii)Write a program in Python to find factorial of a number 8.	**R**	**CO1**
12 a)	thislist = ["oliva", "manoj", "kate", "pinaki", "brinda"],If you apply sort() on it what will be the result. How to make it descending in order, write a code for it.	**U**	**CO2**
(OR)			
12 b)	Explain the use of del,clear(),type() in Python with example	**U**	**CO2**
13 a)	What is the use of help() and dir() functions in Python	**C**	**CO3**
(OR)			
13 b)	Write a short notes in i)Usage of Module and package,ii)the use of min(),max() and abs()	**C**	**CO3**

14 a)	i)Write a program in Python to Create a new string made of the first, middle, and last characters of each input string **Given**: s1 = "America" s2 = "Japan" **Expected Output** AJrpan ii)What is abstraction explain with example	**Ap**	**CO4**
(OR)			
14 b)	i)Arrange string characters such that lowercase letters should come first Input str1 = PiNeAPPle Output ielePNAPP ii)Analyze the use of super() in Inheritance.	**Ap**	**CO4**
15 a)	The string is "welcome to Canada" Write the Python code for each operation i. What is the value for [3:5] ii. What is the value for [4:6] iii. What is the value for [2:7] iv. What is the value for [3:6]	**Ap**	**CO4**
(OR)			
15 b)	**Calculate the sum and average of the digits present in a string** Given a string s1, write a program to return the sum and average of the digits that appear in the string, ignoring all other characters. **Given**: str1 = "PYnative18@#8496" **Expected Outcome**: Sum is: 36 Average is 6	**Ap**	**CO4**
16 a)	**Write a program to count occurrences of all characters within a string** **Given**: str1 = "Orange" **Expected Outcome**: {'O': 1, 'r': 1, ‘a’:1,’n’:1,’g’:1, 'e': 1}	**An**	**CO5**
(OR)			
16 b)	What is the use of subplot(),grid() explain it with example.	**An**	**CO5**
17 a)	i)Create a dictionary like the example given below {'brand': 'Ford', 'model': 'Mustang', 'year': 2020} apply len(),type(),Update the year value with 2018 in Python. ii)Write a program in Python to create a Fibonacci series upto 6th term	**An**	**CO5**
(OR)			
17 b)	i)Create a set1 = {"apple", "banana", "cherry", "grapes"}in Python apply checking of "grapes" present in this list or not.Define another set2 = {"apple", 1, 2, 3} join this 2 set .apply intersection_update() on these two set. ii) Create a 2 Matrix(X,Y Given below) in python By using Numpy Library and apply the following operation on It	**An**	**CO5**

	X=([7 ,33] ,[41 ,50]) **Y=([19,23],[62,60])** i)Add 2 matrix ii)multiply 2 matrixes iii)Find the row wise summation for this iv)Find the transpose of matrix 'X'		

CSE11256	**Android Development**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**OOPs concepts**				
Co-requisite	**NIL**				

Course Objectives:

Course Outcomes:

On the completion of this course the student will be able to

CO 1) Understand basic concepts of java programming

CO 2) Explain fundamental topics of android

CO 3) Analyse advanced features of android

CO 4) Implement 2D, 3D graphics and web services with android

CO 5) Build commercial level apps and launch in Google Play Store

Course Description:

Unit-I	**5 Lecture Hours**
Java Basics and overview : Using variables, Flow Control, Arrays and matrices, Working with Strings, Exceptions in Java, Basic OOPs, ArrayList and collections, Enums, Static variables and methods, Basic Threading, Timers, What is UI, Working with SWT, UI Events	
Unit-II:	**10 Lecture Hours**
What is Android- First Android app, How to run and debug applications (Emulator vs. Real device), Android project structure, XML files, Enhancing the first app, Activity, Menus, Intents, Context	
Unit-III:	**10 Lecture**

	Hours
Android Features: intelliJIDEA / Android Studio, Permissions, Working with files, Working with the network, Debugging Android apps, Providing feedback to the user, Vibration, Sounds, Flash, Raw camera usage, Touch gestures	
Unit-IV:	**10Lecture Hours**
Animation and Web Services: Animations, 2D graphics, 3D graphics and OpenGL, Soap and Rest overview, Working with SOAP, Working with Rest	
Unit-V:	**10 Lecture Hours**
Location, Status bar notifications, Localization, Services, Google's external libraries - Google Maps, Monetizing apps, Ads, Publishing and uploading app to Google Play	
Text Books: 1. Android Cookbook – Ian Darwin 2. Head First Android Development: A Brain-Friendly Guide-David Griffiths and Dawn Griffiths Reference Books: 1. The Busy Coder's Guide to Advanced Android Development - Mark Murphy	

Learn and obtain hands-on experience in developing basic and advanced Android apps. The course begins with an overview of required Java programming knowledge. Then we will move on to the world of Android development and create various apps that utilize different capabilities of a modern Android phone, including the usage of vibration, sounds playback and recording, the camera, animations, location, basic 3D graphics, file system, Network operations (UDP/TCP) and more. During the course we will work with the most advanced IDEs including Eclipse and IntelliJIDEA (Android Studio).

Course Content:

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	Understand basic concepts of java programming	PO1, PO3, PO4
CO2	Explain fundamental topics of android	PO1,PO2, PO3, PO4
CO3	Analyse advanced features of android	PO1,PO2, PO3, PO4
CO4	Implement 2D, 3D graphics and web services with android	PO1,PO2, PO3, PO4
CO5	Build commercial level apps and launch in Google Play Store	PO1,PO2, PO3, PO4

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning			
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 11256	Android Development	3	3	3	3	-	-	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech	**Semester:**	VII
Paper Title:	Android Development	**Paper Code:**	CSE 11256
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**46.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **47.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **48.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	What is Absolute URL?	**R**	**CO1**
2	Use of SMTP protocol in Web.	**U**	**CO2**
3	Purpose of Ipv6 is meant for extra Ip-address suggest your answer	**C**	**CO3**
4	What is the significance of HTTP 404 error?	**Ap**	**CO4**
5	What is POP?	**An**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	i)Explain how DNS work? ii)Give a brief usage of recursive DNS server.	**R**	**CO1**
(OR)			
6 b)	i)Explain the role of TCP protocol. ii)Give a brief overview of IPV4 addressing.	**R**	**CO1**
7 a)	What is Un-ordered List in HTML give a example of it.	**U**	**CO2**
(OR)			
7 b)	Explain FTP protocol.	**U**	**CO2**
8 a)	Give a brief analysis of the following HTML tag i) ,ii)<b>,iii) ,iv)<strong>	**Ap**	**CO3**
(OR)			
8 b)	Analyze between HTTP and HTTPS with suitable example.	**C**	**CO3**
9 a)	What is the role of SMTP give brief application of it.	**Ap**	**CO4**
(OR)			
9 b)	What is XML prolog give an example of it.	**Ap**	**CO4**
10 a)	How the browser interacts with server give a brief analysis on it with suitable diagram.	**An**	**CO5**
(OR)			
10 b)	Give a brief usage of this tag i)<dt>,ii)<dd>,iii)<th>,iv)<tr>	**An**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			

<table>
<tr><td>11 a)</td><td>i)Explain Client server model with suitable diagram.
ii)Explain POP3 protocol.</td><td>R</td><td>CO1</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>11 b)</td><td>i)Write down HTML tag for the given table
<table>
<tr><th>Month</th><th>Savings</th></tr>
<tr><td>January</td><td>$100</td></tr>
<tr><td>February</td><td>$80</td></tr>
</table>
ii)what is the use of SPAN tag give a suitable example of it.</td><td>R</td><td>CO1</td></tr>
<tr><td>12 a)</td><td>Give a brief example of JavaScript bit wise AND, OR, NOT operator by taking suitable example.</td><td>U</td><td>CO2</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>12 b)</td><td>Give a brief example of JavaScript Addition, subtraction, Multiplication arithmetic operator by taking suitable example.</td><td>U</td><td>CO2</td></tr>
<tr><td>13 a)</td><td>Write a HTML tag to divide a web page into 3 equal halves by frame tag.</td><td>C</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>13 b)</td><td>Write a short notes in i)TELNET,ii)ARP,iii)RARP,iv)DIV tag</td><td>C</td><td>CO3</td></tr>
<tr><td>14 a)</td><td>Write down HTML code to generate following output given below List

Maharashtra
o Pune
I. Dighi
II. Moshi
III. Shivajinagar
o Mumbai
I. Santakruiz
II. Vikroli
III. Mumbra</td><td>Ap</td><td>CO4</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>14 b)</td><td>State the difference between DIV and SPAN tag in HTML by taking suitable example.</td><td>Ap</td><td>CO4</td></tr>
<tr><td>15 a)</td><td>What is CSS? Give a brief usage of inline CSS by taking suitable example.</td><td>Ap</td><td>CO4</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>15 b)</td><td>Give a brief usage of web server and how is it working.</td><td>Ap</td><td>CO4</td></tr>
<tr><td>16 a)</td><td>Analyze the advantages of Client side Javascript.</td><td>Ap</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>16 b)</td><td>Explain Javascript Boolean and date operator with suitable example.</td><td>Ap</td><td>CO5</td></tr>
<tr><td>17 a)</td><td>What is the advantages of XML.</td><td>An</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>17 b)</td><td>What is XML DTD give a example of it.</td><td>An</td><td>CO5</td></tr>
</table>

CSE11257	**Cyber Security**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Computer Network**				
Co-requisite	**NIL**				

Course Objectives:

1. To understand basics of Cyber Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To understand various protocols for cyber security to protect against the threats in the cyber space.

Course Outcomes:

On the completion of this course the student will be able to

CO1. Define the basics of Cyber security and types of existing malware.
CO2. Understand and identify the cyber security breaches and cyber attacks.
CO3. Explain the preventive measures for cyber fraud
CO4. Examine the basics concept of Social Network Security and Web Security.
CO5. Appraise the recent threats and attacks against the technical world and design some effective prevention scheme.

Course Description:

Effective network communication is an integral part of technical life. Cyber Security and Cryptography is a process of securing the data communication, all the algorithms, messages etc. In this course you will learn the basics of cyber security and how to prevent and detect any sort of cyber attacks. The course begins with a detailed discussion of different types of malware, cyber security breaches and cyber attacks. Throughout the course participants will be exposed to many exciting open problems in the field and work on fun (optional) programming projects. In the course cyber security we will cover more advanced security tasks such as zero-day vulnerability, privacy mechanisms, and other forms of defense against hackers.Course Content:

Course Content:

Unit-I	5 Lecture Hours
Cyber security fundamentals: Definition of cyber space, cyber security, importance of cyber security, hacker, related case studies **Types of malware:** Worm, virus, spyware, Trojan, related case studies	
Unit-II:	**10 Lecture Hours**
Cyber security breaches: Phishing, identity theft, harassment, cyber stalking, related case studies **Types of cyber attacks:** Password attacks, Denial of service attacks, Passive attack, Penetration testing, related case studies	
Unit-III:	**10 Lecture Hours**
Prevention tips: Design a strong password, Two-step verification, Question validity of web-sites, related case studies **Mobile protection:** No credit card numbers, place lock on phone, don't save passwords, related case studies	
Unit-IV:	**10Lecture Hours**
Social network security: Security measures like not revealing location, keeping birth-date hidden, having private profile, not linking accounts, related case study **Prevention software:** Firewalls, Virtual private network, Anti-virus & anti-spyware, Routine updates, related case study	
Unit-V:	**10 Lecture Hours**

Critical cyber threats: Critical cyber threats, cyber terrorism, cyber-warfare, cyber-espionage, **Defense against hackers:** Cryptography, digital forensics, intrusion detection, legal recourse, related course study
Text Books: "Network Security: Private Communication in Public World", Charlie Kaufman, RadiaPerman, Mike Speciner, 2nd Edition, Pearson Education, 2011. **Reference Books:** "Cryptography and Network Security", Atulkahate, TMH, 2003. "Cyber Security", Nina Godbole, WILEY, 2003.

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Define** the basics of Cyber security and types of existing malware.	PO1, PO2,PO12,PO3
CO2	**nderstand** and identify the cyber security breaches and cyber ttacks.	PO2,PO3
CO3	**Explain** the preventive measures for cyber fraud	PO1, PO5,PSO1
CO4	**Examine** the basics concept of Social Network Security and Web Security.	PO1, PO2, PO3,PO12
CO5	**Appraise** the recent threats and attacks against the technical	PO5, PSO3,PO12

	world and design some effective prevention scheme.	

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning			
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 11257	Cyber Security	3	3	3	-	3	-	-	-	-	-	-	**3**			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

ADAMAS UNIVERSITY	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech	**Semester:**	VII
Paper Title:	Cyber Security	**Paper Code:**	CSE 11257
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**49.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **50.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **51.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	What is Cyber Crime? List the types of cybercriminals?	**R**	**CO1**
2	Address the types of services provided by cloud computing.	**U**	**CO2**
3	What is cryptographically generated addresses(CGA)?	**C**	**CO3**
4	Write about Steganography with applications.	**Ap**	**CO4**
5	What are the weak areas of the ITA 2000?	**An**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Discuss the legal perspectives of cyber crime	**R**	**CO1**
(OR)			
6 b)	Who are the Cyber criminals and classify them?	**R**	**CO1**
7 a)	What are the advantages of Cloud Computing?	**U**	**CO2**
(OR)			
7 b)	Define the terms Mobile phone theft, Mishing and Hacking Bluetooth.	**U**	**CO2**
8 a)	Explain the mechanism of how phishing works?	**Ap**	**CO3**
(OR)			
8 b)	What are the physical security countermeasures for laptops?	**C**	**CO3**
9 a)	What are the different types and techniques of Credit Card Frauds?	**Ap**	**CO4**
(OR)			
9 b)	Discuss about the SQL Injection in detail.	**Ap**	**CO4**
10 a)	What is buffer overflow? Discuss how to minimize Buffer Overflow?	**An**	**CO5**
(OR)			
10 b)	Discuss in detail about the Policy standards in information security.	**An**	**CO5**

Group C Answer All the Questions (7 x 5 = 35)			
11 a)	Explain the following terms related to cyber crimes: i) Spamming ii) Salami technique iii) Hacking iv) Password sniffing	**R**	**CO1**
(OR)			
11 b)	Discuss the global perspective on cybercrimes.	**R**	**CO1**
12 a)	What is Cyber Stalking? Explain various types of Stalkers with a case study.	**U**	**CO2**
(OR)			
12 b)	Define Social Engineering? Describe the classification of Social Engineering with examples.	**U**	**CO2**
13 a)	Explain the trends in mobile credit card frauds in wireless computing	**C**	**CO3**
(OR)			
13 b)	Explain about Vishing and Smishing in detail.	**C**	**CO3**
14 a)	Differentiate between computer Virus and Worms with two examples each.	**Ap**	**CO4**
(OR)			
14 b)	Explain about Trojan Horses and Backdoors in detail with examples.	**Ap**	**CO4**
15 a)	What is CSS? Give a brief usage of inline CSS by taking suitable example.	**Ap**	**CO4**
(OR)			
15 b)	Explain in detail the forensic analysis of E-mail.	**Ap**	**CO4**
16 a)	Explain various phases in computer forensics/digital forensics.	**Ap**	**CO5**
(OR)			
16 b)	Discuss in detail about the Botnets.	**Ap**	**CO5**
17 a)	Write a short note on Attack Vector. How it alters the system state?	**An**	**CO5**
(OR)			
17 b)	Discuss cryptographic security for mobile devices.	**An**	**CO5**

CSE11258	Neural Networks and Deep Learning	L	T	P	C
Version 1.0	Contact Hours – 45 Hours	3	0	0	3
Pre-requisite/Exposure	Discrete Mathematics, Calculus, Machine Learning				
Co-requisite	NIL				

Course Objectives:

1. To enable students to analyze different components of a neural network
2. To provide the fundamentals of building problem specific neural networks
3. To enhance the skill of students to manipulate the parameters of deep learning models
4. To allow students to identify challenging areas where deep learning solutions can be implemented

Course Outcomes:

On the completion of this course the student will be able to

CO1: **Understand** the fundamental building blocks neural networks

CO2: **Analyze** the different parameters that controls the performance of neural networks

CO3: **Explain** various types of deep learning techniques

CO4: **Compare** several key deep learning models for different types of problems

CO5: **Develop** deep learning models by using state-of-the-art tools.

Course Description:

This course requires minimal knowledge in discrete mathematics, differential calculus and basic machine learning. The course starts from single node neurons to multi-layered neural networks. While discussing all relevant challenges in this field, deep learning techniques are introduced. Most advanced features of deep learning techniques have been discussed; A broad array of deep learning models have been analysed to aid in problem specific model design. Finally, with the help of modern deep learning tools such as Tensorflow, Keras and Pytorch, students are prepared to tackle challenging problems in the field of computer vision, natural language processing, sequence analysis and so on.

Course Content:

Unit-I	**9 Lecture Hours**
Introduction: Evolution of machine learning techniques, history of neural learning systems, linear and logistic regression, decision boundaries. **Neural Network Architecture:** Biological vs artificial neuron, perceptron, XOR problem, stochastic gradient descent, weights and biases, activation functions, non-linearity, multi-layered perceptron	
Unit-II	**9 Lecture Hours**
Controlling the Neural Network: Restricted Boltzmann machines, backpropagation, learning rate, momentum, adaptive learning rates, regularization, hyper-parameter management, ensemble techniques. **Neural Network Models**: Hopfield neural networks, recurrent neural networks, Self-organizing feature maps, auto-encoders.	
Unit-III	**9 Lecture Hours**
Deep Learning Techniques: Vanishing gradients, deep belief networks, long short-term memory, representation learning, convolutional neural networks, Subsampling, rectified-linear units, deep convolutional auto-encoders, layer-wise training, auxiliary classifiers, residual connections, adversarial learning.	
Unit-IV	**9 Lecture Hours**
Deep Learning Models: Classification: LeNet-5, AlexNet, VGG-Net, GoogLeNet, ResNet, DenseNet, MobileNet. Detection: R-CNN, YOLO Segmentation: Seg-Net, U-Net, SegFast Sequential Learning: LSTM, GRU	

Generative Learning: Variational auto-encoder, GAN, Conditional GAN	
Unit-V	**9 Lecture Hours**
Deep Learning Tools: PyTorch: Installation, Tensors, autograd, modules, dataset and dataloader, Training and Testing TensorFlow: Installation, Loading dataset, Model, Training, Testing	
Text Books: 4. Neural Networks and Learning Machines - Simon Haykin – Pearson Prentice Hall 5. Deep Learning – Ian Goodfellow, Yoshua Bengio, Aaron Courville – MIT Press **Reference Books:** **5.** Deep Learning with PyTorch: A 60 Minute Blitz **6.** TensorFlow 2 quickstart for beginners	

Modes of Evaluation: Quiz/Assignment/Presentation/Extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the fundamental building blocks neural networks	PO1, PO2,
CO2	**Analyze** the different parameters that controls the performance of neural networks	PO2, PO3, PO4,
CO3	**Explain** various types of deep learning techniques	PO1, PO2, PO4,
CO4	**Compare** several key deep learning models for different types of problems	PO2, PO3, PO4, PO5, PO6,
CO5	**Develop** deep learning models by using state-of-the-art tools.	PO3, PO5,

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning			
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 11258	Neural Networks and Deep Learning	2	3	2	3	2	1	-	-	-	-	-	-			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	CSE11259	**Semester:**	II
Paper Title:	Neural Networks and Deep Learning	**Paper Code:**	CSE11258
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**1.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **2.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **3.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

	Group A **Answer All the Questions (5 x 1 = 5)**		
1	Why does a haptic display require a high sampling rate?	**R**	**CO1**
2	What is the importance of Surface Contact Point (SCP)?	**U**	**CO2**
3	What are the factors responsible for perception of size in human vision?	**C**	**CO3**
4	Why does the left arrow in the adjoining figure generally appear to be shorter than the right one?	**Ap**	**CO4**
5	What are the main differences between coding schemes used for music system and for telephony / conferencing?	**An**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	What are the factors resposible for perception of size in human vision?	**R**	**CO1**
	(OR)		
6 b)	i)Explain the role of TCP protocol. ii)Give a brief overview of IPV4 addressing.	**R**	**CO1**
7 a)	What is Un-ordered List in HTML give a example of it.	**U**	**CO2**
	(OR)		
7 b)	Explain FTP protocol.	**U**	**CO2**
8 a)	Give a brief analysis of the following HTML tag i) ,ii)<b>,iii) ,iv)<strong>	**Ap**	**CO3**
	(OR)		
8 b)	Analyze between HTTP and HTTPS with suitable example.	**C**	**CO3**
9 a)	What is the role of SMTP give brief application of it.	**Ap**	**CO4**
	(OR)		
9 b)	What is XML prolog give an example of it.	**Ap**	**CO4**
10 a)	How the browser interacts with server give a brief analysis on it with suitable diagram.	**An**	**CO5**
	(OR)		
10 b)	Give a brief usage of this tag i)<dt>,ii)<dd>,iii)<th>,iv)<tr>	**An**	**CO5**
	Group C **Answer All the Questions (7 x 5 = 35)**		

11 a)	i)Explain Client server model with suitable diagram. ii)Explain POP3 protocol.	**R**	**CO1**
(OR)			
11 b)	What is Error Analysis?	**R**	**CO1**
12 a)	Give a brief example of JavaScript bit wise AND, OR, NOT operator by taking suitable example.	**U**	**CO2**
(OR)			
12 b)	Give a brief example of JavaScript Addition, subtraction, Multiplication arithmetic operator by taking suitable example.	**U**	**CO2**
13 a)	Write a HTML tag to divide a web page into 3 equal halves by frame tag.	**C**	**CO3**
(OR)			
13 b)	Discuss the application of second-order methods to the training of deep networks.	**C**	**CO3**
14 a)	Write an early stopping meta-algorithm for determining the best amount of time to train.	**Ap**	**CO4**
(OR)			
14 b)	Explain in detail about the concept of gradient based learning.	**Ap**	**CO4**
15 a)	Give an example of learning XOR function to explain a fully functioning feed forward network.	**Ap**	**CO4**
(OR)			
15 b)	Give the Architecture of kohenen self-organizing and explain how it is used cluster the input vectors.	**Ap**	**CO4**
16 a)	List and explain the various activation functions used in modeling of artificial neuron. Also explain their suitability with respect to applications.	**Ap**	**CO5**
(OR)			
16 b)	Describe the Characteristics of Continuous Hopfield memory and discuss how it can be used to solve Traveling salesman Problem.	**Ap**	**CO5**
17 a)	Assume that a person is driving a car, while listening to music. The car's driver assistance system detects a pedestrian ahead on the road and estimates that the driver needs to apply his brakes within 10-15 ms to avoid an accident. Which of the following alarms will be most effective in this case? 1. Audio alarm, e.g. beeps from the speakers. 2. Visual alarm, e.g. flashing light on the panel. 3. Vibro-tactile alarm, e.g. a vibration on the seat.	**An**	**CO5**
(OR)			
17 b)	Explain the architecture and algorithm of full CPN with diagram.	**An**	**CO5**

		L	T	P	C
CSE11259	**Web Technology**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Browser compatibility knowledge /HTML**				
Co-requisites	**--**				

1. To help the pupils to develop an understanding of client /server model.
2. To enable students a precise understanding of web protocol.
3. To give the students a perspective of web design language for designing a web site.
4. To enable students design a structure of web page model for any organization.

Course Outcomes:

On completion of this course, the students will be able to

CO1. **Understanding** of E- Mail, Telnet, FTP, E-Commerce, Video Conferencing, E- Business.
CO2. **Formalize** HTML Tag Reference, Global Attributes, Event Handlers, Document Structure.
CO3. **Classify** a detailed analysis of form, frame and CSS in HTML.
CO4. **Demonstrate** effectively a web page with HTML/JavaScript/XML style.
CO5. **Create** rich internet application using XML

Course Description:

The methods by which computers communicate with each other through the use of markup languages and multimedia packages is known as web technology. In the past few decades, web technology has undergone a dramatic transition, from a few marked-up web pages to the ability to do very specific work on a network without interruption. Let's look at some examples of web technology. Being a web developer gives you the power to create new cool things. If you can imagine it you can build it (or kind of). You don't need any kind of material - just your knowledge about web development.

Course Content:

Unit-I	**08 Lecture Hours**
Unit Heading: Internet And WWW: Introduction, E- Mail, Telnet, FTP, E-Commerce, Video Conferencing, E-Business. Internet Service Providers, Domain Name Server, Internet Address, World Wide Web (WWW): World Wide Web And Its Evolution, Uniform Resource Locator (URL), Browsers - Internet Explorer, Netscape Navigator, Opera, Firefox, Chrome, Mozilla. Search Engine, Web Server - Apache, IIS, Proxy Server, HTTP Protocol. Case Study of E-Business website like (Myntra,Jabong,Amazon)	
Unit-II	**12 Lecture Hours**
Unit Heading: HTML And Graphics: HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level Formatting, Block Level Formatting, List Tags, Hyperlink Tags, Image And Image Maps, Table Tags, Form Tags, Frame Tags, Executable Content Tags. **Imagemaps:** Introduction, Client-Side Imagemaps, Server-Side Imagemaps, Using Server-Side	

And Client-Side Imagempas Together, Alternative Text For Imagemaps, Tables : Introduction To HTML Tables And Their Structure, The Table Tags, Alignment, Aligning Entire Table, Alignment Within A Row, Alignment Within A Cell, Attributes, Content Summary, Background Colour, Adding A Caption, Setting The Width, Adding A Border, Spacing Within A Cell, Spacing Between The Cells, Spanning Multiple Rows Or Columns, Elements That Can Be Placed In A Table, Table Sections And Column Properties, Tables As A Design Tool.

Frames: Introduction To Frames, Applications, Frames Document, The Tag, Nesting Tag, Placing Content In Frames With The Tag, Targeting Named Frames, Creating Floating Frames, Using Hidden Frames, Frame analysis in Online Job portal.

Forms: Creating Forms, The <FORM>Tag, Named Input Fields, The <INPUT> Tag, Multiple Lines Text Windows, Drop Down And List Boxes, Hidden Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms And Scripting, Action Buttons, Labelling Input Files, Grouping Related Fields, Disabled And Read-Only Fields, Form Field Event Handlers Passing

Form Data Style Sheets: Introduction, Different Approaches To Style Sheets, Using Multiple Approaches, Linking To Style Information In Separate File, Setting Up Style Information, Using The <LINK>Tag, Embedded Style Information, Using <STYLE> Tag, Inline Style Information. Real life case study analysis of E-Ticket booking, with suitable linking of travel destination.

Unit-III	**08 Lecture Hours**

Unit Heading: **Java Script:** Introduction, Client-Side Javascript, Server-Side Javascript, Javascript Objects, Javascript Security.

Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short.

Java Script: Introduction, Client-Side Javascript, Server-Side Javascript, Javascript Objects, Javascript Security.

Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional Operator), ,(Comma Operator), Delete, New, This, Void

Statements: Break, Comment, Continue, Delete, Do … While, Export, For, For…In, Function, If…Else, Import, Labelled, Return, Switch, Var, While, With,

Core Javascript: Array, Boolean, Date, Function, Math, Number, Object, String, Regexp

Document And Its Associated Objects: Document, Link, Area, Anchor, Image, Applet, Layer

Events And Event Handlers: General Information About Events, Defining Event Handlers: Onabort, Onblur, Onchange, Onclick, Ondblclick, Ondragdrop, Onerror, Onfocus, Onkeydown, Onkeypress, Onkeyup, Onload, Onmousedown, Onmousemove, Onmouseout, Onmouseover, Onmouseup, Onmove, Onreset, Onresize, Onselect, Onsubmit, Onunload,Case study analysis of

E-commerce website in transaction processing of client order	
Unit-IV	**10 Lecture Hours**
Unit Heading: Introduction Client-Side JavaScript, Server-Side Javascript, Javascript Objects, Javascript Security. **Operators:** Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional Operator), ,(Comma Operator), Delete, New, This, Void **Statements:** Break, Comment, Continue, Delete, Do … While, Export, For, For…In, Function, If…Else, Import, Labelled, Return, Switch, Var, While, With, **Core Javascript:** Array, Boolean, Date, Function, Math, Number, Object, String, Regexp **Document And Its Associated Objects:**Document, Link, Area, Anchor, Image, Applet, Layer	
Unit-V	**07 Lecture Hours**
Unit Heading: XML: Introduction, Anatomy, Document, Creating XML Documents, Creating XML Dtds, XML Schemas, XSL, Mapping of XML ontology for a web site. **PHP:** Introduction, Server-Side Web Scripting, Installing PHP, Adding PHP To HTML, Syntax And Variables, Passing Information Between Pages, Strings, Arrays And Array Functions, Numbers, Basic PHP Errors / Problems	
Text Books: **1. "Web Design The Complete Reference", Thomas Powell, Tata Mcgrawhill** **2. HTML And XHTML The Complete Reference", Thomas Powell,Pearson education.**	

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Internal Assessment	ETE
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understanding** of E- Mail, Telnet, FTP, E-Commerce, Video Conferencing, E-Business	**PO1,PO2,PO8,PO12,**
CO2	**Formalize** HTML Tag Reference, Global Attributes, Event Handlers, Document Structure	**PO1,PO2,PO8,PO12,**

CO3	**Classify** a detailed analysis of form, frame and CSS in HTML	**PO1,PO2,PO4,PO12,**
CO4	**Demonstrate** effectively a web page with HTML/JavaScript/XML style**.**	**PO3,PO4,PO8,PO12,**
CO5	**Create** rich internet application using XML	**PO3,PO5,PO8,PO12,**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship			
Course Code	Cours e Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO 12	PS O1	PSO 2	PSO 3
CSE1125 9	Web Techn ology	3	3	2	2	1	-	-	2	-	-	-	3			

1 = Weakly Mapped
2 = Moderately Mapped
3 = Strongly Mapped

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	CSE11259	**Semester:**	VII
Paper Title:	Web Technology	**Paper Code:**	CSE11259
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	**4.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **5.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **6.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	What is Absolute URL?	**R**	**CO1**
2	Use of SMTP protocol in Web.	**U**	**CO2**
3	Purpose of Ipv6 is meant for extra Ip-address suggest your answer	**C**	**CO3**
4	What is the significance of HTTP 404 error?	**Ap**	**CO4**
5	What is POP?	**An**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	i)Explain how DNS work? ii)Give a brief usage of recursive DNS server.	**R**	**CO1**
(OR)			
6 b)	i)Explain the role of TCP protocol. ii)Give a brief overview of IPV4 addressing.	**R**	**CO1**
7 a)	What is Un-ordered List in HTML give a example of it.	**U**	**CO2**
(OR)			
7 b)	Explain FTP protocol.	**U**	**CO2**
8 a)	Give a brief analysis of the following HTML tag i) ,ii)<b>,iii) ,iv)<strong>	**Ap**	**CO3**
(OR)			
8 b)	Analyze between HTTP and HTTPS with suitable example.	**C**	**CO3**
9 a)	What is the role of SMTP give brief application of it.	**Ap**	**CO4**
(OR)			
9 b)	What is XML prolog give an example of it.	**Ap**	**CO4**
10 a)	How the browser interacts with server give a brief analysis on it with suitable diagram.	**An**	**CO5**
(OR)			
10 b)	Give a brief usage of this tag i)<dt>,ii)<dd>,iii)<th>,iv)<tr>	**An**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	i)Explain Client server model with suitable diagram. ii)Explain POP3 protocol.	**R**	**CO1**

<table>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>11 b)</td><td>i)Write down HTML tag for the given table
<table><tr><th>Month</th><th>Savings</th></tr><tr><td>January</td><td>$100</td></tr><tr><td>February</td><td>$80</td></tr></table>
ii)what is the use of SPAN tag give a suitable example of it.</td><td>R</td><td>CO1</td></tr>
<tr><td>12 a)</td><td>Give a brief example of JavaScript bit wise AND, OR, NOT operator by taking suitable example.</td><td>U</td><td>CO2</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>12 b)</td><td>Give a brief example of JavaScript Addition, subtraction, Multiplication arithmetic operator by taking suitable example.</td><td>U</td><td>CO2</td></tr>
<tr><td>13 a)</td><td>Write a HTML tag to divide a web page into 3 equal halves by frame tag.</td><td>C</td><td>CO3</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>13 b)</td><td>Write a short notes in i)TELNET,ii)ARP,iii)RARP,iv)DIV tag</td><td>C</td><td>CO3</td></tr>
<tr><td>14 a)</td><td>Write down HTML code to generate following output given below List

Maharashtra
o Pune
I. Dighi
II. Moshi
III. Shivajinagar
o Mumbai
I. Santakruiz
II. Vikroli
III. Mumbra</td><td>Ap</td><td>CO4</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>14 b)</td><td>State the difference between DIV and SPAN tag in HTML by taking suitable example.</td><td>Ap</td><td>CO4</td></tr>
<tr><td>15 a)</td><td>What is CSS? Give a brief usage of inline CSS by taking suitable example.</td><td>Ap</td><td>CO4</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>15 b)</td><td>Give a brief usage of web server and how is it working.</td><td>Ap</td><td>CO4</td></tr>
<tr><td>16 a)</td><td>Analyze the advantages of Client side Javascript.</td><td>Ap</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>16 b)</td><td>Explain Javascript Boolean and date operator with suitable example.</td><td>Ap</td><td>CO5</td></tr>
<tr><td>17 a)</td><td>What is the advantages of XML.</td><td>An</td><td>CO5</td></tr>
<tr><td colspan="4">(OR)</td></tr>
<tr><td>17 b)</td><td>What is XML DTD give a example of it.</td><td>An</td><td>CO5</td></tr>
</table>

ECE12043	**Application of IOT Lab**	L	T	P	C
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	Basic IOT				
Co-requisites	---				

Course Objectives

1. Students will understand basics concept application of IOT Lab
2. Students will learn the application of Sensors
3. Students will learn the working principle of different sensors and actuators.
4. Students will learn about the various application of sensors in IOT Devices.
5. Students will think about different real-life problems associated with IOT.
6.

Course Outcomes

On completion of this course, the students will be able to

CO1: develop arduino programming for problem solving
CO2: develop arduino programming with LED, button and switch
CO3: interpret analog and digital communications with arduino
CO4: develop arduino programming for connecting sensors and actuators to control the applications

Catalog Description

The Lab course is an application of IOT at the system, subsystem, and component level. Students will gain hands-on experience assembling and testing IoT devices to achieve node to client communication, node to node communication, and peer to cloud communication. The student enrolled in the course are expected to have knowledge of electric circuits and electronics, as well as have programming skills in higher-level languages such as C/C++. The laboratory experiments and project activities are designed to make the student assemble the hardware components on a breadboard or use wires to interface the components directly to the pins of the microcontroller or IoT device.

Course Content

List of experiments:

1. Introduction of Arduino IDE

2. Write an arduino program to demonstrate setup () and loop () functions

3. Write an arduino program to demonstrate serial and serial.begin() statements

4. Write an arduino program to demonstrate serial.print() statement

5. Write an arduino program to demonstrate serial.available() statement

6. Write an arduino program to demonstrate serial.read() and serial.write() statements

7. Write an arduino program to demonstrate serial.analogRead() function

8. Write an arduino program to demonstrate user defined functions

9. Write an arduino program for interfacing with infrared and ultrasonic sensor

10. Write an arduino program for interfacing with accelerometer

11. Write an arduino program for interfacing with PWM

Text Books:

Laboratory Manual: [1] Fundamentals of Internet of Things Laboratory Manual, Dept. of CSE(IoT), KITSW

Reference Books:

[1] Brian Evans, Beginning Arduino Programming, New York: Apress, 2011. [2] Cornel Amariei, Arduino Development Cook Book,Birmingham: Packt Publishing Ltd., 2015.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Develop arduino programming for problem solving	**PO1, PSO1, PSO2**
CO2	Develop arduino programming with LED, button and switch	**PO1, PO2, PO3, PO4, PSO1, PSO2**
CO3	Interpret analog and digital communications with arduino	**PO1, PO2, PO3, PSO1, PSO2**
CO4	Develop arduino programming for connecting sensors and actuators to control the	**PO3, PO4, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to	An ability to develop their problem-solving skills and assess social, environmental
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE12043	**Application of IOT Lab**	3	3	3	3									3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	ADAMAS UNIVERSITY PURSUE EXCELLENCE

Name of the Program: B. Tech
Stream: ECE
PAPER TITLE: Application of IOT Lab
Maximum Marks: 50
Total No of questions: 10

Semester: VII

PAPER CODE: ECE12043
Time duration: 3 Hours
Total No of Pages: 01

Section A (Answer any one Question)

1.	Write an arduino program to demonstrate if statements	**U**	**CO1**
2	Write an arduino program to demonstrate switch case	**U**	**CO1**
3	Write an arduino program to demonstrate loops	**R**	**CO3**
4	Write an arduino program to demonstrate arrays	**R**	**CO4**
5	Write an arduino program to demonstrate serial.read() and serial.write() statements	**U**	**CO4**
6	Write an arduino program to demonstrate data types.	**U**	**CO5**
7	Write an arduino program to demonstrate variables	**U**	**CO5**
8	Write an arduino program to demonstrate constants	**Ap**	**CO2**
9	Write an arduino program to demonstrate operators	**Ap**	**CO2**
10	Write an arduino program to demonstrate serial.analogRead() function	**Ap**	**CO5**

ECE12044	**Introduction to Artificial Intelligence Lab**	L	T	P	C
Version 1.0	**Contact Hours - 45**	0	0	2	2
Pre-requisites/Exposure	Basic knowledge in Probability and Linear Algebra				
Co-requisites	-----				

Course Objectives

1. Develop proficiency in Python programming by implementing various algorithms and problem-solving techniques.
2. Gain a comprehensive understanding of fundamental search algorithms like Breadth First Search (BFS) and Depth First Search (DFS) through hands-on implementation.
3. Apply algorithmic problem-solving skills to solve classic puzzles and optimization problems, fostering critical thinking and analytical reasoning abilities.

Course Outcomes

On completion of this course, the students will be able to

CO1: Implement various search algorithms, including BFS, DFS, Hill Climbing, and A*, to solve diverse problem scenarios.
CO2: Develop Python programs to solve classic puzzles and optimization challenges such as the 8-puzzle, water-jug problem, traveling salesman problem, and Tower of Hanoi.
CO3: Analyze and evaluate algorithmic approaches for problem-solving, assessing their efficacy, scalability, and computational efficiency.
CO4: Design and apply heuristic search algorithms and metaheuristic techniques to optimize solutions for complex problems effectively.

Catalog Description:

This lab series provides hands-on experience in implementing various algorithms and problem-solving techniques using Python. Students will learn to develop and analyze Breadth First Search (BFS) and Depth First Search (DFS) algorithms, along with tackling classic problems such as Tic-Tac-Toe, the 8-Puzzle, and the Travelling Salesman Problem. Through practical exercises, participants will gain proficiency in Python programming while mastering algorithms like the Water-Jug problem, Tower of Hanoi, and Monkey Banana problem. Additionally, they will explore advanced problem-solving methods, including solving the Missionaries-Cannibals Problem, the 8-Queens Problem, and implementing heuristic search algorithms like Hill Climbing and A* search.

Course Content

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1. Implement Breadth First Search (BFS) algorithm in Python.

2. Implement Depth First Search (DFS) algorithm in Python.
3. Develop a Tic-Tac-Toe game using Python.
4. Solve the 8-Puzzle problem using Python.
5. Implement the Water-Jug problem using Python.
6. Solve the Travelling Salesman Problem using Python.
7. Implement the Tower of Hanoi problem using Python.
8. Solve the Monkey Banana Problem using Python.
9. Implement the Missionaries-Cannibals Problem using Python.
10. Solve the 8-Queens Problem using Python.
11. Implement the Hill Climbing Algorithm using Python.
12. Implement the A* Algorithm using Python.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Implement** various search algorithms, including BFS, DFS, Hill Climbing, and A*, to solve diverse problem scenarios.	**PO5**
CO2	**Develop** Python programs to solve classic puzzles and optimization challenges such as the 8-puzzle, water-jug problem, traveling salesman problem, and Tower of Hanoi.	**PO2**
CO3	**Analyze and evaluate** algorithmic approaches for problem-solving, assessing their efficacy, scalability, and computational efficiency.	**PO3**
CO4	**Design and apply** heuristic search algorithms and metaheuristic techniques to optimize solutions for complex problems effectively.	**PO4**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE12 044	Intro-duction to Artificial Inte-lligence Lab		3	3	3	3				2				3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

		L	T	P	C
ECE12045	**Advanced Communication Lab**				
Version 1.0	**Contact Hours – 45**	0	0	3	2
Pre-requisites/Exposure	Communication I, Communication -II				
Co-requisites	---				

Course Objectives

1. Understand the working principle of optical sources, detector, fibers
2. Develop understanding of simple optical communication link
3. Understand the measurement of BER, Pulse broadening
4. Understand and capture an experimental approach to digital wireless communication
5. Understand actual communication waveforms that will be sent and received across wireless channel

Course Outcomes

On completion of this course, the students will be able to

CO1: Analyze the performance of simple optical link by measurement of losses and Analyzing the mode characteristics of fiber
CO2: Analyze the Eye Pattern, Pulse broadening of optical fiber and the impact on BER
CO3: Estimate the Wireless Channel Characteristics and Analyze the performance of Wireless Communication System
CO4: Understand the intricacies in Microwave System design

Catalog Description

The Advanced Communication System Laboratory covers design and verification of the concepts of modern communication systems that operates in MHz-THz range. The main focus of the Advanced Communication System (ACS) Laboratory is to design next-generation wireless technologies and mobile computing systems. In particular, ACS Laboratory conducts research in the broad area of communication theory, wireless communications and networks, with focus on the physical layer and optical communication systems – Optical fiber based and integrated photonic waveguides based.

Course Content:
List of experiments:

1. Measurement of connector, bending and fiber attenuation losses.
2. Numerical Aperture and Mode Characteristics of Fibers.
3. DC Characteristics of LED and PIN Photo diode.
4. Fiber optic Analog and Digital Link Characterization – frequency response(analog), eye diagram and BER (digital)
5. Wireless Channel Simulation including fading and Doppler effects
6. Simulation of Channel Estimation, Synchronization and Equalization techniques
7. Analysing Impact of Pulse Shaping and Matched Filtering using Software Defined Radios
8. OFDM Signal Transmission and Reception using Software Defined Radios

9. VSWR and Impedance Measurement and Impedance Matching
10. Characterization of Directional Couplers, Isolators, Circulators
11. Gunn Diode Characteristics
12. Microwave IC – Filter Characteristics

Text Books:

1. "Wireless Networks, Applications and Protocols", by T.S. Rappaport, Pearson Education
2. "Modern Digital and Analog Communication Systems", by B.P. Lathi and Zhi Ding, 4th Edition,
Oxford University Press, 2009.
3. Communication Systems, 4th ed. – A. Bruce Carlson, Paul B. Crilly, Janet C. Rutledge, MGH International edition.
4. Digital Communications, 2nd ed. – Bernard Sklar, Pearson Education.
5. Electronic Communications, 4th ed. – Dennis Roddy, John Coolen, PHI

Reference Books:
1. "Cognitive Radio Communications and Networks Principles and Practice" by A M. Wyglinski,M.N. Nekovee, and Y. T. Hou, Academic Press

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Analyze the performance of simple optical link by measurement of losses and Analyzing the mode characteristics of fiber	**PO1, PSO1, PSO2**
CO2	Analyze the Eye Pattern, Pulse broadening of optical fiber and the impact on BER	**PO1, PO2, PO3, PO4, PSO1, PSO2**
CO3	Estimate the Wireless Channel Characteristics and Analyze the performance of Wireless Communication System	**PO1, PO2, PO3, PSO1, PSO2**
CO4	Understand the intricacies in Microwave System design	**PO3, PO4, PSO1, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and	An ability to develop their problem-solving skills and assess social,
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE12045	**Advanced Communication Lab**	3	3	3	3									3	3

1=weakly mapped
2= moderately mapped
3=strongly mapped

ECE14040	**Summer Internship**	L	T	P	C
Version 1.0		0	0	0	2
Pre-requisites/Exposure	knowledge of the course subjects				
Co-requisites					

Course Objectives

1. To prepare graduates with a broad knowledge of Electronics engineering technology practices applicable to many different industry types.
2. To prepare graduates with key knowledge and skills in applied design, analysis, manufacture, test, and assembly of Electronics systems.
3. To prepare graduates to be productive contributors in professional practice, graduate school, or some other career path.
4. To prepare graduates who know how to act in a professional manner, can continue to learn, and are capable of adapting to a continuously changing work environment.
5. To prepare graduates who can communicate effectively and who can contribute as members of a team.

Course Outcomes

On completion of this course, the students will be able to

CO1**. Explain** the operation of the industrial facility in which the student worked
CO2. **Illustrate** problem solving by analyzing modern tools and devices
CO3. **Apply** existing engineering knowledge in similar or new situations
CO4. **Identify** when new engineering knowledge is required
CO5. **Illustrate** lifelong learning processes through critical reflection of internship experiences

Catalog Description

Through Internship students realize the importance of Professionalism in the workplace; that is, career development of him and his colleagues, remaining competent, working well with others, etc. Students realize the benefits of continuous learning, both formally and informally, throughout his career. Also, realize the need of continuously adapting his career to a "changing" workplace, and of staying current and competent throughout his career.

Course Content

The course involves compulsory training in an industrial environment for a specified duration. The course offers to connect the theoretical aspects and the laboratory scale learning with the industrial practices. Performance of the students is evaluated based on his/her submission of a certificate from the training organization followed by a seminar/viva-voce and report submission.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Attendance	Internal Assessment	MTE	ETE
Weightage (%)	**-**	**50**	**-**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** the operation of the industrial facility in which the student worked	**PO6, PO12**
CO2	**Illustrate** problem solving by analyzing modern tools and devices	**PO2, PSO2**
CO3	**Apply** existing engineering knowledge in similar or new situations	**PO4,PO6,PSO2**
CO4	**Identify** when new engineering knowledge is required	**PO2, PO6**
CO5	**Illustrate** lifelong learning processes through critical reflection of internship experiences	**PO4, PO6, PO12,PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE14040	Summer Internship		2		2		3						2		2

1=weakly mapped
2= moderately mapped
3=strongly mapped

ECE14041	**Minor Project**	L	T	P	C
Version 1.0	**Contact Hours-90**	0	0	6	3
Pre-requisites/Exposure	Basic idea of the required subjects				
Co-requisites					

Course Objectives

1. To be able to apply some of the techniques/principles have been taught
2. To carry out budget and time planning for the project.
3. To inculcate electronic hardware implementation skills by learning PCB artwork design using an appropriate EDA tool.
4. To follow correct grounding and shielding practices
5. To do effective trouble-shooting of the minor project.
6. To develop effective communication skill by delivering a seminar based on mini project**.**

Course Outcomes

On completion of this course, the students will be able to

CO1**. Find** a real world problem
CO2. **Utilize** the modern tools to solve the problems
CO3. **Utilize** a group to promote team spirit and leadership quality among the students
CO4. **Appraise** a projects involving both technological aspects and finance
CO5. **Identify** newer areas of in depth study and research and lifelong learning

Catalog Description

The course encourages students to take project works that are based on current trends and technologies in various subjects, which will augment the theory subjects. The students will form a group to do their project work. This teaming is to encourage team spirit and to insist the importance of team work. The students typically undergo group formation, finalization of area of work, testing, generation and verification of results, and possible research publication procedure.

Course Content

The Evaluation of the project work are to be carried out in the following way:

1. In-depth study of a topic proposed by the supervisor
2. Continuous Evaluation through guide.
3. An open pre-submission seminar by the student.
4. End-semester University Examination (An open seminar followed by a Viva voce)

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Find** a real world problem	**PO1, PO2, PO12, PSO1, PSO2**
CO2	**Utilize** the modern tools to solve the problems	**PO1, PO2, PO11, PSO1**
CO3	**Utilize** a group to promote team spirit and leadership quality among the students	**PO11**
CO4	**Appraise** a projects involving both technological aspects and finance	**PO1, PO11**
CO5	**Identify** newer areas of in depth study and research and lifelong learning	**PO4, PO12, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
ECE14041	Minor Project	3	2									3	2	2	2

1=weakly mapped
2= moderately mapped
3=strongly mapped

		L	T	P	C
ECE14044	**Major Project**	L	T	P	C
Version 1.0	**Contact Hours-90**	0	0	6	4
Pre-requisites/Exposure	Basic idea of the required subjects				
Co-requisites					

Course Objectives

1. To provide a student the opportunities to apply and integrate his/her knowledge acquired throughout the undergraduate study.
2. To develop the capabilities of a student in analyzing and solving complex and possibly real-case problems.
3. To train students with skills on systematic development and documentation of a significant piece of work.

Course Outcomes

On completion of this course, the students will be able to

CO1**. Find** a real world problem
CO2. **Utilize** the modern tools to solve the problems
CO3. **Utilize** a group to promote team spirit and leadership quality among the students
CO4. **Appraise** a project involving both technological aspects and finance
CO5. **Identify** newer areas of in depth study and research and lifelong learning

Catalog Description

The course encourages students to take project works that are based on current trends and technologies in various subjects, which will augment the theory subjects. The students will form a group to do their project work. This teaming is to encourage team spirit and to insist the importance of team work. The students typically undergo group formation, finalization of area of work, testing, generation and verification of results, and possible research publication procedure.

Course Content

The Evaluation of the project work are to be carried out in the following way:
1. In-depth study of a topic proposed by the supervisor
2. Continuous Evaluation through guide.
3. An open pre-submission seminar by the student.
4. End-semester University Examination (An open seminar followed by a Viva voce)

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	**Class Assessment**	**End Term**
Weightage (%)	**50**	**50**

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Find** a real world problem	**PO2,PO3,PO11, PO12, PSO1**
CO2	**Utilize** the modern tools to solve the problems	**PO2, PO3, PSO1, PSO2**
CO3	**Utilize** a group to promote team spirit and leadership quality among the students	**PO11**
CO4	**Appraise** a project involving both technological aspects and finance	**PO3, PO11**
CO5	**Identify** newer areas of in depth study and research and lifelong learning	**PO11, PO12, PSO2**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE14044	Major Project		2	3								3	2	2	2

1=weakly mapped
2= moderately mapped
3=strongly mapped

ECE15045	Comprehensive Viva Voice	L	T	P	C
Version 1.0		0	0	0	2
Pre-requisites/Exposure	knowledge of the course subjects				
Co-requisites					

Course Objectives

The objective of comprehensive viva-voce is to assess the overall knowledge of the student in the relevant field of Engineering acquired over 4 years of study in the undergraduate program.

Course Outcomes

On completion of this course, the students will be able to

CO1. **Recall**, recognize, and visualize the aspects of electronics and communication engineering and the interaction among them.
CO2. **Illustrate**, demonstrate, criticize and appraise the aspects of electronics and communication engineering

Catalog Description

The viva shall normally cover the subjects taught in all the semesters of B.Tech Program.

Course Content

Every student will be required to undergo comprehensive vivavoce at the end of 8th semester of B.Tech Programme. The duration of the viva will range from 15-30 min. The examination committee will be constituted by the HoD and consist of at least three faculty.

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination
Examination Scheme:

Components	Attendance	Internal Assessment	MTE	ETE
Weightage (%)	-	-	-	100

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Recall**, recognize, and visualize the aspects of electronics and communication engineering and the interaction among them.	**PO1,PSO1**
CO2	**Illustrate**, demonstrate, criticize and appraise the aspects of electronics and communication engineering	**PO1,PSO1**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	An ability to apply analytical knowledge, and modern hardware and software tools to design and implement complex systems in the areas related to Electronics and Communication systems	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECE15045	Comprehensive Viva Voice	3												3	

1=weakly mapped
2= moderately mapped
3=strongly mapped