ADAMAS UNIVERSITY

PURSUE EXCELLENCE

KOLKATA

ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of Electrical and Electronics Engineering

B.Tech (Electrical Engineering)

Course Structure and Syllabus

(2024-25)

ADAMAS UNIVERSITY, KOLKATA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS 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 / SOET

ADAMAS UNIVERSITY, KOLKATA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION OF THE DEPARTMENT

To impart quality technical education in Electrical Engineering at par with premier institutions towards excellence in domain knowledge and meet societal demands with credibility, integrity and ethics.

MISSION STATEMENTS OF THE DEPARTMENT

M.S 01: To impart quality knowledge through efficient and dedicated faculty members.

M.S 02: To steer the students to become future leaders in Electrical Engineering with broader knowledge base.

M.S 03: To become a major support system for the society with their knowledge base and dedication.

M.S 04: To inculcate professional ethics and make socially responsible engineers.

Majumder.

HoD, EEE **DEAN / SOET**

ADAMAS UNIVERSITY,

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Name of the Programme: B.Tech (Electrical Engineering)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO1: Engage in analysis and design of various power system components and their applications in the field of Electrical Engineering.

PEO2: Apply the domain knowledge of Electrical Engineering to solve problems for development of society, and/ or pursue higher education and research.

PEO3: Engage in lifelong learning and adapt to changing professional and societal needs.

Majumder.

HoD, EEE

DEAN / SOET

ADAMAS UNIVERSITY, KOLKATA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Name of the Programme: B.Tech (Electrical Engineering)

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, review research literature, and analyse 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 activities with an understanding of the limitations.

PO6: The Engineer and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

HoD, EEE **DEAN / SOET**

(contd.)

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Name of the Programme: B.Tech (Electrical Engineering)

PO7: Environment and Sustainability: Understand the impact of 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 in 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 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.

Majumder.

HoD, EEE **DEAN / SOET**

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Name of the Programme: B.Tech (Electrical Engineering)

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO1: To educate students in Electrical Engineering domain and guide their instincts towards.

PSO2: To provide quality knowledge on Sustainable Energy that can be used for solving problems.

PSO3: To see our students as ethical and responsible engineering professionals.

HoD, EEE **DEAN / SOET**

ADAMAS UNIVERSITY
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ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

Department of Electrical and Electronics Engineering

B.Tech (Electrical Engineering)

(2024-25)

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
B.Tech (Electrical 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)	EVS11112	Environmental Science	3	0	0	3	3
	Theory (BSC)	PHY13201	Applied Science	2	0	1	3	
3	Theory (ESC)	CSE11001	Introduction to Programming	2	0	0	2	2
		GEE11001	Electrical and Electronics Technology	2	0	0	2	
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	DGS11002	Design Thinking and Prototyping	3	0	0	3	3
	Theory (ESC)	MEE11002	Engineering Mechanics	2	1	0	3	
7								
8	Practical (ESC)	CSE12002	Programming Lab	0	0	4	4	2
		GEE12002	Electrical and Electronics Technology Lab	0	0	4	4	
9	Practical (ESC)	CEE12001	Engineering Drawing and CAD	0	0	4	4	2
		MEE12001	Engineering Workshop	0	0	4	4	
			Total	**14/12**	**1/2**	**10/11**	**25**	**20**

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	DGS11002	Design Thinking and Prototyping	3	0	0	3	
3.	Theory (BSC)	PHY13201	Applied Science	3	0	0	3	3
		EVS11112	Environmental Science	3	0	0	3	
4.	Theory (ESC)	GEE11001	Electrical and Electronics Technology	2	0	0	2	2
		CSE11001	Introduction to Programming	2	0	0	2	
5.	Theory	GEE11012	Disruptive Technology Innovations	1	0	2	3	2
	Theory (HSSM)	ENG11053	English Communication	1	0	2	3	
6.	Theory	EIC11001	Venture Ideation	2	0	0	2	2
7.	Practical (ESC)	GEE12002	Electrical and Electronics Technology Lab	0	0	4	4	2
		CSE12002	Programming Lab	0	0	4	4	
8	Practical (ESC)	MEE12001	Engineering Workshop	0	0	4	4	2
		CEE12001	Engineering Drawing and CAD	0	0	4	4	
			Total	**13/14**	**1/2**	**10/10**	**25**	**20**

Total Credits (First Year): 40

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	3	1	0	4	4
2.	Theory (ESC)	CSE11104	Data structure and Algorithm	3	0	0	3	3
3.	Theory (PCC)	EEE11003	Prof. Core – I Electrical Machines – I	3	1	0	4	4
4.	Theory (PCC)	EEE11002	Prof. Core – II Electrical and Electronics Measurement	3	0	0	3	3
5.	Theory (PCC)	EEE11061	Prof. Core – III Electrical circuit theory	3	0	0	3	3
6.	Theory (PCC)	CSE12107	Data Structure and Algorithm Lab	0	0	2	2	1
7.	Practical (PCC)	EEE12006	Prof. Core Lab – I Electrical Machines – I Lab	0	0	2	2	1
8.	Practical (PCC)	EEE12005	Prof. Core Lab – II Electrical and Electronic Measurement Lab	0	0	2	2	1
9.	Practical (BSC)	MTH12531	Numerical Techniques Lab	0	0	2	2	1
10.	Practical (P/S/I)	IDP14001	Interdisciplinary Project	0	0	5	5	3
11.	Practical	SOC14100	# Community Service	0	0	0	0	1
			Total	**15**	**2**	**13**	**30**	**25**

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

SEMESTER IV								
S. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	Theory (PCC)	EEE11062	Prof. Core – IV Signals and Systems	3	1	0	4	4
2.	Theory (PCC)	EEE11007	Prof. Core – V Electrical Machines – II	3	1	0	4	4
3.	Theory (PCC)	EEE11046	Prof. Core – VI Power Systems	3	1	0	4	4
4.	Theory (PCC)	EEE11009	Prof. Core – VII Analog and Digital Electronics	3	1	0	4	4
5.	Theory	PSG11021	Human Values and Professional Ethics	2	0	0	2	2
6.	Practical (PCC)	EEE12063	Prof. Core Lab – III Electrical Circuits and Signals Lab	0	0	2	2	1
7.	Practical (PCC)	EEE12010	Prof. Core Lab – IV Electrical Machines II Lab	0	0	2	2	1
8.	Practical (PCC)	EEE12050	Prof. Core Lab – V Power Systems Lab	0	0	2	2	1
9.	Practical (PCC)	EEE12012	Prof. Core Lab – VI Analog and Digital Electronics Lab	0	0	2	2	1
			Total	**14**	**4**	**8**	**26**	**22**

Total Credits (Second Year): 47

THIRD YEAR

SEMESTER V								
S. No	Type	Course Code	Subject Name	L	T	P	Contact Hrs /week	Credits
1.	Theory (PCC)	ECE11015	Prof. Core –VIII Microcontrollers & Interfacing	3	1	0	4	4
2.	Theory (PCC)	EEE11015	Prof. Core – IX Power Electronics	3	1	0	4	4
3.	Theory (PCC)	EEE11064	Prof. Core – X Digital Signal Processing	3	1	0	4	4
4.	Theory (PCC)	EEE11014	Prof. Core – XI Control Systems	3	1	0	4	4
5.	Theory (PEC)	ECE11017/ EEE11016/ EEE11047	**Prof. Elective – I** 1. Foundation on Artificial Intelligence and Machine Learning 2. Special Electrical Machines 3. Energy Systems-I	3	0	0	3	3
6.	Theory (PEC)	ECE11020/ EEE11048/ EEE11049	**Prof. Elective – II** 1. Introduction to Machine Learning 2. Non-conventional Energy Resources 3. Sensors and Actuators	3	0	0	3	3
7.	Practical (PCC)	ECE12023	Prof. Core Lab – VII Microcontrollers & Interfacing Lab	0	0	2	2	1
8.	Practical (PCC)	EEE12022	Prof. Core Lab – VIII Power Electronics Lab	0	0	2	2	1
9.	Practical (PCC)	EEE12021	Prof. Core Lab – IX Control systems lab	0	0	2	2	1
10.	Seminar (P/S/I)	EEE15033	Technical Seminar	0	0	2	2	1
			Total	**18**	**4**	**8**	**30**	**26**

SEMESTER VI								
S. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	Theory (PCC)	EEE11034	Prof. Core – XII Electric Drives	3	1	0	4	4
2.	Theory (PCC)	EEE11024	Prof. Core – XIII Modern Control Systems	3	0	0	3	3
3.	Theory (PEC)	ECE11029/ EEE11051/ EEE11052	**Prof. Elective – III** 1. Introduction to Artificial Intelligence 2. Introduction to Electric Vehicles 3. Energy systems-II	3	0	0	3	3
4.	Theory (PEC)	ECE11032/ EEE11053/ EEE11054	**Prof. Elective – IV** 1. Advanced Machine Learning 2. Basic Modelling, Analysis and Control 3. Control of Energy Systems	3	0	0	3	3
5.	Theory (OEC)		**Open Elective – I**	3	0	0	3	3
6.	Theory (HSSM)	ECO11505	Economics for Engineers	3	0	0	3	3
7.	Practical (Sessional) (PCC)	EEE12038	Prof. Core Lab – X Electric Drives Lab	0	0	2	2	1
8.	Practical (PCC)	EEE12029	Prof. Core Lab – XI Modern Control Systems Lab	0	0	2	2	1
9.	Practical (PEC)	ECE12038/ EEE12055/ EEE12056	**Prof. Elective – I/II Lab** 1. Introduction to Machine Learning Lab 2. Machine Design Lab 3. Sensors and Actuators Lab	0	0	2	2	1
			Total	**18**	**1**	**6**	**25**	**22**

Total Credits (Third Year): 48

FOURTH YEAR

	SEMESTER VII							
S. No	**Type**	**Course CODE**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/week**	**Credits**
1.	Theory (HSSM)	MGT11402	Industrial Management	3	0	0	3	3
2.	Theory (PEC)	EEE11064/ EEE11057/ EEE11058	**Prof. Elective – V** 1. Application of AI in EE 2. Power Electronics and Drives for Automobiles 3. FACTS Controllers	3	0	0	3	3
3.	Theory (OEC)		**Open Elective – II**	3	0	0	3	3
4.	Theory (OEC)		**Open Elective – III**	3	0	0	3	3
5.	Practical (PEC)	ECE12044/ EEE12059/ EEE12060	**Prof. Elective III/IV/V Lab** 1. Introduction to Artificial Intelligence Lab 2. Simulation Lab 3. Controller design Lab	0	0	2	2	1
6.	Practical (P/S/I)	EEE14040	Summer Internship#	0	0	0	0	2
7.	Practical ((P/S/I)	EEE14039	Minor Project	0	0	2	6	3
			Total	**12**	**0**	**4**	**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 (P/S/I)	EEE14041	Industry Work Experience / SIRE* / Major Project	0	0	12	12 (For Major Project only)	6
2.	Practical (P/S/I)	EEE15042	Comprehensive Viva Voce	0	0	0	0	2
			Total	**0**	**0**	**12**	**12**	**8**

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

Total Credits (Forth Year): 26

Total Credits Distribution Semester wise: (B. Tech)

Semester	I	II	III	IV	V	VI	VII	VIII	Total Credits
Credits	**20**	**20**	**25**	**22**	**26**	**22**	**18**	**08**	**161**

S.No.	Category	Credit Breakup
1	Humanities and Social Sciences including Management courses (HSSM)	10
2	Basic Science courses (BSC)	22
3	Engineering Science courses including workshop, drawing, basics of electronics/electrical/mechanical/computer etc (ESC)	18
4	Professional core courses (PCC)	68
5	Professional Elective courses relevant to chosen specialization/branch (PEC)	17
6	Open subjects – Electives from other technical and /or emerging Subjects (OEC)	9
7	Project work, seminar and internship in industry or elsewhere (P/S/I)	17
8	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	(non-credit)
	Total	**161**

MTH11501	**Engineering Mathematics I**	L	T	P	C
Version 1.1	**Contact hours-60**	3	1	0	4
Pre-requisites/Exposure	12^{th} level Mathematics				
Co-requisites	--				

Course Objectives

1. To give deep knowledge about concepts of differential calculus and enable students to apply these topics in real life problems
2. To give the students a perspective to learn integral calculus and its importance in advanced study in engineering science
3. To help the student to understand the basic concepts of matrix theory with its uses in engineering science
4. To give emphasis about concepts of Eigen value and Eigen vector, vector space and linear transformation and enable students to apply these topics for analysing engineering problems
5. To help the student to understand basic concept of abstract and vector algebra with its uses in engineering science

Course Outcomes

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

CO1	**Extend** the fundamental concepts of differential calculus
CO2	**Make use of** the fundamental concepts of Integral Calculus for finding area, surface, volume of integration
CO3	**Apply** elementary properties and operations on matrix theory for finding solutions to system of equation
CO4	**Relate** the basic concepts and geometrical ideas of vector algebra and its applications

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: 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	**Extend** the fundamental concepts of differential calculus	**PO1, PO2, PO3, PO12**
CO2	**Make use of** the fundamental concepts of Integral Calculus for finding area, surface, volume of integration	**PO1, PO2, PO3, PO12**
CO3	**Apply** elementary properties and operations on matrix theory for finding solutions to system of equation	**PO1, PO2, PO3, PO12**
CO4	**Relate** the basic concepts and geometrical ideas of vector algebra and its applications	**PO1, PO2, PO3, 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	Adequate strong skills in learning new programming environments, analyse and design algorithms for efficient computer-based systems of varying complexity.	The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success, real world problems and meet the challenges of the future.	Ability to analyse the impact of Computer Science and Engineering solutions in the societal and human context, design, model, develop, test and manage complex
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MTH1 1501	Engineering Mathematics I	3	3	3	-	-	-	-	-	-	-	-	3	-	-	-

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

[redacted]

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 20-- – 20--)		
Name of the Program:	B.Tech (EE)	**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**

PHY11201	**Applied Science**	L	T	P	C
Version 1.0		2	0	0	2
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 gainknowledge 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 harmonicmotions.

CO2. Build the knowledge of physical optics and related application.

CO3. Develop the basic concepts of electromagnetic theory and e-m 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, calculatethe 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 endeavours 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, 1^{st}Order reaction & 2^{nd}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.

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Text Books

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

Reference Books

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

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written ExaminationExamination 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	**PO1, PO2,**

	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.	**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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PHY11201	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 $\mathbb{R}^2 = \{(x,y) \mid x, y \in \mathbb{R}\}$ 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)	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 $e = 1.6 \times 10^{-19} c, m_e = 9.1 \times 10^{-31} kg, m_p = 1.7 \times 10^{-27} kg \text{ and } G = 6.67 \times 10^{-11} Nm^2 kg^{-2}$.	**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 double of its volume. The initial temperature of the gas is 300 K and the initial	**Evaluate**	**CO2**

	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□= 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		2	0	0	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 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** various problems using programming language and select the best solution.
CO3. **Apply** modularized solution and design such programs to appraise the solution
CO4. **Understand** the basic usage of memory and construct such memory in terms of array in a program.
CO5. **Define** the 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

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**
CO2	Solve various problems using programming language and select the best solution.	**PO1, PO3**
CO3	Apply the modularized solution and design such programs to appraise the solution	**PO1, PO9**
CO4	Understand 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 different data structures for various collection of data	**PO1, PO11**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CSE11001	Introduction to Programming	3	-	1	2	2	-	-	-	1	-	1	-	-	--

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION**		
Name of the Program:	B.Tech (EE)	**Semester:**	II
Paper Title:	Introduction to Programming	**Paper Code:**	CSE11001
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 return type of strcmp ( ) function?	**R**	**CO4**
2	What is the purpose of comma operator in C?	**R**	**CO1**
3	How does the type float differ from double in C language?	**R**	**CO1**
4	How pointer will reduce the program execution time.	**R**	**CO3**

5	Find out the errors, if any, in the following programs:
	main( )
	{
	int array[6] = { 1, 2, 3, 4, 5, 6 } ;
	int i ;
	for (i = 0 ; i <= 25 ; i++)
	printf ("\n%d", array[i]) ;
	}
		R	**CO4**

Group B **Answer Allthe Questions (5 x 2 = 10)**			
6 a)	i) What is an array variable and how it is different from ordinary variable? [1] ii) How does a structure differ from a union? [1]	**R**	**CO4**
(OR)			
6 b)	i) Explain implicit and explicit type conversions with examples. ii) Develop a C program to accept an integer number and print the digits using words (for example 356 is printed as Three Five Six) [1+1]	**E, Creating**	**CO2**
7 a)	Design the flowchart which depicts the admission procedure in B.Tech	**Creating**	**CO1**
(OR)			
7 b)	Create the algorithm for the admission procedure in B.Tech.	**Creating**	**CO1**
8 a)	Which of the following expressions are valid? Give reasons. (i) +a +b (ii) a++ - - b (iii) a % 10 / - b (iv) a++ + ++b	**R**	**CO1**
(OR)			

8 b)	Utilize continue keyword writes the program in C to find the even numbers.	**Applying**	**CO2**
9 a)	What is the meaning of 3<j && j<5? Is it equivalent to (3<j)&& (j<5)? Explain	**R**	**CO1**
(OR)			
9 b)	Distinguish between entry- control and exit-control loops with an example.	**Analyzing**	**CO2**
10 a)	Develop a ‘C’ program to remove duplicate elements from a given array.	**Applying**	**CO4**
(OR)			
10 b)	What are the values of control variables and number of the iterations in the following for loops? (i) for(x=1.0 ; x>=0.5; x - = 0.1) (ii) for(ch= ‘A’ ; ch != ‘F’ ; ++ch)	**R**	**CO2**
Group C **Answer Allthe Questions (7 x 5 = 35)**			
11 a)	i) What is the importance of # include? Explain. ii) Give various modes of operating a file. [3+2]	**R, U**	**CO1,CO5**
(OR)			
11 b)	i) What are the two types of operators used for accessing members of a structure? ii) Develop a C program to print file contents on the screen. [3+2]	**R, Applying**	**CO4,CO5**
12 a)	Develop a C program to copy the contents of one array into another in the reverse order using function.	**Applying**	**CO4**
(OR)			
12 b)	How to compile and execute a C program explain using a block diagram?	**R**	**CO1**
13 a)	A library charges a fine for every book returned late. For first 5 days the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Create a C program to accept the number of days the member is late to return the book and display the fine or the appropriate message.	**Creating**	**CO2**
(OR)			
13 b)	What is flow chart? How it is useful in writing the programs? Explain about different symbols in flow chart.	**R**	**CO1**
14 a)	Design a menu driven program which has following options: 1. Factorial of a number. 2. Prime or not 3. Odd or even 4. Exit	**Creating**	**CO2**
(OR)			
14 b)	What is fall through problem in switch case and how to solve it show with an example.	**R**	**CO2**
15 a)	A cashier has currency notes of denominations 10, 50 and 100. If the amount to be withdrawn is input through the keyboard in hundreds, **Determine** the total number of currency notes of each denomination the cashier will have to give to the withdrawer.	**Evaluating**	**CO2**
(OR)			
15 b)	What is the need of the iterations and selection? Explain each of the statements with examples.	**R**	**CO2**
16 a)	Create a structure to specify data on students given below: Roll number, Name, Department, Course, Year of joining. Assume that there are not more than 450 students in the collage. (a) Write a function to print names of all students who joined in a particular year. (b) Write a function to print the data of a student whose roll number is given.	**Creating**	**CO5**
(OR)			
16 b)	What is the main reason for using structure? What special keyword is used in defining a structure? Give syntax for structure	**R**	**CO5**
17 a)	What is algorithm? Explain the steps involved in the development of C algorithms.	**R**	**CO1**

(OR)			
17 b)	Distinguish between local and global variable. How to return multiple values in function using global variable show with an example.	**Analyzing**	**CO1**

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)

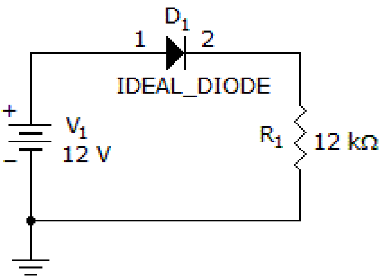
Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** DC network theorems and apply these theorems to calculate the voltage, current and power for a given circuit.	**PO1, PO2**
CO2	**Describe** the concept of active power, reactive power, power factor, quality 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**

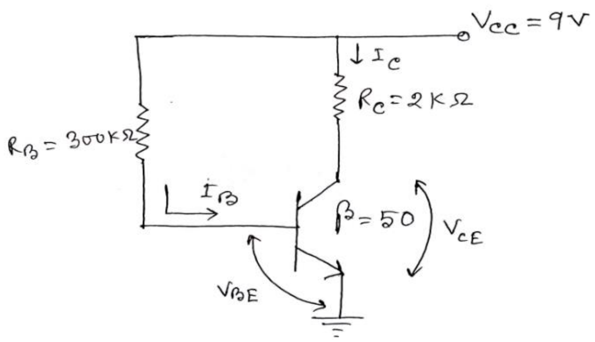
		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
Course Code	Course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

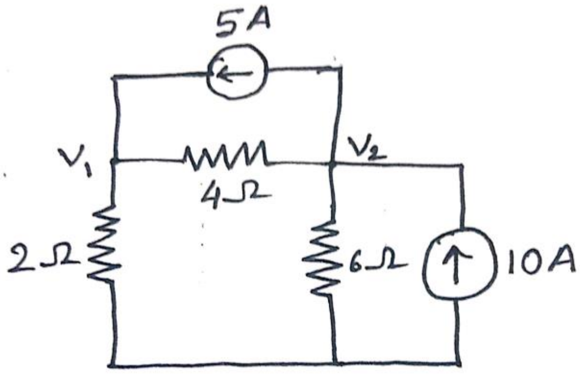
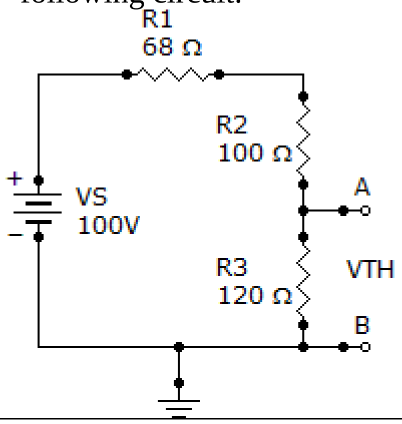
1=weakly mapped
2= moderately mapped
3=strongly mapped

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)	**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 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**

		L	T	P	C
ENG11053	**English Communication**	L	T	P	C
Version 1.0		1	0	2	2
Pre-requisites/Exposure	12th level English				
Co-requisites	--				

Course Objectives

1. To know the importance and techniques of communication skills in order to improve professionalskills
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 partin all group activities and to give an oral group presentation. Students will be expected to interact withmedia resources, such as, web sites, videos, DVDs, and newspapers etc.

Course Content

Module I: **6 lecture hours**

Communication Level 1: Basics of Communication, Means of Communication, Barriers of Communication

Module II: **6 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: **6 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: **6 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: **6 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 andProfessional Purposes, Cambridge Univ. Press, 2006.
4. Quirk R., Greenbaum S., Leech G., and Svartik, J. A Comprehensive Grammar of the Englishlanguage, 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 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 and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
Course Cod	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

e															
ENG11053	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:		**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**
7 a)	How Communication is important in media and journalism?	**Ap**	**CO4**
8 a)	Differentiate active and effective listening.	**R**	**CO3**
9 a)	Presentation of small skits.	**R**	**CO4**
10 a)	Show that $\nabla(f_1 - f_2) = \nabla\varphi_1 - \nabla\varphi_2$.	**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**
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**
13 a)	Write a report based on final year project details.	**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**
15 a)	Differentiate listening and hearing	**Evaluate**	**CO2**
16 a)	Discuss on Class Exercises on Synonyms and Antonyms.	**U**	**CO3**
17 a)	**Compose** an application to the Principal of your University as the class representative of your respective class requesting permission to organize a science exhibition in your department	**Evaluate**	**CO-4**

GEE11012	Disruptive Technology Innovations	L	T	P	C
Version 1.0		1	0	2	2
Pre-requisites/Exposure					
Co-requisites	--				

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 completion of this course, the students 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 cyber security 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

Catalog Description

The course on Disruptive Technology Innovations 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

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)

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

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

BIT11003	Life Science	L	T	P	C
Version 1.0		2	0	0	2
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

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. Contrast between the different networks of human body and other physiological systems andcan summarize consequences of physiological disorders.
CO5. Choose different techniques of medical biotechnology on human body to analyze the malfunction of different human system during diseased conditions.

Catalog 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 andgene therapy.

Unit V: Neurophysiology [10 hours lecture]

Neuron structure and function; Regeneration of nerve; flow and transport of signals from one neuronto 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 Aydin Tozeren 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 Examination Scheme:

Components	Class Assessment	Mid Term	End Term
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcome**
CO1	**Explain** the structure and functions cell organelles and their interrelationship.	**PO9, PO12, PSO1, PSO2**
CO2	**Analyze** the genetic switches and evolutionary dynamics of livingsystem.	**PO2, PO5, PO6**
CO3	**Determine** the mode of transport of molecules in biological systemnumerically.	**PO2, PO3, PO5, PO8, PSO1, PSO2**
CO4	**Contrast** between the different networks of human body and other physiological systems and can summarize consequences of physiological disorders.	**PO1, PO2, PO3, PO5, PO6,PO12,PSO1, PSO2**
CO5	**Choose** different techniques of medical biotechnology on human body to analyze the malfunction of different human system duringdiseased conditions.	**PO1, PO2, PO3, PO5, PO6, PO8, 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	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
BIT11003	Life Science	2	2	1	-	3	2	-	1	1	-	-	2	3	3

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

[redacted]

	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:**	

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	**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 (d) Mitochondria	**UN**	**CO1**
	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**
7 a)	Define active and passive transport with examples. Differentiate between diffusion and osmosis.	**Ap**	**CO4**
8 a)	Describe the general steps involved in synaptic transmission	**R**	**CO3**
9 a)	Presentation of small skits.	**R**	**CO4**
10 a)	**Differentiate** between competitive and uncompetitive inhibition of enzyme substrate reaction.	**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**
12 a)	Explain the mechanism for digestion of protein in gastrointestinal tract of human.	**U**	**CO1**
13 a)	Write a report based on final year project details.	**R**	**CO4**
14 a)	Define active and passive transport with examples. Differentiate between diffusion and osmosis.	**U**	**CO1**
15 a)	**Compare** between Prokaryotic and eukaryotic cells	**Evaluate**	**CO2**
16 a)	**Explain** oncogenes. **How** can they affect the cells**? Is this relates with** Tumor suppressive gene? Discuss in detail.	**U**	**CO3**
17 a)	**What** are the factors influencing living cells and negative as well as positive ways?	**Evaluate**	**CO-4**

DGS11001	**Design Thinking**	L	T	P	C
Version 1.0		1	0	2	2
Pre-requisites/Exposure	Knowledge of analyzing society problems and product usage problems and a zeal to improve the current situation, in additionto 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. Practice 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 theycan 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 asa 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 aprocess, 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 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	Practice the methods, processes, and tools of design thinking	**PO1, PO2**
CO3	Apply the Design Thinking approach and model to real worldscenarios.	**PO1, PO2, PO4**
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 complexproblems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
DGS11001	Design Thinking	3	2	-	1	2	-	-	-	-	-	2	-	-	-

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION**			
Name of the Program:	B. Tech	**Semester:**	I
Paper Title:	Design thinking	**Paper Code:**	DGS11001
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)	**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 **(Multiple Choice Questions)** **Answer All the Questions (5 x 1 = 5)**			
1	Design Thinking is: (a) Thinking about design (b) Designing ways in which people think (c) Asking users to solve problems (d) Defining, framing and solving problems from users' perspectives.	**[U]**	**CO1**
2	What are the steps of Design Thinking Process? (a) Understand > Draw > Ideate > Create > Test (b) Empathise > Define > Ideate > Prototype > Test (c) Empathise > Design > Implement > Produce > Test (d) Understand > Define > Ideate > Produce > Try	**[R]**	**CO2**
3	Design Thinking is a Linear Process. True or False?	**[AP]**	**CO3**
4	A college is redesigning it website. Current students are the main users of the website. Which one of the below elements should definitely be on the website? (a) College rules and regulations (b) Information on faculty members (c) Information about courses	**[R]**	**CO4**

	(d) Alumni details		
5	Aravind Eye Care System (AECS), an Indian eye care provider for millions of low income people has been using design thinking in its approach since a long time. Which of the below statements are examples of design thinking at AECS? (a) AECS provides buses from remote locations to the AEC centre to provide transportation to its users, the poor people as they can't afford these (b) AECS has developed a manufacturing facility which enables providing lenses at a fraction of cost than the market price (c) AECS has been using telemedicine trucks to enable expert advice of doctors at hospital (d) All of the above	**[AN]**	**CO1**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	What are the 4 D's of design thinking?	**[R]**	**CO1**
(OR)			
6 b)	What are the 3 most important elements of design thinking?	**[R]**	**CO1**
7 a)	What are the 5 stages of design thinking?	**[U]**	**CO2**
(OR)			
7 b)	What is POV (Point of View) design thinking?	**[AP]**	**CO2**
8 a)	What means design thinking?	**[U]**	**CO3**
(OR)			
8 b)	Why is design thinking so important?	**[AN]**	**CO3**
9 a)	What is the biggest asset of design thinking?	**[U]**	**CO4**
(OR)			
9 b)	What kind of prototypes should be built in the design thinking process?	**[AN]**	**CO4**
10 a)	What is a design challenge?	**[U]**	**CO2**
(OR)			
10 b)	What is the thinking process model?	**[C]**	**CO2**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	In design thinking, who is the client and target audience?	**[U[**	**CO1**

(OR)			
11 b)	What should prototypes not be?	**[R]**	**CO1**
12 a)	What are primary and secondary researches in design thinking?	**[AP]**	**CO2**
(OR)			
12 b)	What are the 3 phases of human centered design?	**[AP]**	**CO2**
13 a)	How ideation depends on research information?	**[AN]**	**CO3**
(OR)			
13 b)	How can anyone improve their design thinking skills?	**[AN]**	**CO3**
14 a)	Do all potential solutions require prototyping?	**[U]**	**CO4**
(OR)			
14 b)	What is 'How might we' session?	**[R]**	**CO4**
15 a)	Describe the steps of design thinking project with an elaborate example.	**[AP]**	**CO4**
(OR)			
15 b)	How do you create a problem statement in design thinking?	**[AN]**	**CO4**
16 a)	How innovation is correlated with design thinking?	**[U]**	**CO3**
(OR)			
16 b)	What is the difference between design thinking and human centered design?	**[U]**	**CO3**
17 a)	How to be successful in pitching for any idea? Explain with an example.	**[R]**	**CO4**
(OR)			
17 b)	What is design thinking Double Diamond?	**[R]**	**CO4**

PHY12202	**Applied Science Lab**	L	T	P	C
Version 1.0		0	0	2	1
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: Understand about the elastic and other general properties of matter and their measurements.
CO2: Illustrate the knowledge of physical optics and experimental techniques to verify them.
CO3: Develop the basic concepts related to electrical circuits.
CO4: Outline the fundamental knowledge of basic quantum mechanics and few experiments related to it.
CO5: Illustrate the basic information about semiconductor material and devices.
CO6: Develop the qualitative idea of thermo-electric currents and technique to measure it.
CO7: Understand 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 Lab is used to apply existing scientific knowledge to develop more practical applications, for example: technology or inventions. In applied Science Lab different aspects of basic and modern physics has been explored. Applied Science Lab is 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 FLEXUREmethod.
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 andhence 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 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 about the elastic and other general properties of matter and their measurements.	**PO1,**
CO2	Illustrate the knowledge of physical optics and experimental techniques to verify them.	**PO1**
CO3	Develop the basic concepts related to electrical circuits.	**PO1, PO5**
CO4	Outline the fundamental knowledge of basic quantum mechanics and few experiments related to it.	**PO1**
CO5	Illustrate the basic information about semiconductor material and devices.	**PO1, PO5, PO2**
CO6	Develop the qualitative idea of thermo-electric currents and technique to measure it.	**PO1**
CO7	Understand and practice different techniques of quantitative chemical analysis generate experimental skills and apply these skills to various analyses	**PO1, PO2, PO3**
CO8	Analyze the quality of water by determining its hardness & alkalinity.	**PO3, PO9**
CO9	Utilize the fundamental laboratory techniques for analyses	**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 and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PHY1 2202	Applied Science Lab	3	2	2	-	2	-	-	-	2	-	-	-	-	-

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

Course: PHY12202 – Applied Science Lab

Program: B.Tech. **Semester: ODD**

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**

CSE12002	**Programming Lab**	L	T	P	C
Version 1.0		0	0	4	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 basicprograms 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 libraryfunctions.

CO4. Apply array concept in 1-Dimensional and 2-Dimensional construct. Hence be able to designstring functions to cater to various character array related problem.

CO5. Apply 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 behaviour 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 theadvance 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 andcontinue 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*, 2^{nd} ed., USA: McGraw-Hill
3. Brian W. Kernighan, Dennis Ritchie (1988) *C Programming Language*, 2^{nd} ed., : Prentice Hall.
4. Das Sumitabha, UNIX Concepts and Applications, 4^{th} Ed., New Delhi, Tata McGraw-Hill

Reference Books

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

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written 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	List and memorize various Unix commands. Also, students be able to construct various basic programs and appraise them.	**PO3**
CO2	Design and execute iterative statement in a program. Also, students be able to differentiate among different iterative structure.	**PO1, PO4**
CO3	Construct such programs that used to define user definedfunctions and to design library functions.	**PO1, PO7**
CO4	Apply 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, PO2, PSO1**
CO5	Apply the concept of Stack, Queue, and Linked List and appraise them in different cases.	**PO1, PO5, 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 or team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
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
CSE12002	Programming Lab	3	1	1	2	2	-	1	-	-	-	1	-	1	-

Model Question

Paper Code - CSE12002

SET A

1. Write a C program to print all Prime numbers between 1 to n.
2. Write a C program to generate nth Fibonacci term using recursion.
3. Write a C program to count frequency of each element in an array.

Paper Title – Programming Lab

Paper Code - CSE12002

SET B

1. Write a C program to input electricity unit charges and calculate total electricity bill according to the given condition:
   For first 50 units Rs. 0.50/unit
   For next 100 units Rs. 0.75/unit
   For next 100 units Rs. 1.20/unit
   For unit above 250 Rs. 1.50/unit
   An additional surcharge of 20% is added to the bill
2. Write a C program to find factorial of any number using recursion.
3. Write a C program to add two matrices.

Paper Title – Programming Lab

Paper Code - CSE12002

SET C

1. Write a C program to find all factors of a number.
2. Write a C program to read the following information of 5 students: student name, student roll number, and marks of four subjects. Print the roll numbers and names of the students who have secured more than 40% marks.
3. Write a C program to subtract two matrices.

Paper Title – Programming Lab

Paper Code - CSE12002

SET D

1. Write a C program to check whether a year is leap year or not.
2. Write a C program to find second largest element in an array.
3. Write a C program to multiply two matrices.

GEE12002	**Electrical and Electronics Technology Lab**	L	T	P	C
Version 1.0		0	0	4	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. **Show** different meters and instruments for measurement of electronic quantities and understandnetwork theorems.
CO2.**Apply** the characteristics of different semiconductor devices like diode, BJT, FET etc andcarbon tungsten filament lamps experimentally.
CO3. **Demonstrate** various application circuits using diodes
CO4. **Experiment with** the R-L-C circuits
CO5. **Illustrate** the 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-watt meter 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	**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	**Show** different meters and instruments for measurement of electronic quantities and understand network theorems.	**PO1**
CO2	**Apply** the characteristics of different semiconductor devices like diode, BJT, FET etc and carbon tungsten filament lamps experimentally.	**PO3**
CO3	**Demonstrate** various application circuits using diodes.	**PO3**
CO4	**Experiment with** the R-L-C circuits	**PO1**
CO5	**Illustrate** 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 and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
CourseCode	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
GEE12002	Electrical and Electronics Technology Lab	3	-	3	-	-	-	-	-	-	-	-	-	-	-

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Name: **Enrolment No:**	

Course: Electrical and Electronics Technology Lab (GEE12002)

Program: B.Tech. **Semester: ODD 2022-23**
Time: 03 hrs. **Max. Marks: 50**

Questions

1.	Verification of Thevenin's theorem and Norton's theorem	**An+App**	**CO1+CO3+CO5**
2.	Verification of Superposition theorem	**U+An+Ev+App**	**CO3+CO5**
3.	Verification of Maximum power transfertheorem	**U+An+Ev+App**	**CO2+CO3+CO5**
4.	Study of R-L-C series circuit	**U+An**	**CO2+CO3+CO5**
5.	Study of R-L-C parallel circuit	**U+An+App**	**CO1+CO3+CO5+CO6**
6.	Performance study of fluorescent, LED, tungsten and carbon lamps	**U+App+An**	**CO1+CO3+CO6**
7.	Measurement of power in a three-phase circuit using two-wattmeter method.	**U+App+An**	**CO1+CO3**

MEE12001	**Engineering Workshop**	L	T	P	C
Version 1.0		0	0	4	2
Pre-requisites/Exposure	12^{th} 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 Experiment with different metal fitting works
CO3 Show basic forging and welding works
CO4 Understand the operations of machine tools
CO5 Select the appropriate tools required for specific operation
CO6 Understand 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 mould, given the single piece pattern and casting.
7	To prepare a sand mould, 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, andknurling) 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 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, PO2, PO9PSO1**
CO2	Experiment with different metal fitting works	**PO1, PO9, PSO1**
CO3	Show basic forging and welding works	**PO1, PO9, PSO1**
CO4	Understand the operations of machine tools	**PO1, PO2, PO9, PSO1**
CO5	Select the appropriate tools required for specific operation	**PO1, PO9, PSO1**
CO6	Understand 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 and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
MEE12001	Engineering Workshop	3	1	-	-	-	-	-	-	3	-	-	-	3	-

Course: MEE12001 - Engineering Workshop			
Program: B. Tech. (CE) **Semester: I**		**Time: 03 Hrs.**	**Max. Marks: 50**
Section A (Answer All the Questions) (5 x 1 = 5)			
1.	Discuss advantages and limitations of Gas welding.	**U**	**CO1**
2.	Write the steps involved in making a mould	**U**	**CO2**
3.	Describe the various types of pattern with neat sketch.	**R**	**CO4**
4.	Describe the specification of lathe machine.	**R**	**CO3**
5.	Discuss advantages and limitations of Gas welding.	**U**	**CO6**
SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**			
4.	Describe 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**	**CO3**
5.	To make a single piece cylindrical (solid) pattern from the given dimensions.	**App**	**CO5**
6.	To make a square fitting from the given mild steel piece and the dimensions.	**App**	**CO5**
7.	Short note of Turning, Facing, Runner.	**U**	**CO1**
SECTION (Answer All) (2 x 15= 30)			
8.	To make a single ‘V’ butt joint between two metal plates by using ARC welding.	**U**	**CO6**
9.	Describe the various types of allowance in moulding operation.	**U**	**CO2**

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**

		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	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CEE12001	Engineering Drawing & CAD	-	3	3	-	-	-	-	-	3	-	-	3	-	3

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

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	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)	**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.		

<u>Instructions to the Students: Attempt at least 1 Question from each CO.</u>

	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 1.1	**Contact hours-60**	3	1	0	4
Pre-requisites/Exposure	12th level Mathematics				
Co-requisites	--				

Course Objectives

6. To help the student to understand the basic concepts of sequence, series and their application
7. To enable students for finding Fourier series representation of a function
8. 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.
9. To enable students acquire fundamental concept of ordinary differential equation and it's applications in engineering science
10. To help the student to understand the use of vector calculus in engineering.

Course Outcomes

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

CO1	**Explain** the convergence of a series, power series, Fourier series representation of a function
CO2	**Develop** the concept of complex variable and its application
CO3	**Illustrate** various solution procedures of ordinary differential equations
CO4	**Build** the knowledge in vector calculus and its related applications

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

Unit IV: 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:

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

Reference Book:

4. B. S. Grewal, Higher Engineering Mathematics, Khanna Publications
5. G. B. Thomas Jr., M. D. Weir, J. R. Hass, Thomas Calculus Early Transcendentals, 12th Edition
6. 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	**Explain** the convergence of a series, power series, Fourier series representation of a function	**PO1, PO2, PO3, PO12**
CO2	**Develop** the concept of complex variable and its application	**PO1, PO2, PO3**
CO3	**Illustrate** various solution procedures of ordinary differential equations	**PO1, PO2, PO3, PO12**
CO4	**Build** the knowledge in vector calculus and its related applications	**PO1, PO2, PO3, 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	Adequate strong skills in learning new programming environments, analyse and design algorithms for efficient computer-based systems of varying complexity.	The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success, real world problems and meet the challenges of the future.	Ability to analyse the impact of Computer Science and Engineering solutions in the societal and human context, design, model, develop, test and manage complex
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MTH11502	Engineering Mathematics II	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-

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

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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 $x\frac{dy}{dx}+y=\ y^2logx$	**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 $\lvert z-1\rvert = 1$ 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

6. To understand dc network theorems and apply these theorems to calculate the voltage, current, and power for a given circuit.
7. To explain the concept of active power, reactive power, power factor, quality factor, and steady-state sinusoids.
8. To familiarize with passive components, active components, and measuring instruments.
9. To familiarize the working of diodes, transistors, and integrated circuits.
10. 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

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

Reference Books

9. Electronic Circuits, Discrete and Integrated- Charles Belove and Donald L.Schilling
10. Principles of Electrical Engineering and Electronics-VK Mehta, Rohit Mehta, SChand and Company, New Delhi
11. Solid State Electronic Devices- Ben G. Streetman and Sanjay Kumar Banerjee, PHI.
12. 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.
13. Theodore Wildi,*ElectricMachines, Drives and Power Systems*, Pearson,2005.
14. Vincent Del Toro, *Electrical Engineering Fundamentals*, 2nd Ed., Prentice Hall India Learning Pvt. Ltd.,1989.
15. J. Millman, C. Halkias and C. D. Parikh, *Millman's Integrated Electronics: Analog and Digital Circuits and Systems*, 2nd Ed., McGraw Hill Education,2017.
16. 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)

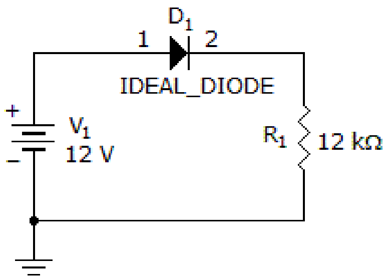
Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Explain DC network theorems and apply these theorems to calculate the voltage, current and power for a given circuit.	**PO1, PO2**
CO2	Describe the concept of active power, reactive power, power factor, quality factor, 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**

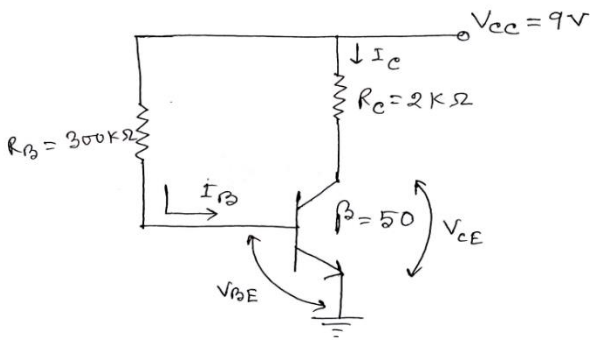
		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual or team work	Communication	Project management and finance	Life-long Learning
Course Code	Course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

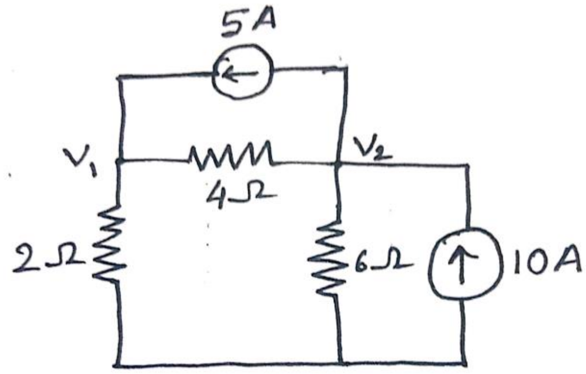
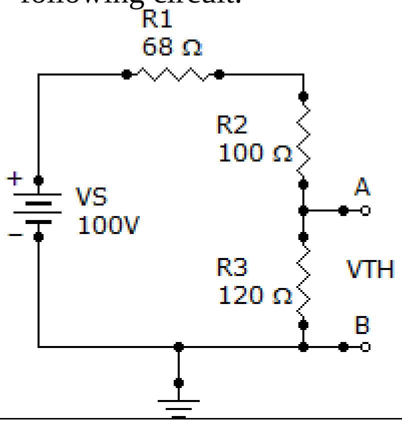
1=weakly mapped
2= moderately mapped
3=strongly mapped

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**

CSE11001	**Introduction to Programming**	L	T	P	C
Version 1.0		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

6. To understand the nature of programming as human activity.
7. To practice the programming construct to solve multi-dimensional problems.
8. To relate and implement mathematical concepts through programming in order to solve computational problems.
9. To enable students to acquire structure and written expression required for their profession.
10. 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** various problems using programming language and select the best solution.
CO3. **Apply** modularized solution and design such programs to appraise the solution
CO4. **Understand** the basic usage of memory and construct such memory in terms of array in a program.
CO5. **Define** the 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

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

Reference Books

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

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	Define basics concepts of programming structure and implement the basics concepts of Programming.	**PO4**
CO2	Solve various problems using programming language and select the best solution.	**PO1, PO3**
CO3	Apply the modularized solution and design such programs to appraise the solution	**PO1, PO9**
CO4	Understand 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 different data structures for various collection of data	**PO1, PO11**

		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CSE11001	Introduction to Programming	3	-	1	2	2	-	-	-	1	-	1	-	-	--

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

ADAMAS UNIVERSITY
END SEMESTER EXAMINATION

Name of the Program:	B.Tech (EE)	**Semester:**	II
Paper Title:	Introduction to Programming	**Paper Code:**	CSE11001
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 return type of strcmp ( ) function?	**R**	**CO4**
2	What is the purpose of comma operator in C?	**R**	**CO1**
3	How does the type float differ from double in C language?	**R**	**CO1**
4	How pointer will reduce the program execution time.	**R**	**CO3**

5	Find out the errors, if any, in the following programs:
	main( )
	{
	int array[6] = { 1, 2, 3, 4, 5, 6 } ;
	int i ;
	for (i = 0 ; i <= 25 ; i++)
	printf ("\n%d", array[i]) ;
	}
		R	**CO4**

	Group B **Answer Allthe Questions (5 x 2 = 10)**		
6 a)	i) What is an array variable and how it is different from ordinary variable? [1] ii) How does a structure differ from a union? [1]	**R**	**CO4**
	(OR)		
6 b)	i) Explain implicit and explicit type conversions with examples. ii) Develop a C program to accept an integer number and print the digits using words (for example 356 is printed as Three Five Six) [1+1]	**E, Creating**	**CO2**
7 a)	Design the flowchart which depicts the admission procedure in B.Tech	**Creating**	**CO1**
	(OR)		
7 b)	Create the algorithm for the admission procedure in B.Tech.	**Creating**	**CO1**
8 a)	Which of the following expressions are valid? Give reasons. (i) +a +b (ii) a++ - - b (iii) a % 10 / - b (iv) a++ + ++b	**R**	**CO1**
	(OR)		
8 b)	Utilize continue keyword writes the program in C to find the even numbers.	**Applying**	**CO2**
9 a)	What is the meaning of 3<j && j<5? Is it equivalent to (3<j)&& (j<5)? Explain	**R**	**CO1**

(OR)			
9 b)	Distinguish between entry- control and exit-control loops with an example.	**Analyzing**	**CO2**
10 a)	Develop a ‘C’ program to remove duplicate elements from a given array.	**Applying**	**CO4**
(OR)			
10 b)	What are the values of control variables and number of the iterations in the following for loops? (i) for(x=1.0 ; x>=0.5; x - = 0.1) (ii) for(ch= ‘A’ ; ch != ‘F’ ; ++ch)	**R**	**CO2**
Group C **Answer Allthe Questions (7 x 5 = 35)**			
11 a)	i) What is the importance of # include? Explain. ii) Give various modes of operating a file. [3+2]	**R, U**	**CO1,CO5**
(OR)			
11 b)	i) What are the two types of operators used for accessing members of a structure? ii) Develop a C program to print file contents on the screen. [3+2]	**R, Applying**	**CO4,CO5**
12 a)	Develop a C program to copy the contents of one array into another in the reverse order using function.	**Applying**	**CO4**
(OR)			
12 b)	How to compile and execute a C program explain using a block diagram?	**R**	**CO1**
13 a)	A library charges a fine for every book returned late. For first 5 days the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Create a C program to accept the number of days the member is late to return the book and display the fine or the appropriate message.	**Creating**	**CO2**
(OR)			
13 b)	What is flow chart? How it is useful in writing the programs? Explain about different symbols in flow chart.	**R**	**CO1**
14 a)	Design a menu driven program which has following options: 1. Factorial of a number. 2. Prime or not 3. Odd or even 4. Exit	**Creating**	**CO2**
(OR)			
14 b)	What is fall through problem in switch case and how to solve it show with an example.	**R**	**CO2**
15 a)	A cashier has currency notes of denominations 10, 50 and 100. If the amount to be withdrawn is input through the keyboard in hundreds, **Determine** the total number of currency notes of each denomination the cashier will have to give to the withdrawer.	**Evaluating**	**CO2**
(OR)			
15 b)	What is the need of the iterations and selection? Explain each of the statements with examples.	**R**	**CO2**
16 a)	Create a structure to specify data on students given below: Roll number, Name, Department, Course, Year of joining. Assume that there are not more than 450 students in the collage. (a) Write a function to print names of all students who joined in a particular year. (b) Write a function to print the data of a student whose roll number is given.	**Creating**	**CO5**
(OR)			
16 b)	What is the main reason for using structure? What special keyword is used in defining a structure? Give syntax for structure	**R**	**CO5**
17 a)	What is algorithm? Explain the steps involved in the development of C algorithms.	**R**	**CO1**
(OR)			
17 b)	Distinguish between local and global variable. How to return multiple values in function using global variable show with an example.	**Analyzing**	**CO1**

MEE11002	**Engineering Mechanics**	L	T	P	C
Version 1.0		2	1	0	3
Pre-requisites/Exposure	12th 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. Analyse 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 **11 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: **11 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: **6 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: **4 lecture hours**
Virtual Work Virtual displacement, principle of virtual work.

Module 5: **8 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 Scheme:

Components	Class Assessment	End Term
Weightage (%)	50	50

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

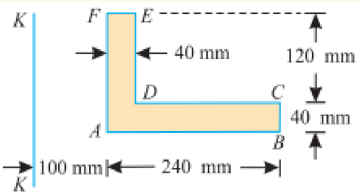
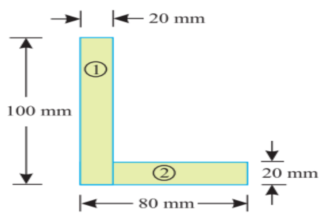
Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Apply conditions of equilibrium of bodies subjected to forces	**PO1,PO2**
CO2	Determine the centroid, center of gravity and moment of inertia of various one dimensional and two dimensional objects	**PO1,PO2**
CO3	Analyze 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,**

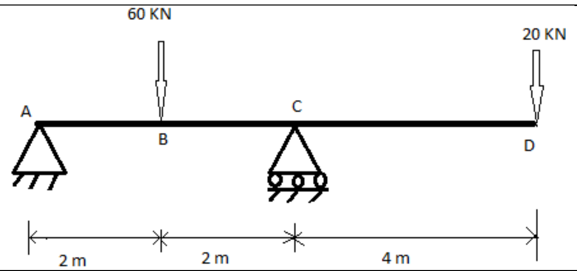
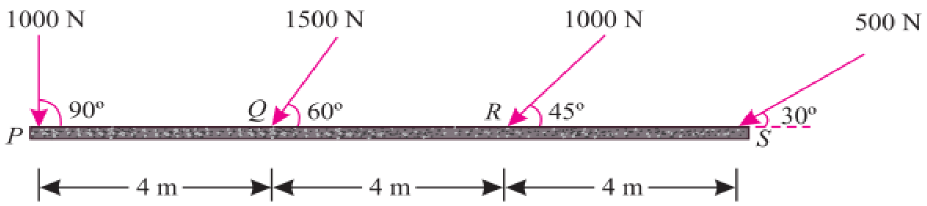
		Engineering Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
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
MEE11002	Engineering Mechanics	3	3	-	-	-	-	-	-	-	-	-	-	-	--

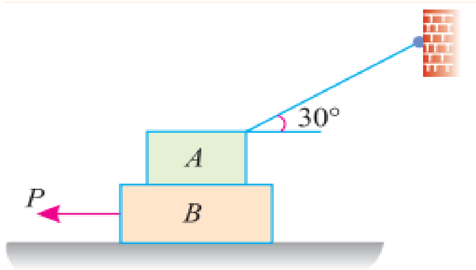
1=weakly mapped
2= moderately mapped
3=strongly mapped

[redacted]

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2021 – 22)		
Name of the Program:	B. TECH EE	**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 principle of virtual work.	**U**	**CO1**

			
7 a)	Explain free body diagram with an example.	**R**	**CO5**
8 a)	State and prove Varignon's theorem.	**U**	**CO5**
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**
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**
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**
12 a)	**Analyze** the current components of PNP in Bipolar Junction Transistor.	**AN**	**CO5**
13 a)	State Parallel axis Theorem.	**C, E**	**CO6 & CO4**
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**
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**
16 a)	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 	**U**	**CO1**

17 a)	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.	**An**	**CO3**

EVS11112	**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					

Course Objectives

1. To understand the intrinsic relation between humans and environment, our position in the ecosystem around us
2. To comprehend the significance of the biodiversity surrounding us.
3. To figure out the importance and need for energy resources, various sources of energy, renewable and non-renewable sources, conventional and unconventional sources.
4. To have basic concepts about sustainability, our dependence on nature and the consequences of overexploitation.
5. To enable students to appreciate the importance and how much we owe to the earth systems for our survival.
6. To have a basic concept about the types of pollution and mitigation procedures.
7. 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.

Course Content

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 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
EVS1 1112	Environmental Science	-	2	-	-	2	2	-	-	2	-	1	1	-	-	1

1=weakly mapped

2= moderately mapped

3=strongly mapped

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ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION: JULY 2021

Name of the Program: B.Tech Semester: II — Stream: CSE
PAPER TITLE: Environmental Science — PAPER CODE: EVS11112
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 (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.	**Ap**	**CO3**

	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)		
10.	**What** is hazardous waste? Discuss the methods of hazardous waste management? What is composting? (4+7+4=15)	**U**	**CO3**

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 therebydeveloping a prototype
4. To help students in identifying their customers using primary and secondaryresearch methods.
5. Expose students to various factors of market and competition with the help ofmarket 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 formsand 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**

EIC11001	CourseCode	
Venture Ideation	CourseTitle	
-	PO1	Engineering Knowledge
-	PO2	Problem analysis
-	PO3	Design/development of solutions
-	PO4	Conduct investigations of complex problems
-	PO5	Modern tool usage
3	PO6	The engineer and society
-	PO7	Environment and sustainability
3	PO8	Ethics
-	PO9	Individual and team work
-	PO10	Communication
3	PO11	Project management and finance
-	PO12	Life-long Learning
-	PSO1	Competitive Examination Preparation
-	PSO2	Technical Competency

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

GEE12002	**Electrical and Electronics Technology Lab**	L	T	P	C
Version 1.0		0	0	4	2
Pre-requisites/Exposure	Class 12th 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. **Show** different meters and instruments for measurement of electronic quantities and understandnetwork theorems.
CO2. **Apply** the characteristics of different semiconductor devices like diode, BJT, FET etc andcarbon tungsten filament lamps experimentally.
CO3. **Demonstrate** various application circuits using diodes
CO4. **Experiment with** the R-L-C circuits
CO5. **Illustrate** the 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-watt meter 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	**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	**Show** different meters and instruments for measurement of electronic quantities and understand network theorems.	**PO1**
CO2	**Apply** the characteristics of different semiconductor devices likediode, BJT, FET etc and carbon tungsten filament lamps experimentally.	**PO3**
CO3	**Demonstrate** various application circuits using diodes.	**PO3**
CO4	**Experiment with** the R-L-C circuits	**PO1**
CO5	**Illustrate** 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 and team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
CourseCode	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
GEE12002	Electrical and Electronics Technology Lab	3	-	3	-	-	-	-	-	-	-	-	-	-	-

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

[redacted]

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

Course: Electrical and Electronics Technology Lab (GEE12002)

Program: B.Tech. **Semester: ODD 2022-23**

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

Questions

1.	Verification of Thevenin's theorem and Norton's theorem	**An+App**	**CO1+CO3+CO5**
2.	Verification of Superposition theorem	**U+An+Ev+App**	**CO3+CO5**
3.	Verification of Maximum power transfertheorem	**U+An+Ev+App**	**CO2+CO3+CO5**
4.	Study of R-L-C series circuit	**U+An**	**CO2+CO3+CO5**
5.	Study of R-L-C parallel circuit	**U+An+App**	**CO1+CO3+CO5+CO6**
6.	Performance study of fluorescent, LED, tungsten and carbon lamps	**U+App+An**	**CO1+CO3+CO6**
7.	Measurement of power in a three-phase circuit using two-wattmeter method.	**U+App+An**	**CO1+CO3**

CSE12002	**Programming Lab**	L	T	P	C
Version 1.0		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 basicprograms 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 libraryfunctions.

CO4. Apply array concept in 1-Dimensional and 2-Dimensional construct. Hence be able to designstring functions to cater to various character array related problem.

CO5. Apply 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 behaviour 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 theadvance 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 andcontinue 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 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	List and memorize various Unix commands. Also, students be able to construct various basic programs and appraise them.	**PO3**
CO2	Design and execute iterative statement in a program. Also, students be able to differentiate among different iterative structure.	**PO1, PO4**
CO3	Construct such programs that used to define user definedfunctions and to design library functions.	**PO1, PO7**
CO4	Apply 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, PO2, PSO1**
CO5	Apply the concept of Stack, Queue, and Linked List and appraise them in different cases.	**PO1, PO5, 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 or team work	Communication	Project management and finance	Life-long Learning	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CSE12002	Programming Lab	3	1	1	2	2	-	1	-	-	-	1	-	1	-

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

Model Question

Paper Code - CSE12002

SET A

4. Write a C program to print all Prime numbers between 1 to n.
5. Write a C program to generate nth Fibonacci term using recursion.
6. Write a C program to count frequency of each element in an array.

Paper Title – Programming Lab

Paper Code - CSE12002

SET B

4. Write a C program to input electricity unit charges and calculate total electricity bill according to the given condition:
   For first 50 units Rs. 0.50/unit
   For next 100 units Rs. 0.75/unit
   For next 100 units Rs. 1.20/unit
   For unit above 250 Rs. 1.50/unit
   An additional surcharge of 20% is added to the bill
5. Write a C program to find factorial of any number using recursion.
6. Write a C program to add two matrices.

Paper Title – Programming Lab

Paper Code - CSE12002

SET C

4. Write a C program to find all factors of a number.
5. Write a C program to read the following information of 5 students: student name, student roll number, and marks of four subjects. Print the roll numbers and names of the students who have secured more than 40% marks.
6. Write a C program to subtract two matrices.

Paper Title – Programming Lab

Paper Code - CSE12002

SET D

4. Write a C program to check whether a year is leap year or not.
5. Write a C program to find second largest element in an array.
6. Write a C program to multiply two matrices.

MEE12001	**Engineering Workshop**	L	T	P	C
Version 1.0		0	0	4	2
Pre-requisites/Exposure	12^{th} level Physics, Engineering Mechanics				
Co-requisites	--				

Course Objectives:

1. To develop a skill in dignity of labor, 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 Experiment with different metal fitting works
CO3 Show basic forging and welding works
CO4 Understand the operations of machine tools
CO5 Select the appropriate tools required for specific operation
CO6 Understand 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 mould, given the single piece pattern and casting.
7	To prepare a sand mould, 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, andknurling) 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 ExaminationScheme:

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, PO2, PO9 PSO1**
CO2	Experiment with different metal fitting works	**PO1, PO9, PSO1**
CO3	Show basic forging and welding works	**PO1, PO9,PSO1**
CO4	Understand the operations of machine tools	**PO1, PO2, PO9, PSO1**
CO5	Select the appropriate tools required for specific operation	**PO1, PO9,PSO1**
CO6	Understand the safety measures required to be taken while using the tools	**PO1, PSO1**

Course: MEE12001 - Engineering Workshop **Program: B. Tech. (CE)** **Time: 03 Hrs.** **Semester: I** **Max. Marks: 50**			
Section A (Answer All the Questions) (5 x 1 = 5)			
1.	Discuss advantages and limitations of Gas welding.	**U**	**CO1**
2.	Write the steps involved in making a mould	**U**	**CO2**
3.	Describe the various types of pattern with neat sketch.	**R**	**CO4**
4.	Describe the specification of lathe machine.	**R**	**CO3**
5.	Discuss advantages and limitations of Gas welding.	**U**	**CO6**
SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**			
4.	Describe 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**	**CO3**
5.	To make a single piece cylindrical (solid) pattern from the given dimensions.	**App**	**CO5**
6.	To make a square fitting from the given mild steel piece and the dimensions.	**App**	**CO5**
7.	Short note of Turning, Facing, Runner.	**U**	**CO1**
SECTION (Answer All) (2 x 15= 30)			
8.	To make a single ‘V’ butt joint between two metal plates by using ARC welding.	**U**	**CO6**

9.	Describe the various types of allowance in moulding operation.	**U**	**CO2**

		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	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
MEE12001	Engineering Workshop	3	1	-	-	-	-	-	-	3	-	-	-	3	-

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

CEE11001	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**

		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	Competitive Examination Preparation	Technical Competency
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CEE12001	Engineering Drawing & CAD	-	3	3	-	-	-	-	-	3	-	-	3	-	3

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

[redacted]

Name of the Program:	B.Tech in EE	**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)	**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.		

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**

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, Laguerее 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

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 $L^{-1}\left\{\dfrac{6}{(s+\alpha)^4}\right\}$	**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 $L^{-1}\left\{\dfrac{s}{(s^2+a^2)^2}\right\}=\dfrac{t\sin at}{2a}$.	**Understand**	**CO2**
(OR)			
7 b)	Find $L^{-1}\left\{\dfrac{1}{(s+1)(s^2+1)}\right\}$.	**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 $Z^{-1}\left(\dfrac{4z}{z-a}\right)$.	**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 $\dfrac{1-\cos t}{t^2}$.	**Remember**	**CO1**
(OR)			
11 b)	Find $L\{f(t)\}$, if $f(t)=\begin{cases}\sin\left(t-\dfrac{\pi}{3}\right); & t>\dfrac{\pi}{3}\\ 0; & t<\dfrac{\pi}{3}\end{cases}$	**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 $\dfrac{d^2y}{dt^2}+2\dfrac{dy}{dt}+2y=5\sin t,\quad y(0)=y'(0)=0.$	**Apply**	**CO2**
13 a)	Apply Laplace transform method to solve the heat equation $\dfrac{\partial u}{\partial t}=\dfrac{\partial^2 u}{\partial x^2}$ 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: $u(x,0)=0,\ u_t(x,0)=\sin\left(\dfrac{\pi x}{l}\right),\ 0<x<l$ $u(0,t)=0,\ u(l,t)=0,\ t>0$	**Apply**	**CO2**
14 a)	Find inverse Z-transform of the function $F(z)=\dfrac{2z^2-10z+13}{(z-3)^2(z-2)}$, when $2<\lvert z\rvert<3$ using partial fraction method.	**Remember**	**CO3**
(OR)			
14 b)	Find the inverse Z-transform of $F(z)=\dfrac{9z^3}{(3z-1)^2(z-2)}$ with the help of Residues method.	**Remember**	**CO3**
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	**Understand & Apply**	**CO3**

	condition $y_0 = y_1 = 0$.		
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 $x\frac{d^2y}{dx^2} + (1-x)\frac{dy}{dx} + ny = 0$.	**Apply**	**CO4**

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.

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech	**Semester:**	III
Paper Title:	Data Structures and Algorithms	**Paper Code:**	CSE11104
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)	**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	**Classiffy** Data Structure	**U**	**CO1**
2	**What** are the type of complexities?	**R**	**CO1**
3	Define Stack	**R**	**CO2**
4	**Which** of the following operations is performed more efficiently by doubly linked list than by singly linked list? A) Deleting a node whose location in given B) Searching of an unsorted list for a given item C) Inverting a node after the node with given location D) Traversing a list to process each node	**R**	**CO3**
5	**What** is the way to represent hierarchical relationship between elements, Which data structure is suitable?	**R**	**CO4**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6	**Define** Stack as an ADT.	**U**	**CO1**
7	**What** is the advantages of Binary Search over Linear Search	**R**	**CO1**
8	**What** are the differences between Stack and Queue	**R**	**CO2**
9	**What** is linked list?	**R**	**CO3**
10	**What** is meant by pivot node?	**R**	**CO4**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11	**Develop** a program to search a key value along with its position in a list.	**AP**	**CO1**
12	**Construct** the postfix expression from the following infix expression using stack:	**AP**	**CO2**

	(A+B)*C-(D-E)/(F+G)		
13	**Explain** the steps involved in deleting an element from the middle into a Circular doubly-linked list.	**AP**	**CO3**
14	**Show** the result of inserting 115, 127, 56, 39, 121, 100, 13, 20, 81, 124, 12 one at a time into an initially empty binary min heap.	**E**	**CO4**
15	**Explain** how a height-balanced tree can be formed by inserting the following elements in the given order.: 1,2,3,4,5,6,7,8,9,10,11	**Ap**	**CO4**
16	**Explain** with a suitable example the collision resolution scheme using linear probing with open addressing	**Ap**	**CO5**
17	**Show** how the Quick sort algorithm will sort the following array in increasing order. 10,9,8,7,6,5,4,3,2,1	**E**	**CO5**

EEE11003	**Electrical Machines – I**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Electrical and Electronics Technology, General Mathematics, Electrostatics, Electromagnetism and AC Fundamentals				
Co-requisites	--				

Course Objectives

1. To illustrate the constructional details and principle of operation of transformer.
2. To acquire knowledge about the constructional details and principle of operation of dc machines.
3. To explain the working of transformers and dc machines as generators and motors.

Course Outcomes

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

CO1. **Illustrate** the constructional details, principle of operation, testing and applications of transformers.
CO2. **Demonstrate** the constructional details and principle of operation of DC machines.
CO3. **Analyze** the working of single and three phase transformers.
CO4. **Analyze** the working of DC machines as generators and motors.
CO5. **Examine** testing, control and applications of DC machines.

Catalog Description

Electrical machine is a general term for machines using electromagnetic forces, such as electric motors, electric generators, and others. They are electromechanical energy converters: an electric motor converts electricity to mechanical power while an electric generator converts mechanical power to electricity. The moving parts in a machine can be rotating (rotating machines) or linear (linear machines). Besides motors and generators, a third category often included is transformers, which although they do not have any moving parts are also energy converters, changing the voltage level of an alternating current In this course students will be introduced with transformer and DC machine.

Course Content

Unit I: Fundamentals of Single Phase Transformers: 14 lecture hours
Introduction, Basics of magnetic circuits, Ampere's law, linear and nonlinear magnetic circuits, Faraday's law of electromagnet induction, concept of an ideal transformer, assumptions, ideal transformer at no load and on load, phasor diagram, basic construction of a practical single phase transformer, circuit model of a practical transformer incorporating an ideal transformer, exact and approximate equivalent circuits of a practical single phase transformer, phasor diagram. Experimental determination of single phase transformer equivalent circuit parameters, open circuit and short circuit tests, percentage regulation, derivation, efficiency, derivation for maximum efficiency, all day efficiency, Sumpner's test, parallel operation.

Unit II: Three-phase Transformers: 12 lecture hours
Bank of three single phase transformers, voltage, current and kVA rating with different connections, three-phase transformer as a single unit, constructional features, comparison with a bank of three single-phase transformers, group connections and relevant phasor diagrams, polarity and terminal convention, vector groups, per phase equivalent circuit based analysis. Tap changing transformer, Parallel operation three-phase transformers, conditions of parallel operation, per

phase equivalent circuit based analysis with equal and unequal no load voltages, load sharing, three-phase to two-phase conversion using Scott connection.

Unit III: DC generators: **10 lecture hours**

Construction of DC machines, operating principle of DC generator, emf equation, types of generator and their circuit models, losses, efficiency, armature reaction, commutation, interpoles, compensating windings, characteristics of different type of DC generators and their applications.

Unit IV: DC motors: **9 lecture hours**

Operating principle of DC motor, types of DC motors, counter emf, speed and torque equations, characteristics of DC motors, speed control, starting of dc motors, Swinburne's test and Hopkinson's test, DC motor applications.

Text Books:

1. P. S. Bhimbra, *Electric Machines*, 2^{nd} Ed., Khanna Publishing, 2017.
2. D. P. Kothari and I. J. Nagrath, *Electric Machines*, 4^{th} Ed., McGraw Hill Education, 2010.
3. Charles I. Hubert, *Electric Machines: Theory, Operation, Applications, Adjustment and Control*, Pearson Education India, 2003.
4. Alexander S. Langsdorf, *Theory of Alternating Current Machinery*, McGraw Hill Education, 1984.
5. Bhag S. Guru and Huseyin R. Hiziroglu, *Electric Machinery and Transformers*, 3^{rd}Ed., Oxford University Press, 2001.

Reference Books:

1. Irving L. Kosow, *Electric Machinery and Transformers*, 2^{nd}Ed., Pearson Education, 2007.
2. P. K. Mukherjee and S. Chakravorti, *Electrical Machines*, DhanpatRai Publications, 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	**Illustrate** the constructional details testing and applications of transformers.	**PO1, PO2, PO3, PO6, PO12, PSO2**
CO2	**Demonstrate** the constructional details and principle of operation of DC machines.	**PO1, PO2, PO3, PO6, PSO1, PSO2**
CO3	**Analyze** the working of single and three phase transformers	**PO3, PO4, PO6, PSO2, PSO3**
CO4	**Analyze** the working of DC machines as generators and motors.	**PO3, PO4, PO6, PSO1, PSO2**
CO5	**Examine** testing, control and applications of DC machines	**PO3, PO4, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11003	Electrical Machines – I	3	3	3	3	-	3	-	-	-	-	-	3	3	3	1

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

[redacted]

Name:

Enrolment No:

ADAMAS UNIVERSITY
PURSUE EXCELLENCE

Course: EEE11003 – Electrical Machines – I

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	a) **Why** is the starting current very high in D.C. motor? b) **Why** are brushes required in a D.C. motor?	**R**	**CO1**
2.	**What** are the different methods of speed control of a D.C. motor.	**R**	**CO2**
3.	**Derive** the torque equation of a D.C. Machine.	**U**	**CO2**
4.	Develop the phasor diagram of a single phase transformer under no-load condition.	**Ap**	**CO3**
	SECTION B (Attempt any **Two Questions)**		
5.	A single-phase, 250/500Volt transformer gave the following results: Open-circuit test 250Volt, 1Amp, 80 Watt on low voltage side Short-circuit test 20Volt, 12Amp, 100Watt on high voltage side **Calculate** the circuit constants and show them on an equivalent circuit.	**Ap**	**CO3**
6.	With Proper circuit diagram, **explain** briefly Hopkinson's test for determination of efficiency of D.C. shunt motor. **What** are the main advantages and limitations of Hopkinson's test?	**Ap**	**CO3**
7.	An 8 pole generator has 500 armature conductors and has a useful flux per pole of 0.065 Wb. What will be the e.m.f. generated if it is lap connected and runs at 1000 r.p.m.? What must be the speed at which it is to be driven to produce the same e.m.f. if it is wave wound?	**An**	**CO4**
	SECTION C is Compulsory		
8.	Compare the various methods of electric braking in a D.C. motor.	**U**	**CO3**

	Electrical and Electronic Measurement	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Basic Principles of Electrical Engineering (Circuit Theory), Basic Digital and Analog Electronics				
Co-requisites	--				

Course Objectives

1. The objective of the course is to introduce the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers.
2. To address the underlying concepts and methods behind Electronics measurements.

Course Outcomes

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

CO1. **Explain** the basics of measuring instruments and recognize the terms related to basics of measurement.

CO2. **Explain** different types of instrument transformers, their construction and working.

CO3. **Discuss** about power and energy measurement.

CO4. **Interpret** different methods to measure resistance using bridges.

CO5. **Demonstrate** different types of DC and AC bridges to measure resistance and inductance.

CO6. **Illustrate** the concept of electronic measurements.

Catalog Description

It is a core course for all UG Electrical Engineering students. The content of this course is also aligned to the syllabus for the GATE EE exam. The course has two halves: (1) Electrical Measurements: Working principle and Dynamics of different electro-mechanical instruments, ammeter, voltmeter, ohmmeter, wattmeter, energy meter, measurement of resistance and impedances, bridges and potentiometers, Instrument transformers. (2) Electronic Instruments: Differential amplifier, op-amp circuits, Analog DC and AC instruments, ADC and DAC, Digital instruments, function generator, oscilloscope.

Course Content

Unit I: 7 lecture hours

Measuring Instruments- Classification, deflecting, control and damping torques, Ammeters and Voltmeters, PMMC, moving iron type instruments, expression for the deflecting torque and control torque, Errors and compensations, extension of range using shunts and series resistance.

Unit II: 8 lecture hours

Instrument transformers- CT and PT, Construction, Ratio and phase angle errors, uses, testing

Unit III: 6 lecture hours

Measurement of Power and Energy- Electrodynamometer type, induction type, calibration devices, errors in wattmeter, compensation, measurement of three phase power. AC induction type single phase and three phase energy meter, errors and compensations.

Unit IV: 8 lecture hours

Measurement of Resistance- Method of measuring low, medium and high resistance, sensitivity of Wheatstone's bridge, Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance –loss of charge method.

Unit V: 10 lecture hours

DC and AC Bridges- Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge, Kelvin's double bridge for measuring lowresistance, measurement of high resistance – loss of charge method.
Measurement of inductance – Maxwell's bridge, Hay's bridge, Anderson's bridge – Owen'sbridge.Measurement of capacitance and loss angle – Desauty's Bridge, Wien's bridge, Schering Bridge.

Unit VI: 6 lecture hours

Electronic Measurement- Introduction. Essentials of electronic instruments, Advantages of electronic instruments, True rms reading voltmeter, Electronic multi-meter, Digital voltmeters (DVM) - Ramp type DVM, Integrating type DVM, Continuous – balance DVM and Successive - approximation DVM, Q meter.

Text Books:

1. J. B. Gupta, Electrical and Electronic Measurements & Instrumentation, S. K. Kataria& Sons, 2013.
2. S. C. Bhargava, Electrical Measuring Instruments and Measurements, CRC Press, 2012.

Reference Books:

1. A. K. Sawhney, A Course in Electrical and Electronics Measurements and Instrumentation, Dhanpat Rai& Co., 2005.
2. E. W. Golding and F. C. Widdis, Electrical Measurements and Measuring Instruments, Reem Publications Pvt. Ltd. 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	**Explain** the basics of measuring instruments and recognize the terms related to basics of measurement.	**PO1, PO2, PO6, PO7, PO12, PSO1**
CO2	**Explain** different types of instrument transformers, their construction and working.	**PO2, PO3, PO6, PO7, PSO1, PSO2**
CO3	**Discuss** about power and energy measurement.	**PO2, PO3, PO4, PO6, PSO2**
CO4	**Interpret** different methods to measure resistance using bridges.	**PO2, PO3, PO4, PO6, PSO1, PSO2**
CO5	**Demonstrate** different types of DC and AC bridges to measure resistance and inductance.	**PO1, PO3, PO4, PO6, PSO1, PSO2**
CO6	**Illustrate** the concept of electronic measurements.	**PO2, PO3, 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 or team work	Communication	Project management and finance	Life-long Learning	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11002	Electrical and Electronic Measurement	2	3	3	3	-	3	2	-	-	-	-	2	3	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	**Semester:**	III
Paper Title:	Electrical and Electronics Measurement	**Paper Code:**	EEE11002
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	**What** is the full form of PMMC?	**Remember**	**CO1**
2	**Illustrate** the use of loss of Charge method?	**Understand**	**CO2**
3	**What** is meant by the term measurand?	**Remember**	**CO3**
4	**Which** bridge can be used for measuring frequency?	**Remember**	**CO4**
5	A bridge circuit works at a frequency of 2 kHz. **Choose** a detector that can be used as null detector in such a bridge?	**Apply**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Compare** the disadvantages of using multipliers with voltmeters for measuring high voltages.	**Understand**	**CO1**
(OR)			
6 b)	**What** do you mean by ratio error of a current transformer?	**Remember**	**CO1**
7 a)	**Compare** the advantages and disadvantages of electrical and mechanical measurement systems	**Understand**	**CO2**
(OR)			
7 b)	**Distinguish** clearly between absolute and secondary instruments.	**Analyze**	**CO2**
8 a)	**Explain** the terms accuracy, sensitivity and resolution as used for indicating instruments	**Evaluate**	**CO3**
(OR)			
8 b)	**Classify** the different types of errors in a measuring instrument?	**Evaluate**	**CO3**
9 a)	**Justify** why Wheatstone bridge is not preferred for precision measurement?	**Evaluate**	**CO4**
(OR)			
9 b)	The inductance of a moving-iron ammeter with a full-scale deflection of 90° at 1.5 A is given by $L = (200 + 40\theta - 4\theta^2 - \theta^3)$ µH where θ is the deflection in radian from the zero position. **Estimate** the angular deflection of the pointer for a current of 1 A.	**Evaluate**	**CO4**
10 a)	A current transformer has single-turn primary and a 100- turn secondary winding. The secondary winding of purely resistive burden of 1.5 Ohm draws a current of 6 A. The magnetizing ampere-turns is 60 A. Supply frequency is 50 Hz and core cross-sectional area is 800 mm^2. **Determine** the ratio and phase angle of the CT. Also find the flux density in the core. Neglect flux leakage, iron losses and copper losses.	**Evaluate**	**CO5**
(OR)			
10 b)	A PMMC voltmeter with a resistance of 20 Ω gives a fullscale deflection of	**Apply**	**CO5**

	120° when a potential difference of 100 mV is applied across it. The moving coil has dimensions of 30 mm × 25 mm and is wound with 100 turns. The control spring constant is 0.375 × 10 -6 N-m/degree. Find the flux density in the air gap. **Solve** for the dimension of copper wire of coil winding if 30% of the instrument resistance is due to coil winding. The specific resistance of copper is 1.7 × 10 -8 Ωm.		
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	**What** are the advantages and disadvantages of a Moving Iron instrument?	**Remember**	**CO1**
	(OR)		
11 b)	**Explain** the working principle and constructional details of a PMMC instrument.	**Understand**	**CO1**
12 a)	**Explain** with clear schematic diagrams, how high voltage and currents are measured with the help of instrument transformers.	**Understand**	**CO2**
	(OR)		
12 b)	**Compare** recording and integrating instruments?	**Understand**	**CO6**
13 a)	**Illustrate** the various operating forces needed for proper operation of an analog indicating instrument.	**Understand**	**CO3**
	(OR)		
13 b)	**What** is the difference between the current and potential transformer	**Remember**	**CO3**
14 a)	**Discuss** the construction of a current transformer.	**Create**	**CO4**
	(OR)		
14 b)	**Discuss** the operation of Varley Loop test	**Create**	**CO4**
15 a)	**Explain** the working principle of rms type Digital Voltmeter.	**Evaluate**	**CO6**
	(OR)		
15 b)	A Maxwell's inductance–capacitance bridge is used to measure a unknown inductive impedance. The bridge constants at bridge balance are: Pure resistance arms = 2.5 kΩ and 50 kΩ. In between these two resistors, the third arm has a capacitor of value 0.012 μF in series with a resistor of value 235 kΩ. **Estimate** the series equivalent of the unknown impedance.	**Evaluate**	**CO5**
16 a)	**Show** that the final balance expressions are independent of supply frequency in a Maxwell's bridge.	**Understand**	**CO6**
	(OR)		
16 b)	**Discuss** the advantages and disadvantages of Maxwell's bridge for measurement of unknown inductance.	**Create**	**CO6**
17 a)	**Show** that both magnitude and phase conditions need to be satisfied for balancing an AC bridge.	**Understand**	**CO5**
	(OR)		
17 b)	Expalin and draw the phasor diagram under balanced condition.	**Understand**	**CO5**

EEE11061	**Electrical Circuit Theory**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Electrical and Electronics Technology				
Co-requisites	--				

Course Objectives

1. To understand the importance of different network theorems in solving complex electrical circuits.
2. To study the effect of resonance in AC circuits.
3. To explain the working principles of magnetic circuits.
4. To explain uses of Laplace transform in different areas of electrical engineering.
5. Apply the concepts of two port network in different circuits of electrical engineering.

Course Outcomes

On completion of this course, the students will be able to
CO1. **Apply** different network theorems to solve complex electrical circuits.
CO2. **Calculate** the quality factor and **Understand** the importance of coefficient of coupling in magnetic circuits.
CO3. **Explain** the transient and steady state response of networks using Laplace Transforms.
CO4. **State** the real-life application of two port networks.

Catalog Description

This paper introduces students to different network theorems and their application principles used in different circuits, power systems, electrical machines, power electronics and in all other electrical engineering courses. The competent and successful electrical engineer must have an improved understanding of the electric circuits.

Course Content

Unit I: Network Theorems in A.C. Circuits: 10 lecture hours

Mesh analysis, nodal analysis, Thevenin’s theorem, Norton’s theorem, Superposition theorem, maximum power transfer theorem, Millman’s theorem, reciprocity theorem.

Unit II: Resonance and Coupled Circuit: 8 lecture hours
Series and parallel resonance, their frequency response, quality factor and Bandwidth, magnetic circuits, self and mutual inductance, coefficient of coupling, tuned circuits, single tuned circuits.

Unit III: Transient Analysis: 9 lecture hours
Review of ordinary linear non homogeneous first and second order differential equations with constant coefficients, transient analysis of dc circuits (with R-L, R-C, R-L-C) by classical method for unit step input, transient behavior of circuit under switching actions, evaluation of initial conditions.

Unit IV: Laplace Transform Analysis of Circuits: 9 lecture hours
Laplace transformation (LT), LT of impulse, step, ramp, sinusoidal signals and shifted functions, waveform synthesis, initial and final value theorems, application of LT in network analysis and obtaining time domain solution for R-L, R-C and R-L-C networks with ac and dc excitations.

Unit V: Two Port Networks Analysis: 9 lecture hours
Open circuit impedance and short circuit admittance parameter, transmission parameters, hybrid parameters and their inter relations, driving point impedance and admittance, solution of problems

Text Books:

1. William H. HaytJr., Jack E. Kemmerly and Steven M. Durbin, *Engineering Circuits Analysis*, 8th Ed., Indian Edition, McGraw Hill Education, 2013.
2. C. K. Alexander and Matthew N. O. Sadiku, *Fundamentals of Electric Circuits*, 6th Ed., McGraw Hill Education, 2019.
3. M. E. Van Valkenburg and T. S. Rathore, *Network Analysis*, Pearson Education, 2019.

Reference Books:

1. William H. Hayt and Jack E. Kemmerly, *Problems and Solutions in Engineering Circuit Analysis*, McGraw Hill Education, 2017.
2. M. Nahvi, Joseph Edminister and K. Rao, *Electric Circuits (Schaum's Outlines Series)*, 5th Ed., McGraw Hill Education, 2017.

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

Components	Mid Term	Attendance	Class Assessment	End Term
Weightage (%)	**20**	**10**	**30**	**40**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Apply** different network theorems to solve complex electrical circuits.	**PO1, PO2, PO3, PO5, PO8, PSO1**
CO2	**Calculate** the quality factor and **Understand** the importance of coefficient of coupling in magnetic circuits.	**PO3, PO4, PO5, PO6, PO7, PSO1, PSO2**
CO3	**Explain** the transient and steady state response of networks using Laplace Transforms.	**PO2, PO4, PO5, PO6, PSO2**
CO4	**State** the real-life application of two port networks.	**PO2, PO3, PO4, PO5, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11061	Electric Circuit Theory	2	3	3	3	3	3	2	-	-	-	-	-	3	3	-

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(ODD SEMESTER 2022)**		
Name of the Program:	B. TECH	**Semester:**	III
Paper Title:	**Electrical Circuit Theory**	**Paper Code:**	EEE11061
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	02
(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, 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	**What** is an LTI system?	**Remember**	**CO1**
2	**Define** Auto Correlation Function	**Remember**	**CO2**
3	**State** the conditions for causality of a LTI System?	**Remember**	**CO3**
4	**What** is the advantage of FTIR?	**Remember**	**CO4**
5	The impulse function is denoted by _______ a) u(t) b) δ(t) c) u(t) or δ(t)d) none of the above	**Understand**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**Find** the Fourier transform of Signum Function	**Evaluate**	**CO1**
	(OR)		
6 b)	**What** are the Conditions for a System to be LTI System?	**Remember**	**CO1**
7 a)	**State** Distributive properties of convolution	**Remember**	**CO2**
	(OR)		
7 b)	**State** initial value theorem for Laplace transforms.	**Remember**	**CO3**
8 a)	**Define** Z transform. What are the two types of Z transform.	**Evaluate**	**CO3**
	(OR)		
8 b)	**State** Modulation theorem	**Understand**	**CO4**
9 a)	**Explain** sampling theorem	**Remember**	**CO4**
	(OR)		
9 b)	**Explain** Band limited Signals	**Analyze**	**CO4**
10 a)	**Distinguish** between linear and non-linear systems	**Remember**	**CO5**
	(OR)		
10 b)	**How** are signals classified?	**Understand**	**CO4**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	**Explain** the Dirchlet's conditions and its significance to obtain Fourier series representation of any signal	**Understand**	**CO1**
	(OR)		
11 b)	**Evaluate** the trigonometric Fourier series expansion of a Half wave	**Analyze**	**CO1**

	rectified cosine function.		
12 a)	**With** the help of graphical example explain sampling theorem for Band limited signals and also give the mathematical analysis	**Remember**	**CO2**
(OR)			
12 b)	**What** is Poly-Wiener criterion for physical realization?	**Understand**	**CO2**
13 a)	**State** and derive the relationship between band-widthand and rise time.	**Understand**	**CO3**
(OR)			
13 b)	**List** the properties of Autocorrelation function.	**Analyze**	**CO3**
14 a)	State and prove the relation between auto correlation function and energy/power spectral density function	**Understand Analyse**	**CO4,**
(OR)			
14 b)	**Determine** the inverse Laplace of the following functions. i) 1/s(s+1)	**Evaluate**	**CO4**
15 a)	**Obtain** the Complex Fourier transform of the following functions. i) Impulse function δ(t) ii) Unit Step function.	**Understand**	**CO4**
(OR)			
15 b)	**Find** the Z - transform of the signal (i)$x(n)= n.a^n u(n)$ (ii) $x(n)= a^n \cos(\omega 0\ n)\ u(n)$	**Evaluate**	**CO4**
16 a)	**List** the properties of ROC for Z-transforms	**Analyse**	**CO4**
(OR)			
16 b)	**State** and Prove Properties of auto correlation	**Understand**	**CO4**
17 a)	**Compare** the merits and demerits of performing sampling using impulse, Natural and Flat -top sampling techniques.	**Analyse**	**CO5**
(OR)			
17 b)	A continuous time signal is given as: x(t) = 8 cos200πt Determine i. Minimum sampling rate ii.If fs=400Hz what is discrete time signal obtained after sampling. iii.If fs=150Hz what is discrete time signal obtained after sampling.	**Evaluate**	**CO5**

Data structure and algorithm lab

EEE12006	**Electrical Machines – I Lab**	L	T	P	C
Version 1.0		0	0	3	2
Pre-requisites/Exposure	Basic Principles of Electrical Engineering				
Co-requisites	--				

Course Objectives

This course provides hands on experience on the speed control of d.c motor and induction motor, starting methods of three phase induction motor, polarity identification for parallel operation of transformer , three to two phase conversion using scott connected transformer , parallel operation and voltage regulation of the alternator.

Course Outcomes

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

CO1. **Make experiment with** DC motor to obtain load characteristics.

CO2. **Make experiment with** single phase transformer to determine equivalent circuit parameters, and parallel operation of two single phase transformers.

CO3. **Study** Scott connected transformer.

Catalog Description

The course will begin with explaining basic underlying principles of working of various types of electrical rotating machines. Motoring and generating mode of operation. Primary focus will be on the operation of 3-phase induction machine, single phase induction motor,and synchronous machines. For each of this machine equivalent circuit will be derived and then used to derive expression for the torque. Starting, speed control of the motors will be performed. Although main focus will be on the steady state performance analysis.

Course Content

1. Open circuit test of a single phase transformer
2. Short circuit test of a single phase transformer
3. Polarity test of 1-phase transformer
4. Parallel operation of transformer
5. Speed control of D.C. shunt motor by armature control method
6. Speed control of D.C. shunt motor by field control method
7. D.C. shunt motor load test
8. D.C. series motor load test
9. Study of separately excited D.C. generator
10. Study of compound generator

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	**Make experiment with** DC motor to obtain load characteristics.	**PO1, PO2, PO3, PO5, PO6, PO8, PO10, PSO1, PSO2**
CO2	**Make experiment with** single phase transformer to determine equivalent circuit parameters, and parallel operation of two single phase transformers.	**PO1, PO2, PO3, PO5, PO6, PO10, PSO2**
CO3	**Study** Scott connected transformer.	**PO3, PO4, PO6, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12006	Electrical Machines – I Lab	3	3	3	3	3	3	-	3	-	3	-	-	3	3	-

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

	Electrical and Electronic Measurement Lab	L	T	P	C
Version 1.0		0	0	3	2
Pre-requisites/Exposure	Basic Principles of Electrical Engineering (Circuit Theory), Basic Digital and Analog Electronics				
Co-requisites	--				

Course Objectives

The objective of the course is to provide a brief knowledge of measurements and measuring instruments related to engineering. The basic idea of this course is to give the sufficient information of measurements in any kind of industry viz. electrical, electronics, mechanical etc.

Course Outcomes

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

CO1. **Demonstrate** the basics of different measuring instrument.

CO2. **Demonstrate** and practice the application of different measuring Instrument.
CO3. **Develop** different bridges to measure electrical and electronic circuit elements.
CO4. **Estimate** different measuring instruments with oscilloscope and MATLAB.

Catalog Description

It is a core course for all UG Electrical Engineering students. The content of this course is also aligned to the syllabus for the GATE EE exam. The course has two halves: (1) Electrical Measurements: Working principle and Dynamics of different electro-mechanical instruments, ammeter, voltmeter, ohmmeter, wattmeter, energy meter, measurement of resistance and impedances, bridges and potentiometers, Instrument transformers. (2) Electronic Instruments: Differential amplifier, op-amp circuits, Analog DC and AC instruments, ADC and DAC, Digital instruments, function generator, oscilloscope.

Course Content

1. Extend the range of D.C ammeter by using shunt resistances (low range to high range). 2. Extend the range of D.C.voltmeter by using series multiplier.(Low range to high range). 3. Extend the range of A.C.ammeter by using C.T.(high range to low range).
4. Extend the range of A.C.voltmeter by using P.T.(high range to low range). 5. Calibrate a D.C.voltmeter by standard method.
6. Calibrate a D.C ammeter by standard method.
7. Measure power and p.f. of single phase circuit using wattmeter by indirect method.
8. Measure p.f. of single phase circuit by direct method using digital p.f.meter and compare the same with indirect method.
9. Measure p.f. of three -phase circuit using digital p.f meter and compare the same within direct method.
10. Calibrate a wattmeter by standard method.
11. Measure energy consumed by single- phase circuit using analog single- phase energy meter.
12. Measure energy consumed by single- phase circuit using digital single- phase energy meter and compare the same with analog single-phase energy meter readings.
13. Measure energy consumed by three phase circuit using analog three- phase energy meter.
14. Measure energy consumed by three- phase circuit using digital three- phase energy meter and compare the same with analog three-phase energy meter readings.
15. Measure energy consumed by three- phase circuit using digital three- phase energy meter and compare the same with analog three-phase energy meter readings.

16. Calibrate single phase energy meter by standard method.
17. Conduct an experiment to determine unknown resistance using Wheat stone's bridge.
18. Conduct an experiment to determine unknown inductance by Maxwell's bridge.
19. Conduct an experiment to determine unknown capacitance by Schering bridge.
    Measure R, L, C by using digital LCR meter and current flowing in any phase a.c circuit using digital tong tester.

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 of different measuring instrument.	**PO1, PO2, PO3, PSO1, PSO2**
CO2	**Demonstrate** and practice the application of different measuring Instrument.	**PO1, PO2, PO3, PO6, PSO2**
CO3	**Develop** different bridges to measure electrical and electronic circuit elements.	**PO1, PO2, PO3, PO5, PSO2**
CO4	**Estimate** different measuring instruments with oscilloscope and MATLAB.	**PO2, PO4, PO5, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12005	Electrical and Electronic Measurement Lab	3	3	3	2	3	-	-	-	-	-	-	-	2	3	-

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech	**Semester:**	III
Paper Title:	Electrical and Electronics Measurement Lab	**Paper Code:**	EEE12005
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.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	**What** is the full form of PMMC?	**Remember**	**CO1**
2	**Illustrate** the use of loss of Charge method?	**Understand**	**CO2**
3	**What** is meant by the term measurand?	**Remember**	**CO3**
4	**Which** bridge can be used for measuring frequency?	**Remember**	**CO4**
5	A bridge circuit works at a frequency of 2 kHz. **Choose** a detector that can be used as null detector in such a bridge?	**Apply**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Compare** the disadvantages of using multipliers with voltmeters for measuring high voltages.	**Understand**	**CO1**
(OR)			
6 b)	**What** do you mean by ratio error of a current transformer?	**Remember**	**CO1**
7 a)	**Compare** the advantages and disadvantages of electrical and mechanical measurement systems	**Understand**	**CO2**
(OR)			
7 b)	**Distinguish** clearly between absolute and secondary instruments.	**Analyze**	**CO2**
8 a)	**Explain** the terms accuracy, sensitivity and resolution as used for indicating instruments	**Evaluate**	**CO3**
(OR)			
8 b)	**Classify** the different types of errors in a measuring instrument?	**Evaluate**	**CO3**
9 a)	**Justify** why Wheatstone bridge is not preferred for precision measurement?	**Evaluate**	**CO4**
(OR)			
9 b)	The inductance of a moving-iron ammeter with a full-scale deflection of 90° at 1.5 A is given by $L = (200 + 40\theta - 4\theta^2 - \theta^3)$ μH where θ is the deflection in radian from the zero position. **Estimate** the angular deflection of the pointer for a current of 1 A.	**Evaluate**	**CO4**
10 a)	A current transformer has single-turn primary and a 100- turn secondary winding. The secondary winding of purely resistive burden of 1.5 Ohm draws a current of 6 A. The magnetizing ampere-turns is 60 A. Supply frequency is 50 Hz and core cross-sectional area is 800 mm^2. **Determine** the ratio and phase angle of the CT. Also find the flux density in the core. Neglect flux leakage, iron losses and copper losses.	**Evaluate**	**CO5**
(OR)			
10 b)	A PMMC voltmeter with a resistance of 20 Ω gives a fullscale deflection of	**Apply**	**CO5**

	120° when a potential difference of 100 mV is applied across it. The moving coil has dimensions of 30 mm × 25 mm and is wound with 100 turns. The control spring constant is 0.375 × 10 -6 N-m/degree. Find the flux density in the air gap. **Solve** for the dimension of copper wire of coil winding if 30% of the instrument resistance is due to coil winding. The specific resistance of copper is 1.7 × 10 -8 Ωm.		
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**What** are the advantages and disadvantages of a Moving Iron instrument?	**Remember**	**CO1**
(OR)			
11 b)	**Explain** the working principle and constructional details of a PMMC instrument.	**Understand**	**CO1**
12 a)	**Explain** with clear schematic diagrams, how high voltage and currents are measured with the help of instrument transformers.	**Understand**	**CO2**
(OR)			
12 b)	**Compare** recording and integrating instruments?	**Understand**	**CO6**
13 a)	**Illustrate** the various operating forces needed for proper operation of an analog indicating instrument.	**Understand**	**CO3**
(OR)			
13 b)	**What** is the difference between the current and potential transformer	**Remember**	**CO3**
14 a)	**Discuss** the construction of a current transformer.	**Create**	**CO4**
(OR)			
14 b)	**Discuss** the operation of Varley Loop test	**Create**	**CO4**
15 a)	**Explain** the working principle of rms type Digital Voltmeter.	**Evaluate**	**CO6**
(OR)			
15 b)	A Maxwell's inductance–capacitance bridge is used to measure a unknown inductive impedance. The bridge constants at bridge balance are: Pure resistance arms = 2.5 kΩ and 50 kΩ. In between these two resistors, the third arm has a capacitor of value 0.012 μF in series with a resistor of value 235 kΩ. **Estimate** the series equivalent of the unknown impedance.	**Evaluate**	**CO5**
16 a)	**Show** that the final balance expressions are independent of supply frequency in a Maxwell's bridge.	**Understand**	**CO6**
(OR)			
16 b)	**Discuss** the advantages and disadvantages of Maxwell's bridge for measurement of unknown inductance.	**Create**	**CO6**
17 a)	**Show** that both magnitude and phase conditions need to be satisfied for balancing an AC bridge.	**Understand**	**CO5**
(OR)			
17 b)	Expalin and draw the phasor diagram under balanced condition.	**Understand**	**CO5**

	Numerical Techniques Lab	L	T	P	C
Version 1.0		0	0	3	2
Pre-requisites/Exposure	Knowledge of 12^{th} level Mathematics, Numerical Techniques and C/MATLAB Programming Language				
Co-requisites	--				

Course Objectives

The primary objective of this course is to provide students hands on experience of implications of the various techniques used in numerical computations through understanding algorithms and writing computer programs. These techniques include solving non-linear equations and system of linear equations, computing numerical interpolation and numerical integrations, and solving ordinary differential equations. The ultimate goal of this course is to enhance the skill to critically think, model and solve any mathematical problems.

Course Outcomes

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

CO1. Numerically **solve** non-linear equations related to univariate problems.

CO2. Numerically **solve** system of linear equation related to multivariate problems.

CO3. **Obtain** interpolated value of a function that is known at a finite number of points.

CO4. Numerically **compute** values of any definite integrals.

CO5. **Solve** initial value problems representing systems with spatial/temporal variations.

Catalog Description

Numerical computations play a crucial role in solving simple to complex problems in science and engineering. Growing power and efficiency of the modern computers has made the numerical computations more sophisticated, accurate and powerful. Practical knowledge of numerical computation techniques is very essential for modern science and engineering. This lab course is designed for under graduate and B. Tech. students to provide them comprehensive knowledge and practical experience of solving various mathematical problems using suitable numerical techniques. In this course students will learn algorithms and write computer programs for the numerical techniques towards solving problems. The course includes techniques for solving non-linear equations and system of linear equations, computing interpolations and integrations of functions, and solving ordinary differential equations. The course will help students to build the skill to model and solve real-life problems with simple to moderate level of difficulty.

Course Content

Write C/ MATLAB programs to execute the followings:

1. The root of non-linear equation using Bisection method.
2. The root of non-linear equation using false position method.
3. The root of non-linear equation using Newton-Raphson method.

4. Interpolate values using Newton’s forward Interpolation method.
5. Interpolate values using Newton’s backward Interpolation method.
6. Interpolate values using Lagrange’s interpolation method.
7. Solve a system of linear equation using gauss-elimination method.
8. Solve a system of linear equation using Gauss-Seidel method.
9. Evaluate the integral using different numerical integration rules.
10. Solve an ordinary differential equation using different numerical methods.

Text Books:

1. S. Dey, S. Gupta, Numerical Methods, McGraw Hill Education (India) Pvt. Ltd., 2013.
2. Amritava Gupta, S.C. Bose, Introduction to Numerical Analysis, 3rd Ed., Academic Publishers, 2013.
3. D. Kincaid and W. Cheney, Numerical Analysis: Mathematics of Scientific Computing, 3rd Ed., AMS, 2002.
4. K. E. Atkinson, An Introduction to Numerical Analysis, 2nd Ed., John Wiley& Sons, 1989.

Text Books:

1. Laurene V. Fausett, Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson, 2007.
2. B.S. Grewal, Numerical Methods in Engineering & Science: with Programs in C & C++, 11th Ed., Khanna Publishers, 2013.

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	Numerically **solve** non-linear equations related to univariate problems.	PO1, PO2, PO3, PSO1
CO2	Numerically **solve** system of linear equation related to multivariate problems.	PO2, PO3, PO6, PSO1

CO3	**Obtain** interpolated value of a function that is known at a finite number of points.	**PO1, PO3, PO9, PO12, PSO1**
CO4	Numerically **compute** values of any definite integrals.	**PO1, PO2, PO3, PO12, PSO1**
CO5	**Solve** initial value problems representing systems with spatial/temporal variations.	**PO1, PO2, PO3, PO11, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SMA42212	Numerical Techniques Lab	3	3	3	-	-	2	-	-	2	-	2	3	3	-	-

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

ADAMAS UNIVERSITY

END SEMESTER PRACTICAL EXAMINATION

(EVEN SEMESTER 2022)

Name of the Program:	Electrical Engineering	**Semester:**	IV
Paper Title:	Numerical Techniques Lab	**Paper Code:**	MTH12531
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	12	**Total No of Pages:**	2

Answer any two questions from any one section only

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.

Section A

Answer Any Two Questions (2 x 20 = 40 marks) + Viva (10 marks)

Explain the Bisection method and then find a real root of the non-linear equation $xe^x - 1 = 0$ between 0 and 1 correct to three decimal places by Matlab program.	**U**	**CO1**
Explain the Gauss elimination method for solving a system of linear equations and then find the solution of the following system by Matlab program: $2x + y + 4z = 12$ $8x - 3y + 2z = 20$ $4x + 11y - z = 33$	**U**	**CO2**
Derive the Newton's forward interpolation formula and then find the value of $f(1.6)$ by Matlab program for the following table: x: 1, 1.4, 1.8, 2.2 $f(x)$: 3.49, 4.82, 5.96, 6.5	**R**	**CO3**
Derive the formula of Trapezoidal rule and then find the following integration by Matlab program (Take 10 number of intervals between 0 to 6): $\int_0^6 \frac{1}{1+x^2} dx$	**R**	**CO4**

OR

Section B

Answer Any Two Questions (2 x 20 = 40 marks) + Viva (10 marks)

Explain the Regula-Falsi method and then find a real root of the non-linear equation $x \log_{10} x = 1.2$ correct to three decimal places by Matlab program.	**U**	**CO1**
Explain the Gauss-Seidel method for solving a system of linear equations and then find the solution of the following system by Matlab program: $10x + y + z = 12$ $2x + 10y + z = 13$ $2x + 2y + 10z = 14$	**U**	**CO2**
Derive the Newton's backward interpolation formula and then find the value of $f(1.28)$ by Matlab program for the following table:	**R**	**CO3**

x	1.15	1.20	1.25	1.30
$f(x)$	1.0723	1.0954	1.1180	1.1401

Derive the formula of Simpson's 1/3rd rule and then find the following integration by Matlab program (Take 10 number of intervals between 0 and 1): $$\int_0^1 \frac{x^2}{1+x^3}dx$$	**R**	**CO4**

(OR)

Section C

Answer Any Two Questions (2 x 20 = 40 marks) + Viva (10 marks)

Explain the Newton-Raphson method for solving a non-linear equation and then find a positive real root of $x^4 - x = 10$ correct to three decimal places by Matlab program.	**U**	**CO1**
Derive the Lagrange's interpolation formula and then find the value of $f(9)$ by Matlab program for the following table:	**R**	**CO3**

x	5	7	11	13	17
$f(x)$	150	392	1452	2366	5202

Explain the Euler's method for solving an ordinary differential equation and then find an approximate value of y corresponding to $x=1$ of the following initial value problem by Matlab program: $$\frac{dy}{dx} = x + y; \;\; y(0) = 1$$	**U**	**CO5**
Explain the Runge-Kutta 4th order method for solving an ordinary differential equation and then find approximate values of y corresponding to $x = 0.2,\ 0.4$ of the following initial value problem by Matlab program: $$\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}; \;\; y(0) = 1$$	**U**	**CO5**

	Interdisciplinary Project	L	T	P	C
Version 1.0		0	0	5	3

Pre-requisites/Exposure	Knowledge of Basic English
Co-requisites	Knowledge of Basic Computer Skills

Course Objectives

1. Interdisciplinary nature of knowledge and learning.
2. 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.
3. Competencies learned during the educational process and to apply these competencies in a real-world application.

Course Outcomes

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

CO1. **Recognize** the unique advantages of integrative research and learning.

CO2. **Understand** the fundamentals of research methods and practices of various academic disciplines.

CO3. **Demonstrate** an understanding of current issues and concerns.

CO4. **Realize** the importance of ethics in research process.

CO5. **Understand** the inter-disciplinary systems of research documentation.

Course Content

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 Timetable. 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.

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	**Recognize** the unique advantages of integrative research and learning.	**PO1, PO9, PO10, PSO1**
CO2	**Understand** the fundamentals of research methods and practices of various academic disciplines.	**PO1, PO9, PO10, PSO1**
CO3	**Summarize** the energy management system of smart cities.	**PO1, PO9, PO10, PSO1**
CO4	**Demonstrate** an understanding of current issues and concerns.	**PO1, PO9, PO10, PSO1**
CO5	**Understand** the inter-disciplinary systems of research documentation.	**PO1, PO9, PO10, PSO1**

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

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
IDP14001	Interdisciplinary Project	3	-	-	-	-	-	-	-	3	3	-	-	3	-	-

	Community Service	L	T	P	C
Version 1.0		-	-	-	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. **Understand** 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**

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 –** Throughdiscussion, 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 theirwork, 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 theTestimonials 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
7. 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.
8. 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).

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

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Understand the concept of social responsibility throughan internship.	**PO6, PO9, PO12,PSO3**
CO2	Acquire hands on experience in 'giving back to thesociety' through the concept of social responsibility through an internship.	**PO6, PO9, PO12,PSO3**

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

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsibleengineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
SOC14100	Community Service	-	-	-	-	-	3	-	-	3	-	-	3	-	-	3

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

	Signals and Systems	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Electrical and Electronics Technology				
Co-requisites	--				

Course Objectives

1. To understand the importance of different signals
2. To aware students about the meaning and implications of the properties of systems and signals
3. To explain the uses of Z-transform and Fourier transform.

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

CO1. **Understand** different signals and its characteristics.

CO2. **Calculate** the fourier transform co-efficients and understand its applications

CO3. **Apply** Z-transform and understand its application in electrical engineering.

CO4. **Understand** discrete time signals and systems.

Catalog Description

This paper introduces students to different network theorems and their application principles used in different circuits, power systems, electrical machines, and power electronics and in all other electrical engineering courses. The competent and successful electrical engineer must have an improved understanding of the electric circuits.

Course Content

UNIT I

Signals – Signals and their representation, classification of signals, singularity functions – Impulse, step, ramp functions, representation of signals with singularity functions, exponential functions. Systems: Definition, Classification of Systems, Convolution integral, graphical convolution. Signal Approximation

UNIT-II

Fourier Transforms and their applications to systems – Fourier transform definition, properties of F.Ts , energy spectral density, parsevals theorem, power spectral density, Hilbert transforms and properties. Linear Systems – impulse response, response of a linear system, linear time invariant system, linear time variant system, transfer function of LTI system

UNIT-III

Random Variables & Processes – Probability, Joint Probability, Statistical independence, Random Variables, cumulative distribution function, probability density function, relation between probability & probability density, joint commutative distribution, average valve of random variables, variance of a random variable

UNIT-IV

Discrete Time Signals & Systems: Discrete time signals, representation, operations on sequences, Discrete time systems and classification, LTI systems, Linear Convolution, Difference equations. Z-Transforms: ROC, properties of Z-Transforms Inverse Z-Transforms, Causality and stability. Realization of Discrete Systems: Structural realization of discrete systems – Direct form – I, Direct form-II, Cascade and parallel forms.

TEXT BOOKS:

1. Simon & Haykins, Signals & Systems, Wiley Eastern Ltd.,
2. Zeimer, Signals & Systems, PHI.
3. Proakis, Digital Signal Processing: Principles, Algorithms and Applications.(PHI)

4. Simon & Haykin – “ Signals & Circuits” – John Willey

REFERENCE BOOKS:

1. Oppenheim, Willsky & Young; Signals and Systems PHI, EEE, New Delhi.
2. P-Z Peebles – Probabilities, Random Variables and Random Signal Principles – TMH.
3. B.P. Lathi, Signals & Systems and Communication – BSP.

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** different signals and its characteristics.	**PO2, PO3, PO6, PSO1, PSO2**
CO2	**Calculate** the fourier transform co-efficients and understand its applications	**PO2, PO3, PO6, PO12, PSO2**
CO3	**Apply** Z-transform and understand its application in electrical engineering	**PO2, PO3, PO6, PO12, PSO1, PSO2**
CO4	**Understand** discrete time signals and systems.	**PO2, PO3, PO6, PSO1, PSO2**

		L	T	P	C
EEE11007	**Electrical Machines – II**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Electrical Machines – I				
Co-requisites	--				

Course Objectives

1. This course teaches the principles which are fundamental to AC machines.
2. The aim of this course is to provide students with an understanding of the physical principles that governs electromechanical motion and transformation of electrical energy.

Course Outcomes

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

CO1. **Classify** various losses in a three phase induction motor.

CO2. **Understand** principle of operation and different Staring methods.

CO3. **Learn** the process of ‘synchronization’ of a generator to the live bus bar and appraise the purpose for parallel operation of generators.

CO4. **Learn** the method of starting a synchronous motor.

Catalog Description

The course will begin with explaining basic underlying principles of working of various types of electrical rotating machines. The conditions to be fulfilled for the steady production of electromagnetic torque (Te).Motoring and generating mode of operation. Primary focus will be on the operation of 3-phase induction machine, single-phase induction motor, and synchronous machines. A fair knowledge of distributed windings is essential in order to understand the working of rotating machines more effectively – few lectures will be devoted on this topic. Concept of electrical and mechanical angles will be explained. Nature of magnetic flux distribution along the air-gap of a rotating machine will be discussed. Clear concept of Rotating magnetic field is so important in understanding the operation of induction and synchronous machines. For each of this machine equivalent circuit will be derived and then used to derive expression for the torque. Starting, speed control and electrical braking of the motors will be discussed. Although main focus will be on the steady state performance analysis, few cases of important transient analysis will be discussed. Students will be motivated to solve numerical problems logically and efficiently.

Course Content

Unit I: Three-Phase Induction Motor: 10 lecture hours
Construction, working principle, rotating magnetic field, exact and approximate per phase equivalent circuit, phasor diagram under no load and loaded condition, slip and its effect on rotor parameters, rotor frequency, torque-slip characteristics, starting torque, breakdown torque, maximum mechanical power, power flow diagram, efficiency, synchronous watt, measurement of slip, determination of equivalent circuit using no-load test and blocked rotor test, circle diagram, starting methods, speed control methods, crawling, cogging, deep cage and double cage rotors, starting methods, speed control of three-phase induction motor, applications, self-excited and grid connected induction generator.

Unit II: Single-Phase Induction Motor: 10 lecture hours
Introduction, Principle of operation, double field revolving theory, and Equivalent circuit of single- phase induction motor, determination of equivalent circuit parameters from no load and blocked
Staring methods, speed-torque characteristic, condition of maximum torque, split phase starting, resistance spilt phase, capacitor split phase, capacitor start and run, shaded pole starting, Reluctance starting, Applications.

Unit III: Three-Phase Synchronous Generator: 15 lecture hours
Introduction, comparison with DC generator, advantages of rotating field over rotating armature, constructional features, excitation systems, armature windings, EMF equation, winding factor, harmonics, armature resistance, armature reaction: unity power factor, zero lagging and zero leading power factor, armature reaction reactance, equivalent circuit of an alternator, voltage equation, phasor diagram of a loaded alternator for various types of loads, voltage regulation and methods of estimation of voltage regulation, load characteristic of alternators, power equation, parallel operation of alternators, synchronising procedures, synchronising power and torque

Unit IV: Three-Phase Synchronous Motor: 10 lecture hours
Voltage equation, phasor diagram, operation at constant load with variable excitation, power equations, salient pole synchronous motor, starting of synchronous motors, applications, synchronous condensers.

Text Books:

1. P. S. Bhimbra, *Electric Machines*, 2nd Ed., Khanna Publishing, 2017.
2. D. P. Kothari and I. J. Nagrath, *Electric Machines*, 4th Ed., McGraw Hill Education, 2010.
3. Charles I. Hubert, *Electric Machines: Theory, Operation, Applications, Adjustment and Control*, Pearson Education India, 2003.
4. Alexander S. Langsdorf, *Theory of Alternating Current Machinery*, McGraw Hill Education,

1984.

5. Bhag S. Guru and Huseyin R. Hiziroglu, *Electric Machinery and Transformers*, 3rd Ed., Oxford University Press, 2001.

Reference Books:

1. Irving L. Kosow, *Electric Machinery and Transformers*, 2nd Ed., Pearson Education, 2007.
2. P. K. Mukherjee and S. Chakravorti, *Electrical Machines*, DhanpatRai Publications, 2011.
3. N. N. Parker Smith, *Parker Smith's Problems in Electrical Engineering*, 9th Ed., CBS Publishers, 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	**Classify** various losses in a three phase induction motor.	**PO2, PO3, PO6, PSO1, PSO2**
CO2	**Understand** principle of operation and different Staring methods.	**PO2, PO3, PO6, PO12, PSO2**
CO3	**Learn** the process of 'synchronization' of a generator to the live bus bar and appraise the purpose for parallel operation of generators.	**PO2, PO3, PO6, PO12, PSO1, PSO2**
CO4	**Learn** the method of starting a synchronous motor.	**PO2, PO3, PO6, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11007	Electrical Machines – II	-	3	3	-	-	3	-	-	-	-	-	3	3	3	-

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

[redacted]

Name:

Enrolment No:

Course: EEE11007 – Electrical Machines – II

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	**What** are the conditions of parallel operation of alternators?	**U**	**CO3**
2.	**What** are the starting methods of three phase induction motor?	**U**	**CO2**
3.	**Give** any two methods of starting a synchronous motor.	**U**	**CO4**
4.	**Why** is a starter needed for starting a large capacity induction motor?	**U**	**CO2**
	SECTION B (Attempt any **Two Questions)**		
5.	**What** is synchronizing power of an alternator?	**An**	**CO3**
6.	**What** are the advantages of parallel operation of alternator?	**U**	**CO3**
7.	**What** are the rotational losses in induction motor?	**R**	**CO1**
	SECTION C is Compulsory		
8.	Two identical three-phase wye-connected synchronous generators share equally a load of 10 MW at 33 kV and 0.8 lagging power factor. The synchronous reactance of each machine is 6 Ω per phase and the armature resistance is negligible. If one of the machines has its field excitation adjusted to carry 125 A of lagging current, **what** is the current supplied by the second machine? The prime mover inputs to both machines are equal.	**An**	**CO2**

		L	T	P	C
EEE11046	**Power Systems**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Electric Circuits				
Co-requisites	--				

Course Objectives

1. To introduce the concepts and phenomenon of different sources of Power Generation.
2. To give the student will get an idea about the fundamental concepts of electrical power distribution, both AC & DC.
3. To give the students a view of Tariff methods for electrical energy consumption in the prospect of optimum utilization of electrical energy.
4. To enable student's Initial knowledge will take place for different fault and study state analysis.

Course Outcomes

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

CO1. **Explain** general structure of power system.

CO2. **Apply** the concept behind the passive elements like resistance, inductance and capacitance for formation of equivalent networks of transmission lines.

CO3. **Understand** the effect of corona in power system.

CO4. **Analyze** electrical and mechanical design aspects of transmission lines and underground cables.

Catalog Description

This course familiarizes you with standards and policies of the electric utility industry, and provides you with basic vocabulary used in the business. It introduces the electric power system, from generation of the electricity all the way to the wall plug. You will learn about the segments of the system, and common components like power cables and transformers.

Course Content

Unit1: Introduction: 4 lecture hours

Single-phase and three-phase transmission, comparison of AC and DC transmission, advantage of high voltage transmission, advantages and disadvantage of EHV (AC) and HVDC Transmission, concept of complex power, per unit system, power system layout.

Unit2: Line Constants: 9 lecture hours

Resistance, inductance and capacitance of single-phase and three-phase line with symmetrical and unsymmetrical spacing, GMD and GMR calculation, transposition of power line, Effect of earth on line capacitance, charging current due to capacitance effect, bundle conductors, skin and proximity effect.

Unit3: Performance of Transmission Line: 8 lecture hours

Analysis of short, medium and long transmission line, ABCD constants and its calculation for short, medium and long transmission line, transmission efficiency, voltage regulation, Ferranti effect, surge impedance and surge impedance loading, line compensators.

Unit4: Corona: 4 lecture hours

Critical disruptive voltage, visual critical voltage, corona power losses, factors affecting corona, advantages and disadvantages of corona, problem discussion, radio interference between power and communication line, power flow through a transmission line (circle diagrams), reactive compensation of transmission lines.

Unit5: Mechanical Design of Overhead Transmission Lines: 8 lecture hours
Types of conductor and insulator, insulating materials, potential distribution over a string of suspension insulators, string efficiency, methods of equalization of the potentials, sag and tension calculation with equal and unequal heights of the towers, effect of ice and wind loading.

Unit6: Underground Cables:6 lecture hours
Overhead line verses underground cables, type and construction, grading of cables, insulation resistance of single core cable, capacitance of single core and three core cables, measurement of capacitance, dielectric losses, most economical conductor size in a cable.

Unit7: Distribution Systems: 6 lecture hours
Classification of distribution system, types of ac and dc distributors, feeder, voltage drop and load calculation for concentrated and distributed loads, radial and ring main system, economic choice of conductor, Kelvin's law.

Text Books:

1. C. L. Wadhwa, *Electrical Power System*, 6th Ed., New Age International (P) Ltd., 2008.
2. D. P. Kothari and I. J. Nagrath, *Power System Engineering*, 3rd Ed., McGraw Hill, 2019.
3. John J. Grainger and William D. Stevenson, Jr., *Power System Analysis*, Indian Edition, McGraw Hill Education, 2017.

Reference Books:

1. Theodore Wildi, *Electrical Machines, Drives and Power Systems*, 6th Ed., Pearson Education, 2013.
2. J. Duncan Glover, Mulukutla S. Sarma and Thomas J. Overbye, *Power System: Analysis & Design*, 5th Ed., Cengage Learning India Pvt. Ltd., 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	**Explain** general structure of power system.	**PO1, PO2, PSO1, PSO2**
CO2	**Apply** the concept behind the passive elements like resistance, inductance and capacitance for formation of equivalent networks of transmission lines.	**PO2, PO6, PO8, PSO1, PSO2**
CO3	**Understand** the effect of corona in power system.	**PO2, PO3, PO8, PSO1**
CO4	**Analyze** electrical and mechanical design aspects of transmission lines and underground cables.	**PO1, PO3, PO4, PO6, PO10, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11046	Power System	3	3	3	2	-	3	-	3	-	3	-	2	3	3	-

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(ODD SEMESTER 2022)**		
Name of the Program:	B. TECH	**Semester:**	V
Paper Title:	Power System	**Paper Code:**	EEE11046

Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	02
(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, 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 ACSR conductor?	**Remember**	**CO1**
2	**Define** load curve.	**Remember**	**CO2**
3	**What** are the materials normally used in insulator?	**Remember**	**CO3**
4	The most common system for secondary distribution is a) 3 phase 3 wire b) 3 phase 4 wire c) 3 wire DC d) all of the above	**Remember**	**CO4**
5	**What** is nominal circuit?	**Understand**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Define** GMD and GMR.	**Understand**	**CO1**
(OR)			
6 b)	**What** is proximity effect?	**Remember**	**CO1**
7 a)	**What** is meant by transposition of line.	**Remember**	**CO2**
(OR)			
7 b)	**What** is Critical disruptive voltage?	**Remember**	**CO3**
8 a)	**What** do you mean by Sag?	**Evaluate**	**CO3**
(OR)			
8 b)	**What** is skin effect?	**Understand**	**CO4**
9 a)	**What** is the difference between feeder and distributor?	**Remember**	**CO4**
(OR)			
9 b)	**Define** grading of cables.	**Analyze**	**CO4**
10 a)	**Draw** the single line diagram of radial and ring main system.	**Remember**	**CO5**
(OR)			
10 b)	**State** the kelvin’s law for the determination conductor size.	**Understand**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Compare** AC and DC transmission system.	**Understand**	**CO1**
(OR)			
11 b)	**What** are the advantages of high voltage DC transmission system?	**Analyze**	**CO1**
12 a)	**Draw** the layout of electric power system.	**Remember**	**CO2**
(OR)			
12 b)	**Determine** the inductance of a single core conductor due to internal flux linkages.	**Understand**	**CO2**
13 a)	**Determine** the inductance of a single core conductor due to external flux linkages.	**Understand**	**CO3**
(OR)			
13 b)	**Write** short notes on skin effect.	**Analyze**	**CO3**
14 a)	Briefly describe the effect of earth on line capacitance	**Understand** **Analyse**	**CO4,**
(OR)			

14 b)	**Write** short notes on surge impedance and surge impedance loading	**Understand**	**CO4**
15 a)	**Write** short notes on Corona in transmission system.	**Understand**	**CO4**
(OR)			
15 b)	**Explain** radio interference between power and communication line	**Understand**	**CO4**
16 a)	**Determine** capacitance of single-core cable.	**Analyse**	**CO4**
(OR)			
16 b)	**Write** short notes on static VAR generator.	**Understand**	**CO4**
17 a)	**Determine** the ABCD parameters for short transmission lines.	**Analyse**	**CO5**
(OR)			
17 b)	**Draw** the power angle curve of a synchronous generator.	**Remember Analyse**	**CO5**

EEE11009	**Analog and Digital Electronics**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Electrical and Electronics Technology				
Co-requisites	--				

Course Objectives

1. To illustrate operation of semiconductor devices and apply concepts for the design of Regulators and Amplifiers.
2. To demonstrate number representation and conversion between different representations in digital electronic circuits and implement logical operations using combinational logic circuits.

Course Outcomes

On completion of this course, the students will be able to
CO1. **Illustrate** knowledge on commonly used linear and non-linear applications of Op-amps and Comparators.
CO2. **Explain** basic digital electronic gates.
CO3. **Develop** a digital logic and apply it to solve real life problems.
CO4. **Analyze**, **design** and **implement** combinational and sequential logic circuits.

Catalog Description

Analog Circuits and Digital Circuits is a classic way of differentiating between two types of electronic circuits based on the signals they process. To put it in simple words, Analog Circuits deals with continuous analog signals whereas Digital Circuits deals with discrete digital signals. In this course students will be introduced with analog and digital electronics.

Course Content

Unit I: Biasing of BJT: 8 lecture hours

BJT characteristics & parameters, all biasing circuits, analysis of above circuits and their design, variation of operation point and its stability.Introduction to FET and comparison with BJT.

Unit II: Operational Amplifiers and Linear Applications: 10 lecture hours
Block diagram representation, ideal op-amp, equivalent circuit, open-loop configuration, transfer characteristics, op-amp with negative feedback, frequency response op-amp IC741 specifications, basic op-amp applications: adder, scalar, subtractor, difference amplifier, I-V converter, V-I converters, integrator, differentiator, instrumentation amplifier using 2 and 3 op- amp stages. IC555 timer, multivibrators: astable, monostable and bistable.

Unit III: Numer Systems and Codes: 4 lecture hours
Binary, octal, decimal and hexadecimal number systems and their conversion, binary addition and subtraction.

Unit IV: Boolean Algebra and Logic Gates: 8 lecture hours
Theorems and properties of Boolean algebra, standard SOP and POS form, reduction of Boolean functions using algebraic method, K-map method (2,3,4 Variable),basic digital circuits: NOT,AND,OR,NAND,NOR,EX-OR,EX-NOR gates.

Unit V: Combinational Logic Design: 8 lecture hours
Introduction, half and full adder, half and full subtractor, four bit binary adder, one digit BCD adder, code conversion, multiplexers and demultiplexers, decoders, 4-bit magnitude comparator.

Unit VI: Sequential Logic Design: 6 lecture hours
Flip Flops: SR, D, JK, JK Master Slave and T Flip Flop, truth tables and excitation tables, Flip-flop conversion,counters: design of asynchronous and synchronous counters, modulo counters, UP-DOWN counter, IC74193 shift registers: shift register IC7496, SISO, SIPO,PIPO,PISO, bidirectional shift register.

Text Books:

1. Robert L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuit Theory*, Pearson, 2013.
2. Ramakant A. Gayakwad, *Op-amps and Linear Integrated Circuits*, Pearson Education, 2015.
3. R. P. Jain, *Modern Digital Electronics*, 4^{th} Ed., McGraw Hill Education, 2009.

Reference Books:

1. M. Morris Mano, *Digital Logic and Computer Design*, Pearson Education, 2004.
2. Martin Roden, Gordon Carpenter and William Wieserman,*Electronic Design: From Concept to Reality*, 4^{th} Ed., Discovery Press, 2002.

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** knowledge on commonly used linear and non-linear applications of Op-amps and Comparators.	**PO2, PO4, PO5, PSO1, PSO3**
CO2	**Explain** basic digital electronic gates.	**PO2, PO4, PO5, PSO1, PSO3**

CO3	**Develop** a digital logic and apply it to solve real life problems.	**PO2, PO4, PO5, PSO1, PSO3**
CO4	**Analyze**, **design** and **implement** combinational and sequential logic circuits.	**PO2, PO4, PO5, PSO1, PSO3**

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11009	Analog and Digital Electronics	-	3	-	3	3	-	-	-	-	-	-	-	3	-	3

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(EVEN SEMESTER 2022)**		
Name of the Program:	B.Tech	**Semester:**	IV
Paper Title:	Analog and Digital Electronics	**Paper Code:**	EEE11009
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	**Define** closed loop gain for an op-amp.	**Remember**	**CO1**
2	**What** is voltage gain?	**Remember**	**CO2**
3	**What** is a D flip flop?	**Remember**	**CO3**
4	**What** is meant by Excess 3 code?	**Remember**	**CO4**
5	**What** is a Logic gate?	**Remember**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Prove** A+ AB = A+B using Boolean algebra.	**Understand**	**CO1**
(OR)			
6 b)	A digital system has 4-bit input from 0000 to 1111. **Design** a logic circuit that produces high output when input is smaller than 1000. Use K-map technique.	**Understand**	**CO1**
7 a)	**Simplify** the following expression Y = (A + B)(A+ C')(B' + C')	**Understand**	**CO2**
(OR)			
7 b)	**State and prove** distributive property of Boolean algebra.	**Remember**	**CO2**
8 a)	**Differentiate** between BJT and FET.	**Understand**	**CO3**
(OR)			
8 b)	With proper circuit diagram, **explain** the working of a BJT.	**Analyse**	**CO3**
9 a)	**Write** a short note on inverting mode of Op-Amp.	**Remember**	**CO4**
(OR)			
9 b)	**Design** a differentiator using operational amplifier.	**Understand**	**CO4**
10 a)	**Explain** the term SOP and POS related to Boolean function.	**Analyse**	**CO5**
(OR)			
10 b)	**Convert** the following decimal numbers to hexadecimal and octal numbers. 3741.97	**Understand**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Convert** the following binary numbers to decimal and octal	**Analyse**	**CO1**

	numbers. i) 01011011100 ii) 10011110011		
	(OR)		
11 b)	**Design** and sketch an operational amplifier adder circuit.	**Understand**	**CO1**
12 a)	**Simplify** the following Boolean Expression: **ABC +A'BC +ABC'**	**Analyse**	**CO2**
	(OR)		
12 b)	**Simplify** the following Boolean Expression: **AB + (AC) + AB'C(AB+C)**	**Understand**	**CO2**
13 a)	**Explain** half adder with proper circuit diagram and truth table.	**Analyse**	**CO3**
	(OR)		
13 b)	**Explain** half subtractor with proper circuit diagram and truth table.	**Analyse**	**CO3**
14 a)	**Simplify** the following Boolean function using K-Map and realize the simplified expression using logic gates. f**(A, B, C, D) = ∑m(3,4,5,7,13,14,15)**	**Understand**	**CO4**
	(OR)		
14 b)	**Simplify** the following Boolean function using K-Map and realize the simplified expression using logic gates. f**(A, B, C, D) = ∑m(3,4,5,7,14,15)+D(0,1,2,6)**	**Understand**	**CO4**
15 a)	**Construct** an 4x1 multiplexer and explain the working.	**Analyse**	**CO4**
	(OR)		
15 b)	**Construct** an 4x1 de-multiplexer and explain the working.	**Analyse**	**CO4**
16 a)	**Convert** SR flip flop to JK flip flop.	**Evaluate**	**CO5**
	(OR)		
16 b)	**Define** the working of T flip flop with truth table.	**Remember**	**CO5**
17 a)	**Explain** BCD to gray converter with truth table.	**Analyse**	**CO5**
	(OR)		
17 b)	**Differentiate** between combinational circuits and sequential circuits	**Understand**	**CO5**

PSG11021	**Human Values and Professional Ethics**	L	T	P	C
Version 1.0		2	0	0	2
Pre-requisites/Exposure	12th level English				
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

On completion of this course, the students will 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.

Course 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/ 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 importance of values, ethics, harmonyand 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 behavior 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
PSG11021	Human Values and Professional Ethics	-	-	-	-	-	2	-	3	-	-	-	-	-	-	-

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

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** (each carrying 10 marks)**. Section C** is Compulsory (carrying 16 marks)**.**

	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. (Ap)	**U**
8.	Discuss the Basic Aspects and Characteristic Features of Kohlberg's Theory and Gilligan's Theory.	**U**
	SECTION C is Compulsory 1x1611	

EEE12063	**Electrical Circuits and Signals Lab**				
Version 1.0					
Pre-requisites/Exposure	Electric Circuits, Electrical and Electronics Technology				
Co-requisites	--				

Course Objectives

1. To introduce with different circuit parameters, their behaviour and graphical representation that brings out with different circuit related theory and topology.

2. To introduce with different software related simulation methods.

3. To bring with idea how hardware and software combination and verification can be done.

Course Outcomes

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

CO1. **Understand** different network theorems required to analyze complex problems.

CO2. **Explain** differences between various dependent sources.

CO3. **Know** the significance of average value, rms value, form factor, peak factor of sinusoidal wave and square wave using hardware and verification using MATLAB.

CO4. **Learn** about Z, Y, ABCD Parameters of a two-port network.

CO5. **Obtain** the knowledge about R-L-C circuit response in Series parallel combination.

Catalog Description

Construction, analysis, and characterization of circuits with student-owned Lab-in-a-Box system. Experiments include: characterization of breadboard backplane wiring; component tolerances; Ohm's law; Kirchhoff's laws; series and parallel resistors; voltage and current dividers; delta-wye configurations; mesh-current and node-voltage analysis; superposition and Thevenin equivalents; inverting and non-inverting amplifier circuits; series RC and RL circuits; discharging LEDs and integrator and differentiator circuits. Introductory design experiments to include a simple voltmeter and a flashing traffic arrow.

Course Content

1. Verification of Kirchhoff’s current law and voltage law using hardware and PSpice.

2. Verification of reciprocity theorem using hardware and PSpice.

3. Verification of Milliman's theorem using hardware and PSpice.

4. Verification of circuits containing dependent sources (VDVS, VDCS, CDCS, CDVS) using PSpice.

5. Determination of average value, rms value, form factor, peak factor of sinusoidal wave and square wave using hardware and verification using MATLAB.

6. Calculation and Verification of Z, Y, ABCD Parameters of a two-port network.

7. Verification of hybrid parameters of a two-port network using PSpice.

8. Verification of series resonance using hardware and MATLAB. 9. Verification of parallel resonance using hardware and MATLAB.

10. Observe transient response of first order R-L circuit using PSpice and determine time constant of the circuit.

11. Observe transient response of first order R-C circuit using PSpice and determine time constant of the circuit.

12. Observe transient response of second order R-L-C circuit using PSpice with (a) under- damped, (b) over-damped and (c) critically damped responses.

Text Books:

1. W.H. Hayt, J. E. Kemerlay& S.M. Durbin, "Engineering Circuit Analysis", Eighth Edition, McGraw Hill, 2012

2. Van Valkenburg, "Network Analysis", Prentice-Hall India, 2001. .

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** different network theorems required to analyze complex problems.	**PO1, PO2, PO3, PO5, PO12, PSO2**
CO2	**Explain** differences between various dependent sources.	**PO1, PO2, PO5, PSO1, PSO2**
CO3	**Know** the significance of average value, rms value, form factor, peak factor of sinusoidal wave and square wave using hardware and verification using MATLAB.	**PO2, PO3, PO5, PSO1, PSO2**
CO4	**Learn** about Z, Y, ABCD Parameters of a two-port network.	**PO3, PO4, PO5, PSO2**
	Obtain the knowledge about R-L-C circuit response in Series	**PO2, PO3, PO5,**

CO5	parallel combination.	**PSO1, PSO2**

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

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12004	Electric Circuits Lab	3	3	3	3	3	-	-	-	-	-	-	3	3	3	-

	Electrical Machines – II Lab	L	T	P	C
Version 1.0		0	0	2	1
Pre-requisites/Exposure	Electrical Machines – I and Electrical Machines – II				
Co-requisites	--				

Course Objectives

This course provides hands on experience on the speed control of d.c motor and induction motor, starting methods of three phase induction motor, polarity identification for parallel operation of transformer, three to two phase conversion using Scott connected transformer, parallel operation and voltage regulation of the alternator.

Course Outcomes

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

CO1. **Obtain** speed control of three phase induction motor by various methods.

CO2. **Make experiment with** single phase induction motor to obtain equivalent circuit parameters.

Catalog Description

The course will begin with explaining basic underlying principles of working of various types of electrical rotating machines. Motoring and generating mode of operation. Primary focus will be on the operation of 3-phase induction machine, single phase induction motor, and synchronous machines. For each of this machine equivalent circuit will be derived and then used to derive expression for the torque. Starting, speed control of the motors will be performed. Although main focus will be on the steady state performance analysis.

Course Content

1. Different methods of starting three phase induction motor.
2. Speed control of three phase induction motor by V/F method.
3. Speed control of three phase slip ring induction motor by rotor resistance control.
4. Speed control of a three phase induction motor by voltage control method.
5. Load test on wound rotor induction motor.
6. Determination of equivalent circuit parameters of a single phase induction motor.
7. Load test on single phase induction motor.
8. Determination of regulation of synchronous generator by synchronous impedance method.
9. Parallel operation of synchronous generators.

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	**Obtain** speed control of three phase induction motor by various methods.	**PO2, PO3, PO5, PO8, PO10, PSO2**
CO2	**Make experiment with** single phase induction motor to obtain equivalent circuit parameters.	**PO2, PO3, PO4, PO6, PO8, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12010	Electrical Machines – II Lab	-	3	3	3	3	3	-	3	-	3	-	-	3	3	-

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

	Power Systems Lab	L	T	P	C
Version 1.0		0	0	2	1
Pre-requisites/Exposure	Electric Circuits, Power System – I				
Co-requisites	--				

Course Objectives

1. To create familiarization with different software.
2. To give the student the operational view of power system.
3. To identify the application of their theoretical knowledge what they have gain already.

Course Outcomes

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

CO1. **Make experiment with** active and reactive power control of an alternator.

CO2. **Discuss** distribution by network analyzer and earth tester for measurement of earth resistance.

CO3. **Understand** the effect of corona in power system.

CO4. **Understand** dielectric strength test of insulating oil; determination of breakdown strength of solid insulating material and dielectric constant, tan delta, resistivity test of transformer oil.

CO5. **Relate** the energy management strategies used in hybrid and electric vehicles.

Catalog Description

This course familiarizes you with standards and policies of the electric utility industry, and provides you with basic vocabulary used in the business. It introduces the electric power system, from generation of the electricity all the way to the wall plug. You will learn about the segments of the system, and common components like power cables and transformers.

Course Content

1. Active and reactive power control of an alternator.
2. Measure the earth resistance.
3. Distribution system with network analysis.
4. Study and analysis of an electrical transmission line circuit with the help of PSpice.
5. Breakdown voltage of transformer oil.
6. A, B, C, D parameters of a simple transmission line.
7. Study on (i) on load time delay relay (ii) off load time delay relay
8. Polarity, ratio and magnetization characteristics test of CT and P.T.
9. Testing on earth fault relay.
10. Testing on under voltage relay.
11. Study of different underground cables.

Text Books:

1. C. L. Wadhwa, *Electrical Power System*, 6th Ed., New Age International (P) Ltd., 2008.
2. D. P. Kothari and I. J. Nagrath, *Power System Engineering*, 3rd Ed., McGraw Hill, 2019.
3. John J. Grainger and William D. Stevenson, Jr., *Power System Analysis*, Indian Edition, McGraw Hill Education, 2017.

Reference Books:

1. Theodore Wildi, *Electrical Machines, Drives and Power Systems*, 6th Ed., Pearson Education, 2013.
2. J. Duncan Glover, Mulukutla S. Sarma and Thomas J. Overbye, *Power System: Analysis & Design*, 5th Ed., Cengage Learning India Pvt. Ltd., 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	**Make experiment with** active and reactive power control of an alternator.	**PO2, PO3, PO4, PO5, PSO2**
CO2	**Discuss** distribution by network analyzer and earth tester for measurement of earth resistance.	**PO1, PO2, PO5, PSO2**
CO3	**Understand** the effect of corona in power system.	**PO1, PO2, PO3, PO6, PSO2**
CO4	**Understand** dielectric strength test of insulating oil; determination of breakdown strength of solid insulating material and dielectric constant, tan delta, resistivity test of transformer oil.	**PO1, PO2, PO6, PO10, PSO2, PSO3**

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12020	Power Systems – I Lab	3	3	3	2	3	3	-	-	-	2	-	-	-	3	2

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

[redacted]

Name: **Enrolment No:**	

Course: Power systems Lab (EEE12050)

Program: B.Tech. **Semester: ODD 2022-23**

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

Questions

1.	Active and reactive power control of an alternator.	**An+App**	**CO1+CO3+CO5**
2.	Measure the earth resistance.	**U+An+Ev+App**	**CO3+CO5**
3.	Distribution system with network analysis	**U+An+Ev+App**	**CO2+CO3+CO5**
4.	Study and analysis of an electrical transmission line circuit with the help of PSpice.	**U+An**	**CO2+CO3+CO5**
5.	Breakdown voltage of transformer oil.	**U+An+App**	**CO1+CO3+CO5+CO6**
6.	A, B, C, D parameters of a simple transmission line	**U+App+An**	**CO1+CO3+CO6**
7.	Study on (i) on load time delay relay (ii) off load time delay relay	**U+App+An**	**CO1+CO3**
8.	Polarity, ratio and magnetization characteristics test of CT and P.T	**U+Apply**	**CO3+CO4+CO5+**
9.	Testing on earth fault relay	**U+An+ App**	**CO2+CO3+CO5**
10.	Study of different underground cables.	**U+App+An**	**CO2+CO3+CO5**

	Analog and Digital Electronics Lab	L	T	P	C
Version 1.0		0	0	2	1

Pre-requisites/Exposure	Electrical and Electronics Technology
Co-requisites	--

Course Objectives

1. To illustrate operation of semiconductor devices and apply concepts for the design of Regulators and Amplifiers.
2. To demonstrate number representation and conversion between different representations in digital electronic circuits and implement logical operations using combinational logic circuits.

Course Outcomes

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

CO1. **Test** operations of op-amps and comparators.
CO2. **Test** basic digital electronic gates.
CO3. **Develop** a digital logic and apply it to solve real life problems.
CO4. **Analyze**, **design** and **implement** combinational and sequential logic circuits.

Catalog Description

Analog Circuits and Digital Circuits is a classic way of differentiating between two types of electronic circuits based on the signals they process. To put it in simple words, Analog Circuits deals with continuous analog signals whereas Digital Circuits deals with discrete digital signals. In this course students will be introduced with analog and digital electronics.

Course Content

1. BJT biasing method and characteristics.
2. Op-amp as inverting amplifiers.
3. Op-amp as non-inverting amplifiers.
4. Op-amp as square wave generator.
5. Design, study and plot input and output waveforms of following circuits using the Op-amp:

(i) adder, (ii) subtractor, (iii) integrator, (iv) differentiator, (v) voltage follower, (vi) V to I converter and (vii) I to V converter.

6. Find ripple factor and observe output waveform with and without RC filter for the following

(i) half-wave rectifier circuit, (ii) center-tap full-wave rectifier circuit, and (iii) full-wave bridge

7. Basic logic gates and universal gates.
8. Design of half and full adder circuit.
9. Design of half and full subtractor circuit.
10. Design of flip-flops using gates and ICs.
11. Design of sequential circuits.
12. Study of (i) Binary to Gray Code Conversion, and (ii) Gray to Binary Code Conversion.
13. Study of (i) 4:1 Multiplexer, and (ii) 1:4 De-multiplexers.
14. Study of (i) S-R flip flop, (ii) J-K flip flop (iii) D flip flop and (iv) T flip flop, using universal NAND gate.

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	**Test** operations of op-amps and comparators.	**PO1, PO2, PO3, PO5, PO7, PSO2**
CO2	**Test** basic digital electronic gates.	**PO2, PO3, PO5, PO7, PO10, PSO1**
CO3	**Develop** a digital logic and apply it to solve real life problems.	**PO3, PO5, PO10, PO12, PSO2**
CO4	**Analyze**, **design** and **implement** combinational and sequential logic circuits.	**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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12012	Analog and Digital Electronics Lab	3	3	-	-	3	-	2	-	-	3	-	2	3	3	-

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

ADAMAS UNIVERSITY
END SEMESTER EXAMINATION
(EVEN SEMESTER 2022)

Name of the Program:	B.Tech	**Semester:**	IV
Paper Title:	Analog and Digital Electronics	**Paper Code:**	EEE11009
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)	**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	**Define** open loop gain for an op-amp.	**Remember**	**CO1**
2	**What** is current gain?	**Remember**	**CO2**
3	**What** is the need for an instrumentation amplifier?	**Remember**	**CO3**
4	**What** is meant by BCD code?	**Remember**	**CO4**
5	**What** is meant by radix (or base) of a number system?	**Remember**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**Reduce** the following Boolean expression: $AB + \overline{AC} + A\overline{B}C(AB + C)$	**Understand**	**CO1**
	(OR)		
6 b)	**Obtain** truth table and name operation performed for A'B+AB'	**Understand**	**CO1**
7 a)	**Draw** the logic circuit diagram to realize the following output: Y= BC + BCA	**Remember**	**CO2**
	(OR)		
7 b)	State and **prove** De Morgan's theorems.	**Understand**	**CO2**
8 a)	**Compare** BJT and FET.	**Analyse**	**CO3**
	(OR)		
8 b)	**Draw** the V-I characteristics of BJT.	**Understand**	**CO3**
9 a)	**Write** a short note on comparator using Op-Amp.	**Remember**	**CO4**
	(OR)		
9 b)	**Design** an integrator using operational amplifier.	**Analyse**	**CO4**
10 a)	A digital system has 4-bit input from 0000 to 1111. **Design** a logic circuit that produces high output when input is greater than 1000. Use K-map technique.	**Analyse**	**CO3**
	(OR)		
10 b)	**Convert** the following decimal numbers to hexadecimal and octal numbers. 168.036	**Evaluate**	**CO3**
	Group C		

Answer All the Questions (7 x 5 = 35)			
11 a)	**Write** short note on the operation of a p-n junction diode in forward biased and reverse biased condition.	**Analyse**	**CO1**
(OR)			
11 b)	**Design** and sketch an operational amplifier subtractor circuit.	**Analyse**	**CO1**
12 a)	**Simplify** the following Boolean Expression: **ABC +AB'C +ABC'**	**Understand**	**CO2**
(OR)			
12 b)	**Simplify** the following Boolean Expression: **AB + (AC)' + AB'C(AB+C)**	**Understand**	**CO2**
13 a)	**Explain** full adder with proper circuit diagram and truth table.	**Analyse**	**CO3**
(OR)			
13 b)	**Explain** full subtractor with proper circuit diagram and truth table.	**Analyse**	**CO3**
14 a)	**Simplify** the following Boolean function using K-Map and realize the simplified expression using logic gates. ***f*(A, B, C, D) = ∑m(3,4,5,7,9,13,14,15)**	**Understand**	**CO4**
(OR)			
14 b)	**Simplify** the following Boolean function using K-Map and realize the simplified expression using logic gates. ***f*(A, B, C, D) = ∑m(3,4,5,7,9,14,15)+D(0,1,2)**	**Understand**	**CO4**
15 a)	**Construct** an 8x1 multiplexer and explain the working.	**Analyse**	**CO4**
(OR)			
15 b)	**Construct** an 8x1 de-multiplexer and explain the working.	**Analyse**	**CO4**
16 a)	**Convert** SR flip flop to D flip flop.	**Understand**	**CO3**
(OR)			
16 b)	**Define** the working of D flip flop with truth table.	**Understand**	**CO3**
17 a)	**Explain** binary to BCD converter with truth table.	**Analyse**	**CO2**
(OR)			
17 b)	**Differentiate** between combinational circuits and sequential circuits	**Understand**	**CO2**

		L	T	P	C
ECE11015	Microcontroller and Interfacing				
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Digital Electronics, Computer Architecture				
Co-requisites	--				

Course Objectives

11. Outline the history of computing devices.
12. Develop programs for microprocessor and microcontrollers.
13. 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 & receive serial data using 8051 serial port and to generate an external interrupt using a switch.	**PO1,PO2,PO5,PO11**
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 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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	Microcontroller and Interfacing	3	2	1		3						1		1	

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

[redacted]

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech	**Semester:**	
Paper Title:	**Microcontroller and Interfacing**	**Paper Code:**	
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	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**

	Power Electronics	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Analog Electronics				
Co-requisites	--				

Course Objectives

1. To illustrate various power semiconductor devices.
2. To compare the operating characteristics of various power semiconductor devices.
3. To analyse different power converter circuits.

Course Outcomes

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

CO1. **Compare** various power semiconductor devices.

CO2. **Illustrate** the details of power semiconductor switches (Construction, Characteristics and operation).

CO3. **Develop** various types of converters.

CO4. **Examine** working of various power converters under different load.

Catalog Description

Power electronics is the study of application of solid-state devices for efficient control and conversion of electric power. In this course students will be introduced with different power semiconductor devices and different power electronics converter.

Course Content

Unit 1: Introduction to Power Electronics: 10 lecture hours

Introduction, advantages of power devices operating in the switch mode to those operating in the active region. power diode Thyristor: characteristics, two transistor model, turn ON methods, protection, ratings, thyristor commutation circuits: natural commutation, class A, class B, class C and class D commutation circuits.

Unit 2: Phase Controlled Converter: 12 lecture hours

Single phase converters: half wave and full wave with R, RL, RLE load without and with freewheeling diode, line commutated inverters, dual converters, performance parameters, effect of source inductance on performance of single-phase converters, 3-phase converters: Half wave and full wave,

Unit 2: DC to DC Converter 10

Power Transistor – Power MOSFET, IGBT, Characteristics, Buck , Boost, Buck-Boost converter with circuit configuration and analysis. Introduction to ZVS and ZCS. Hybrid Converters.

Unit 4: DC to AC and AC to AC Converter: 12 lecture hours

Concept of CSI and VSI, voltage control of inverters: single pulse, multiple pulse width modulation and sinusoidal pulse width modulation,1-phase half bridge and full bridge inverters,
AC-AC converter: Single and Three phase controllers, phase control, PWM AC voltage controller, Principle of ON-OFF control and Cyclo-converters.

Text Books:

1. P. S. Bhimbra, *Power Electronics*, Khanna Publishers, 2006.
2. Muhammad H. Rashid, *Power Electronics: Devices, Circuits and Applications*, 4th Ed., Pearson Education, 2017.
3. John G. Kassakian, Martin F. Schlecht and George C. Verghese, *Principles of Power Electronics*, Pearson Educatio, 2010.

Reference Books:

1. R. S. Ramshaw, *Power Electronics: Thyristor Controlled Power for Electric Motors*, Springer, 1975.
2. Muhammad H. Rashid, *Recent Developments in Power Electronics*, IEEE, 1996.applications.

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

Components	Mid Term	Attendance	Class Assessment	End Term
Weightage (%)	20	10	30	40

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Compare** various power semiconductor devices.	**PO1, PO2, PO6, PSO1**
CO2	**Illustrate** the details of power semiconductor switches (Construction, Characteristics and operation).	**PO1, PO2, PO3, PO6, PSO1, PSO2**
CO3	**Develop** various types of converters.	**PO2, PO3, PO4, PO5, PO6, PO7, PSO2**
CO4	**Examine** working of various power converters under different load	**PO2, PO3, PO4, PO5, PO6, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11015	Power Electronics	3	3	3	3	3	3	2	-	-	-	-	-	3	3	-

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

Model question paper

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

Course: EEE11015 – Power Electronics

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	**What** are the different triggering method of a thyristor?	**R**	**CO1**
2.	**Compare** BJT with Power BJT.	**Un**	**CO2**
3.	**What** is commutation? **What** are the different types of commutation.	**R**	**CO2**
4.	A 230 Volt, 50 Hz, 1 pulse SCR is triggered at a firing angle of 40° and the load current extinguishes at an angle of 210°. **Find** the average output voltage and current for R = 2Ω and L = 2mH.	**Ap**	**CO3**
	SECTION B (Attempt any **Two Questions)**		
5.	**Explain** the working principle of on-off control method of an AC voltage controller.	**Ap**	**CO3**
6.	With proper circuit and voltage waveforms, **explain** the working of step up and step down chopper.	**Ap**	**CO3**
7.	A single phase full bridge inverter has a resistive load of R=5 Ohm and the DC input voltage of 220 Volt. **Find**: (a) RMS output voltage, and (b) Output power.	**R**	**CO4**
	SECTION C is Compulsory		
8.	**Explain** with proper circuit diagram, the operation of full wave fully controlled rectifier.	**Ap**	**CO3**

Course

ECE11009	**Digital Signal Processing**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Electric Circuits				
Co-requisites	--				

Objectives

1. To provide students a brief concept of signals and systems related to signal processing.
2. To acquire knowledge of different types of signal processing methods.
3. To familiar with the importance of Fourier Transformation in signal processing and its different methods.
4. To realize the importance of filter and their various designing techniques.

Course Outcomes

On completion of this course, the students will be able to
CO1: Illustrate digital signals, systems, and their significance.
CO2: Analyse the digital signals using various digital transforms DFT, FFT etc.
CO3: Design and develop the basic digital system.
CO4: Interpret the finite word length effects on functioning of digital filters.

Catalog Description

Digital Signal Processing (DSP) is concerned with the representation, transformation and manipulation of signals on a computer. After half a century advances, DSP has become an important field, and has penetrated a wide range of application systems, such as consumer electronics, digital communications, medical imaging and so on. With the dramatic increase of the processing capability of signal processing microprocessors, it is the expectation that the importance and role of DSP is to accelerate and expand. Discrete-Time Signal Processing is a general term including DSP as a special case. This course will introduce the basic concepts and techniques for processing discrete-time signal on a computer. By the end of this course, the students should be able to understand the most important principles in DSP. The course emphasizes understanding and implementations of theoretical concepts, methods and algorithms.

Course Content

Module 1
Introduction, continuous-time and discrete-time signals, classification of signals, Discrete-Concept, Advantages and application of digital signal processing, Analog signal to digital signal conversion, Sampling theorem, Reconstruction of signal, Concept of Discrete –time signal, Representation of discrete time sequences, Classifications of discrete time sequences with example, Mathematical operations on sequences. LTI systems, Representation of Discrete time signal using Impulse response, Concept and properties of linear convolution, Methods of convolution process between two signals by both graphical and tabular form procedure, De-convolution, interconnections of LTI systems with physical interpretations, stability and causality conditions, recursive and non-recursive systems.

Module 2
Z-Transform: Definition, Relationship between Laplace Transform and Fourier Transform, Mapping between s-plane and z-plane, concept of unit circle (Fourier transformation from z transformation, stability of a system using z transformation, concept of ROC, Z-transformation of finite and infinite sequences and their ROC, z-transformation of standard sequences, properties of z-transform, inverse Z-transform -Residue theorem, partial fraction method, Long division or power series expansion method, convolution process

Module 3

Discrete Time Concept of Fourier Transform: signals, difference between continuous time and discrete time Fourier series, frequency spectrum of periodic discrete time signals, properties of discrete time Fourier series and its example, definition of DTFT, frequency spectrum of discrete time signal, properties of DTFT, DTFT of periodic discrete time signals, analysis of discrete time system using DTFT and its frequency response, Properties of DFT,

Fast Fourier Transform (FFT): Complexity analysis of direct computation of DFT, Concept of FastFourier transformation, Radix-2 computation of FFT using decimation-in-time and decimation-in-frequency algorithms.

Module 4

Introduction to Filter, FIR Filter Design: Basic concepts of IIR and FIR filters, concept of window technique to design FIR filter, Fourier series method of FIR filter designing, Design of FIR filter using window techniques, Concept of IIR digital filter, recursive and non-recursive system, analog to digital domain transformation- impulse invariant method and bilinear transformation and their properties, limitations of bilinear transformation, methods to find out the order of IIR filter, computation of filter transfer function in analog domain, digital filter realization techniques, procedure to design Butterworth digital IIR filters.

Text Books:

1. Alan V. Oppenheim and Ronald W. Schafer, *Digital Signal Processing*, 1stEd. Pearson Education, 2015.
2. S. Salovahanan, *Digital Signal Processing*, 3rd Ed., McGraw Hill Education, 2017.

Reference Books:

1. John G. Proakis and Dimitris G. Manolakis, *Digital Signal Processing: Principles, Algorithms, and Applications*, 4thEd., Pearson Education, 2007.

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 digital signals, systems, and their significance.	**PO1, PO2, PO3, PO5, PSO1**
CO2	Analyse the digital signals using various digital transforms DFT, FFT etc.	**PO1, PO2, PO6, PSO2**
CO3	Design and develop the basic digital system.	**PO1, PO2, PO3, PO6, PSO1, PSO2**
CO4	Interpret the finite word length effects on functioning of digital filters.	**PO1, PO3, PO4, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE11009	Digital Signal Processing	3	3	3	3	1	3	-	-	-	-	-	-	3	3	-

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

[redacted]

Name:

Enrolment No:

Course: ECE11009 – Digital Signal Processing

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	A system with an input and output is described by a relation: y(n) = x(8n), **determine** whether the system is Linear or Non-linear and time invariant or time variant.	**U**	**CO1**
2.	If the signal $x(n) = 3^n u(n)$, then **find** the z-transform of x(-n).	**Ap**	**CO2**
3.	**Calculate** the energy of unit step function, u (n).	**Un**	**CO1**
4.	**Define** linear Phase System.	**Rn**	**CO5**
	SECTION B (Attempt any **Two Questions)**		
5.	a) Write the differences between analog and digital signals. b) What is Nyquist rate? c) If $x(t) = \cos 20\pi t + \cos 100\pi t$, i) Find the Nyquist frequency. ii) If signal x(t) is sampled by 40Hz, find the reconstructed signal frequencies.	**Un**	**CO1**
6.	If DFT of $x_1(n)$ and $x_2(n)$ are X_1(k) and X_2(k) respectively, then prove that $x_1(n) \circledast x_2(n) \xleftrightarrow{DFT} X_1(k).X_2(k)$	**Un**	**CO2**
7.	a) Define FIR system b) Consider a FIR filter with system transfer function $H(Z) = 1 + 2.5z^{-1} + 3z^{-2} + z^{-4} + 5z^{-5}$ i) Sketch transposed from of realization corresponding to direct form	**Un**	**CO2**

	Find input and output relation		
	SECTION C is Compulsory		
8.	a) If Z transform of $x(n)$ is $X(Z)$, then find the z transform of $a^{-n}x(n)$ b) Find the z transform of the signal $x(n) = (1/2)^n u(n) - 2^n u(-n-1)$ c) Find the frequency spectrum of the following signal $x(n) = \begin{cases} 1, & 0 \le n \le L-1 \\ 0, & \text{otherwise} \end{cases}$	**Ap**	**CO2**

EEE11014	**Control Systems**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Electric Circuits, Engineering Mathematics – III				
Co-requisites	--				

Course Objectives

1. Understand and practice the modelling, simulation and implementation of a physical dynamical system by a linear time invariant ordinary differential equation or by a transfer function.
2. Describe the effects of poles and zeros location in the s-plane on the transient and steady state behaviour.
3. Understand the significance of relative stability and absolute stability.
4. Recognize the properties of root locus for feedback control systems with single variable parameter.
5. Construct Bode plots, Polar plots and Nyquist plots for rational transfer functions.

Course Outcomes

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

CO1. **Interpret** that differential equations can describe the dynamic behaviour of physical systems.

CO2. **Outline** the differences between controlling the transient response and the steady-state response of the system.

CO3. **Determine** the direct relationship between the pole locations of second-order systems and the transient response.

CO4. **Justify** the role of root locus plots in parameter design and system sensitivity analysis.

CO5. **Understand** performance specifications in the frequency domain and relative stability based on gain margin and phase margin.

Catalog Description

The knowledge of Control System is essential for engineering graduates in solving many stability design problems arising in electrical, mechanical, aerospace, biomedical and chemical systems. Since control system is an integral part of our modern society, it finds a wide range of applications in aircraft, robots and process control systems.

This course introduces principles and techniques required in the design and implementation of control algorithms in practical systems. This course focus on modelling of physical systems including electrical and mechanical systems, time response analysis and transfer function based analysis techniques. This course also deal with stability of different types of time invariant systems using Routh's array, root locus technique, frequency response based analysis including Bode plot and Nyquist plot. It also covers design of compensators, P, PI, PID controllers and their applications to get a desired output.

Course Content

Unit 1: Introduction to Control Systems: 4 lecture hours

Concept of feedback and automatic control, effects of feedback, objectives of control system, definition of linear and nonlinear systems, elementary concepts of sensitivity and robustness, types of control systems, servomechanisms and regulators, examples of feedback control systems, transfer function concept, poles and zeroes of a transfer function, properties of transfer function.

Unit 2: Mathematical Modeling of Dynamic Systems: 8 lecture hours
Translational systems, rotational systems, gear-train arrangement, electrical analogy of Spring-Mass-Dashpot system,block diagram representation of control systems, block diagram algebra, signal flow graph, Mason's gain formula.

Unit 3: Time Domain Analysis: 8 lecture hours
Time domain analysis of a standard second order closed loop system, concept of undamped natural frequency, damping, overshoot, rise time and settling time, dependence of time domain performance parameters on natural frequency and damping ratio, step and impulse response of first and second order systems, effects of poles and zeros on transient response, stability by pole location, Routh-Hurwitz criteria and applications.

Unit 4: Error Analysis: 6 lecture hours
Steady state errors in control systems due to step, ramp and parabolic inputs, concepts of system types and error constants.

Unit 5: Stability Analysis: 8 lecture hours
Root locus techniques, construction of Root Loci for different systems, changes of gain on the movement of pole and zeros.

Unit 6: Frequency Domain Analysis of Linear System: 11 lecture hours
Bode plots, Polar plots, Nyquist criteria, measure of relative stability, phase and gain margin, determination of stability margins in Bode plot.

Text Books:

1. Kastuhiko Ogata, *Modern Control Engineering*, 5th Ed., Pearson Education, 2015.
2. FaridGolnaraghi and Bengamin C. Kuo, *Automatic Control Systems*, 9thEd., Wiley, 2014.
3. Norman S. Nise, *Nise's Control Systems Engineering*, Wiley India Edition, Wiley, 2018.

Reference Books:

1. Richard C. Dorf and Robert H. Bishop, *Modern Control Systems*, 12th Ed., Pearson Education India, 2013.
2. Naresh K. Sinha, *Control Systems*, 4th Ed., New Age International Pvt. Ltd., 2013.

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** that differential equations can describe the dynamic behaviour of physical systems.	**PO1, PO2, PO4, PO5, PSO1**
CO2	**Outline** the differences between controlling the transient response and the steady-state response of the system.	**PO1, PO3, PO5, PSO2**
CO3	**Determine** the direct relationship between the pole locations of second-order systems and the transient response.	**PO1, PO2, PO4, PO5, PO6, PSO2**
CO4	**Justify** the role of root locus plots in parameter design and system sensitivity analysis.	**PO1, PO2, PO3, PO5, PO6, PSO2**
CO5	**Understand** performance specifications in the frequency domain and relative stability based on gain margin and phase margin.	**PO1, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11014	Control Systems	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-

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

[redacted]

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

Course: EEE11014 – Control Systems

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**

Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:

Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	**What** should be the torque-balance equations for an (a) ideal inertia, (b) ideal spring, (c) ideal dashpot and (d) ideal inertia-spring?	**R**	**CO1**
2.	**Determine** gain K of the following unity feedback system, so that the system will have a damping ratio of 0.5. The open-loop transfer function of the system is given by, $G(s) = \dfrac{K}{s(s+10)}$.	**Un**	**CO2**
3.	The open-loop transfer function of a unity feedback control system is given by, $G(s) = \dfrac{K}{s(1+sT)}$. **By what factor the amplifier gain K should be modified** so that the damping ratio is increased by 0.2 to 0.8?	**Ap**	**CO3**
4.	**What** do you mean by angle of departure? **When** it is to be determined?	**Un**	**CO4**
	SECTION B (Attempt any **Two Questions)**		
5.	**Sketch** the Nyquist plot and therefrom determine the phase margin and gain margin, and **comment** on the stability of the closed-loop system whose loop transfer function is given by, $G(s)H(s) = \dfrac{K}{s(s^2+s+2)}$.	**Ap**	**CO5**
6.	a) A unity feedback control system has the following open-loop transfer function: $G(s) = \dfrac{4s+1}{4s^2}$ **Find expressions** for its time response when it is subjected to	**An**	**CO2**

	(i) unit impulse input and (ii) unit step input. b) What is a minimum-phase transfer function and a non minimum-phase transfer function?	**R**	**CO1**
7.	For a given unity-feedback system, the open-loop transfer function is given by, $G(s) = \dfrac{K}{s(s+2)(s^2+6s+25)}$ (a) **Sketch** the root locus plot. (b) At what value of K, the system becomes unstable? (c) **At the verge of instability, determine** the frequency of oscillation of the system.	**Un** **Un** **Ap**	**CO4**
	SECTION C is Compulsory		
8.	The open-loop transfer function of a unity-feedback system is given by $G(s) = \dfrac{100}{s^2(s+4)(s^2+5s+25)}$ Find the static error coefficient and steady-state error of the system when it is subjected to an input of $r(t) = 2 + 4t + 2t^2$.	**An**	**CO3**

Prof. Elective I

ECE11017	**Foundation on Artificial Intelligence and Machine Learning**	L	T	P	C
Version 1.0	**Contact Hours - 30**	3	0	0	3
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	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
PHY11201	Foundation on Artificial Intelligence and Machine Learning	3	3		3	2		2			2		2	3	3

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

EEE11016	**Special Electrical Machines**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Electrical Machines – I and Electrical Machines – II				
Co-requisites	--				

Course Objectives

1. In this course construction and operating principle of stepper motor, synchronous reluctance motor, switched reluctance motor, brushless DC motor and permanent magnet DC motor will be discussed theoretically.
2. Special machine is utilized in many different applications, for instance stepper motors are used in computer printers, electric watches, camera lenses, CNC machines etc.
3. In order to utilize the stepper motor in different application closed loop control of this motor will be analysed.

Course Outcomes

On completion of this course, the students will be able to
CO1. **Learn** the construction and principle of operation of synchronous reluctance motors.
CO2. **Learn** the operation and closed loop control of stepper motors.
CO3. **Understand** the operation and steady state performance of switched reluctance motor.
CO4. **Analyze** theoretically the characteristics of permanent magnet brushless DC motor.

Catalog Description

Special electrical machines are finding ever-increasing applications, typically in position control systems, robotics and mechatronics, electric vehicles, and high speed transportation. A particular feature of this course is that it does not stop at the basic principles of these complex machines but goes on to cover recent developments and current research, making it useful for senior graduate students and research scholars in the field of electrical machines and drives.

Course Content

Unit 1: Synchronous Reluctance Motors: 8 lecture hours

Constructional features, types, axial and radial flux motors, operating principles, variable reluctance motors, voltage and torque equations, phasor diagram, performance analysis, applications.

Unit 2: Stepper Motors: 10 lecture hours
Constructional features, operating principles, variable reluctance motor, hybrid motor, single stack and multi stack configuration, torque equations, modes of excitation, characteristics, drive circuits, microprocessor control of stepper motors, closed loop control, concept of lead angle, applications.

Unit 3: Switched Reluctance Motors: 9 lecture hours
Constructional features, rotary and linear SRM, operating principle, torque production, steady state performance, analytical method, power converters and their controllers, methods of rotor position sensing, sensor-less operation, characteristic of closed loop control, applications.

Unit 4: Permanent Magnet Brushless DC Motors: 10 lecture hours
Permanent magnet materials, minor hysteresis loop and recoil line-magnetic characteristic, performance coefficient, operating principle, types, magnetic circuit analysis, emf equation, torque equation, commutation, power converter circuits and their controllers, motor characteristics and control, applications.

Unit 5: Permanent Magnet Synchronous Motors: 9 lecture hours
Operating principle, ideal PMSM, emf equation, torque equation, armature mmf, synchronous reluctance, sine wave motor with practical windings, phasor diagram; torque-speed characteristics, power controllers, converter volt-ampere requirements, applications.

Text Books:

1. P. S. Bhimbra, *Electric Machines*, 2nd Ed., Khanna Publishing, 2017.
2. Charles I. Hubert, *Electric Machines: Theory, Operation, Applications, Adjustment and Control*, Pearson Education India, 2003.

Reference Books:

1. Irving L. Kosow, *Electric Machinery and Transformers*, 2nd Ed., Pearson Education, 2007.
2. T. J. E. Miller, Brushless Permanent Magnet and Reluctance Motor Drives, Clarendon Press, Oxford, 1989.

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	**Learn** the construction and principle of operation of synchronous reluctance motors.	**PO1, PO3, PO6, PO8, PO10, PSO1**
CO2	**Learn** the operation and closed loop control of stepper motors.	**PO2, PO3, PO4, PO6, PO10, PSO1, PSO2**

CO3	**Understand** the operation and steady state performance of switched reluctance motor.	**PO2, PO3, PO6, PO10, PSO1, PSO2**
CO4	**Analyze** theoretically the characteristics of permanent magnet brushless DC motor.	**PO2, PO3, PO10, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11016	Special Electrical Machines	2	3	3	2	-	3	-	2	-	3	-	2	3	3	-

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

[redacted]

Name:

Enrolment No:

Course: EEE11016 – Special Electrical Machines

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	**What** is synchronous reluctance motor?	**Un**	**CO1**
2.	**What** is the need for logic sequencer?	**Un**	**CO2**
3.	**Draw** the controller block diagram of stepper motor.	**Un**	**CO2**
4.	**How** the phase windings of the SRM are connected with the converter circuit and **compare** it with the normal inverter with windings.	**An**	**CO3**
	SECTION B (Attempt any **Two Questions)**		
5.	**Draw** and **explain** the speed torque characteristics of stepper motor.	**Un**	**CO2**
6.	**Write** down the limitations of open loop operation and need for closed loop operation of stepper motor.	**Un**	**CO2**
7.	**Draw** and **explain** the inductance variation with respect to the rotor position in Switched Reluctance Motor.	**An**	**CO3**
	SECTION C is Compulsory		
8.	a) **Why** is a BLDC motor called a dc motor? b) **Why** does a BLDC motor come with an integrated hall sensor? c) **Why** the flux linkage curve is linear in PMBLDC motor? d) **What** is the effect of fringing in the emf wave form of PMBLDC motor?	**An**	**CO4**

EEE11047	**Energy Systems-I**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Objectives

1. To help the student to understand basic concept of energy sources and the present energy scenario.
2. To give emphasis about the leading renewable sources of energy.
3. To give the students a perspective to learn about the technologies available for successful utilization of the energy sources.

Course Outcomes

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

CO1. **Acquire** fundamental concept of energy
CO2. **Develop** awareness about the energy scenario.
CO3. **Understand** the role significance of solar energy
CO4. **Understand** wind energy and its application
CO5. **Develop** an energy storage system.

<u>Course Content</u>

Module 1: Introduction to Energy: [8]
Introduction to units of energy, power, Forms of energy, Conservation of energy, Energy forms, conventional energy sources, role of energy in economic development and social transformation, Fossils fuel and climate change, Renewable energy resources, Importance of energy storage and importance, Methods of storage: Biological, Chemical, Heat, and Mechanical. Distribution of energy

Module 2: Energy Scenario [8**]**
Potential &development of renewable energy sources, types of renewable energy systems, Future of Energy Use, Global and Indian Energy scenario, Energy for sustainable development, renewable electricity and key elements, Global climate change, CO2 reduction potential of renewable energy.

Module 2: Solar Energy (12 Hrs)
Solar energy system, Solar Radiation, Availability, Measurement and Estimation, Solar Thermal Conversion Devices and Storage, Solar-Electrical Power Generation, general Solar Photo Voltaic (SVP) system, Different configurations, SPV system components and their characteristics, Stand-Alone and Grid Connected SPV systems, other Miscellaneous Applications of Solar Energy.

Module 4: Wind Energy (08 Hrs)
Wind Energy Conversion, Potential, Nature of the wind, Wind Data and Energy Estimation, Site selection, Types of wind turbines, Wind farms, Wind Generation and Control, classification of wind, characteristics, offshore wind energy – Hybrid systems, wind energy potential and installation in India

Module 5: Energy storage (09 Hrs)**)**
Energy storage, Battery – types, equivalent circuit, performance characteristics, battery design, charging and charge regulators. Battery management. Flywheel-energy relations, components, benefits over battery. Fuel Cell energy storage systems. Ultra-Capacitors. Bio-Mass and Bio-Fuels

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Text Books:

1. G. D. Rai, *Non-Conventional Energy Resources*, Khanna Publishers, 1988.
2. B. H. Khan, *Non-Conventional Energy Resources*, 3rd Ed., McGraw Hill Education, 2017.

Reference Books:

1. G. S. Sawhney, *Non-Conventional Resources of Energy*, Prentice Hall of India, 2012.
1. J.F. Manwell, "Wind Energy Explained, theory design and applications," J.G.

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Acquire** fundamental concept of energy.	**PO1, PO2, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO2	**Develop** awareness about the energy scenario	**PO1, PO2, PO3, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO3	**Understand** the role significance of solar energy.	**PO1, PO2, PO3, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO4	**Understand** wind energy and its application.	**PO1, PO2, PO3, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO5	**Develop** an energy storage system	**PO1, PO2, PO3, PO4, 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 or team work	Communication	Project management and finance	Life-long Learning	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	Energy System-I	3	3	3	3	-	3	3	-	-	-	-	3	3	3	-

1=weakly mapped

2= moderately mapped3=strongly mapped

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

Course: Energy Systems- I

Program: B. Tech. (Electrical Engineering). **Time: 03 Hrs. Semester:**

Max. Marks: 40

Instructions:

Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	Describe a solar cooling system based on vapour compression system.	**U**	**CO3**
2.	Describe the construction of a solar PV panel.	**U**	**CO3**
3.	What are the criteria for site selection of a windmill.	**Re**	**CO1**
4.	Derive an expression for the total power of a wind stream.	**Re**	**CO4**
	SECTION B (Attempt any **Two Questions)**		
5.	Explain Betz model of expanding airstream tube to determine extraction of wind energy by windmill.	**U**	**CO5**
6.	What are the main advantages and limitations of a battery-storage system?	**Re**	**CO2**
7.	Describe the future of non-conventional energy sources in India.	**U**	**CO1**
	SECTION C is Compulsory		
8.	Explain how biomass conversion takes place?	**U**	**CO4**

Prof. Elective – II

		L	T	P	C
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	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

ECEXXXXX	Introduction to Machine Learning	3	3		2	3	2			2	2			3	2

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

	Non-conventional Energy Resources	L	T	P	C
Version 1.0		3	0	2	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Objectives

1. To help the student to understand basic concept of energy sources and the present energy scenario.
2. To give emphasis about the leading renewable sources of energy.
3. To give the students a perspective to learn about the technologies available for successful utilization of the energy sources.

Course Outcomes

On completion of this course, the students will be able to
CO1. **Acquire** fundamental concept of energy
CO2. **Develop** awareness about the solar energy.
CO3. **Understand** the role significance of biomass and fuel cell
CO4. **Understand** wind and ocean energy and its application

<u>Course Content</u>

Module 1: Electrical Power Generation **[10]**
Importance of Electrical Energy, Sources of Electrical Energy, Hydro Electric Power Plant – Selection of Site, Layout Diagram, Advantage and Disadvantages, Thermal Power Plant– Selection of Site, Layout Diagram, Advantage and Disadvantages, Nuclear Power Plant– Selection of Site, Layout Diagram, Advantage and Disadvantages

Module 2: Solar Energy: [10]
Theory of solar cells, solar cell materials, solar cell power plant, limitations, solar radiation flat plate collectors and their materials, performance analysis, applications, solar thermal power plants, photovoltaic solar cells and its applications.

Module 3: Wind Energy: [10]

Principle of wind energy conversion, basic components of wind energy conversion system, wind mill components, various types and their constructional features, design considerations of horizontal and vertical axis wind turbines, analysis of aerodynamic forces acting on wind mill blades and estimation of power output.

Module 4: Ocean Energy: [10]

Ocean Thermal Electric Conversion (OTEC) systems like open cycle, closed cycle, hybrid cycle; energy from tides, basic principle of tidal power, single basin and double basin tidal power plants, advantages of tidal energy, limitations and scope of tidal energy, wave energy and power from wave, wave energy conversion devices, advantages and disadvantages of wave energy.

Module 5: Biomass Energy and Fuel Cells: [6]

Conversion theory of biomass and its availability. Types of fuel cells, working principle, performance analysis and limitations.

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Text Books:

1. G. D. Rai, *Non-Conventional Energy Resources*, Khanna Publishers, 1988.
2. B. H. Khan, *Non-Conventional Energy Resources*, 3rd Ed., McGraw Hill Education, 2017.

Reference Books:

1. G. S. Sawhney, *Non-Conventional Resources of Energy*, Prentice Hall of India, 2012.
1. J.F. Manwell, "Wind Energy Explained, theory design and applications," J.G.

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Acquire** fundamental concept of energy.	**PO1, PO2, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO2	**Develop** awareness about the solar energy.	**PO1, PO2, PO3, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO3	**Understand** the role significance of biomass and fuel cell	**PO1, PO2, PO3, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO4	**Understand** wind and ocean energy and its application.	**PO1, PO2, PO3, PO4, PO6, PO7,**

		PO12, PSO1, PSO2

EEE11049	**Sensors and Actuators**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Measurements and Instruments				
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

Unit I: Introduction: 8 lecture hours

Introduction to sensor, transducer and actuator, sensor types and technologies, main technical definitions: calibration, selectivity, sensitivity, reproducibility, detection limits, response time, frequency responses, calibration, feedback control.

Unit II: 10 lecture hours

Mechanical and Electromechanical Sensor:Definition, principle of sensing and transduction, classification. Strain Gauge: Theory, type, materials, design consideration, sensitivity, gauge factor,variation with temperature, adhesive, rosettes. Inductive Sensor: common types-Reluctance change type, Mutual inductance change type,transformer action type, Magnetostrictive type, brief discussion with respect to material,construction and input output variable, Ferromagnetic plunger type, short analysis. LVDT: Construction, material, output input relationship, I/O curve, discussion, Proximity sensor.

Unit III: 12 lecture hours
Capacitive Sensors: Variable distance-parallel plate type, variable area- parallel plate, variable dielectric constant type, calculation of sensitivity.
Stretched Diaphragm Type: Microphone, response characteristics.
Piezoelectric Element: piezoelectric effect, charge and voltage co-efficient, crystal model, materials, natural & synthetic type, their comparison, force& stress sensing, ultrasonic sensors.

Unit IV: 8 lecture hours
Thermal Sensors: Material Expansion Type: solid, liquid, gas and vapour.
Resistance Change Type: RTD materials, thermister material, shape, ranges and accuracy specification. Thermo emf Sensor: types, thermoelectric power, general consideration, Junction semiconductor type. Radiation Sensors: types, characteristics and comparison, Pyroelectric type.

Unit V: 7 lecture hours
Magnetic Sensors: Thomson effect, Hall effect, and Hall drive, performance characteristics. Radiation Sensors: LDR, Photovoltaic cells, photodiodes, photo emissive cell types, materials, construction, response, Geiger counters, Introduction to smart sensors.

Text Books:

1. Ernest Doebelin and Dhanesh N. Manik, *Doebelin's Measurement Systems*, 6th Ed., McGraw Hill Education, 2017.
2. Ian Sinclair, *Sensors and Transducers,* Elsevier, 2011.
3. D. Patranabis, Sensors and Transducers, 2nd Ed., Prentice Hall of India Learning Pvt. Ltd., 2003.

Reference Books:

1. Ronald K. Jurgen, *Sensors and Transducers (Progress in Technology)*, 2nd Ed., SAE International, 2003.

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

Components	Mid Term	Attendance	Class Assessment	End Term
Weightage (%)	20	10	30	40

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**

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

	Course Code	EEE11027
	Course Title	Sensors and Transducers
Engineering Knowledge	PO1	3
Problem analysis	PO2	3
Design/development of solutions	PO3	3
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	1
To see our students as ethical and responsible engineering professionals...	PSO3	-

ECE12023	Microcontroller and Interfacing Lab	L	T	P	C
Version 1.0		0	0	2	1
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.
1. Understand 8051 microcontroller concepts, architecture and programming.

Course Outcomes

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

CO1**. Find** the Assembly language programs of 8051 Microcontroller.
CO2. **Illustrate** the real time analysis of 8051 through programs.
CO3. **Find** how to convert high-level language program to assembly level program.
CO4. **Find** how to interface external devices with microcontroller.
CO5. **Design** project based on microcontroller knowledge.

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

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. Copying a block of memory
13. Interfacing Keyboard and Multi-digit Display with multiplexing using 8255
14. Interfacing Stepper Motor.
15. Interfacing ADC and DAC.

Text Books

3. "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.
4. "The 8051 Microcontroller", Kenneth J. Ayala, 3rd Edition, Thomson/Cengage Learning.

Reference Books

3. "The 8051 Microcontroller Based Embedded Systems", Manish K Patel, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
4. "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	**Find** the Assembly language programs of 8051 Microcontroller.	**PO1,PSO1**
CO2	**Illustrate** the real time analysis of 8051 through programs.	**PO1,PSO1**
CO3	**Find** how to convert high level language program to assembly level program.	**PO2,PSO1**
CO4	**Find** how to interface external devices with microcontroller.	**PO3,PSO1**
CO5	**Design** project based on microcontroller knowledge.	**PO1,PO2,PO3,PO5,PO11,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	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
	Microcontroller and Interfacing	3	1	1		1						1		3	

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

[redacted]

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2020 – 21)		
Name of the Program:	B.Tech	**Semester:**	
Paper Title:	**Microcontroller and Interfacing**	**Paper Code:**	
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	15	**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.		

1	Familiarization with 8051 controller Kit.	**U**	**CO1**
2	Add two 8 bit numbers and stored at consecutive memory location.	**R**	**CO2**
3	3. Subtract two 8 bit numbers and stored at consecutive memory location.	**R**	**CO3**
4	4. To multiply two 8 bit numbers and stored at consecutive memory location.	**R**	**CO4**
5	5. To divide two 8 bit numbers and stored at consecutive memory location.	**U**	**CO5**
6	6. To find the largest element in an array.	**An**	**CO1**
7	7. To find the smallest element in an array.	**U**	**CO1**
8	8. To sort the given number in ascending order	**An**	**CO2**
9	9. To sort the given number in descending order	**U**	**CO2**
10	10. To convert decimal to hexadecimal.	**U**	**CO3**
11	11. To convert hexadecimal to decimal.	**R**	**CO3**
12	12. Copying a block of memory	**An**	**CO4**
13	13. Interfacing Keyboard and Multi-digit Display with multiplexing using 8255	**U**	**CO4**
14	14. Interfacing Stepper Motor.	**R**	**CO5**
15	15. Interfacing ADC and DAC.	**U**	**CO5**

	Power Electronics Lab	L	T	P	C
Version 1.0		0	0	2	1
Pre-requisites/Exposure	Analog Electronics				
Co-requisites	--				

Course Objectives

1. To illustrate various power semiconductor devices.
2. To compare the operating characteristics of various power semiconductor devices.
3. To analyse different power converter circuits.

Course Outcomes

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

CO1. **Design** and **test** basic knowledge on the working of SCR and Triac.

CO2. **Develop** different types of converter circuit connections and observe their operatingcharacteristics.

CO3. **Test** different types of converter circuits using simulations for verification of circuitbehaviour.

Catalog Description

Power electronics is the study of application of solid-state devicesfor efficient control and conversion of electric power. In this course students will be introduced with different power semiconductor devices and different power electronics converter.

Course Content

1. Study of the characteristics for an SCR Setup.
2. Study of the characteristics of a Triac Setup.
3. Study the different triggering circuit of SCR Setup.
4. Study of Single phase half controlled symmetrical and asymmetrical bridge converters Setup.
5. Half Controlled Bridge Converter Trainer.
6. Single phase half controlled bridge converter with two Thyristors and two diodes Setup.
7. Study of the operation of Single phase fully controlled bridge converter Setup.
8. Study of Step down Chopper Setup.
9. Simulation of single phase controlled converter with and; without the source inductance.
10. Simulation of step up and step down chopper with MOSFET and GTO.

Text Books:

1. P. S. Bhimbra, *Power Electronics*, Khanna Publishers, 2006.
2. Muhammad H. Rashid, *Power Electronics: Devices, Circuits and Applications*, 4th Ed., Pearson Education, 2017.
3. John G. Kassakian, Martin F. Schlecht and George C. Verghese, *Principles of Power Electronics*, Pearson Educatio, 2010.

Reference Books:

1. R. S. Ramshaw, *Power Electronics: Thyristor Controlled Power for Electric Motors*, Springer, 1975.
2. Muhammad H. Rashid, *Recent Developments in Power Electronics*, IEEE, 1996.

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** and **test** basic knowledge on the working of SCR and Triac.	**PO2, PO3, PO5, PO7, PSO1**
CO2	**Develop** different types of converter circuit connections and observe their operating characteristics.	**PO1, PO2, PO3, PO4, PO5, PO7, PSO1, PSO2**
CO3	**Test** different types of converter circuits using simulations for verification of circuit behaviour.	**PO1, PO2, PO3, PO4, PO5, PO7, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12022	Power Electronics Lab	3	3	3	3	3	-	3	-	-	-	-	-	3	3	-

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech	**Semester:**	III
Paper Title:	Power Electronics Lab	**Paper Code:**	EEE12022
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)	**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	**What** is latching current?	**Remember**	**CO1**
2	**Illustrate** the use of snubber circuit in a converter?	**Understand**	**CO2**
3	**What** is meant by the term Snubber circuit?	**Remember**	**CO3**
4	**Which** converter can be used for controlling frequency?	**Remember**	**CO4**
5	**What** is cycloconverter	**Remember**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	A 230 Volt, 50 Hz, 1 pulse SCR is triggered at a firing angle of 40° and the load current extinguishes at an angle of 210°. Find the average output voltage and current for R = 2Ω and L =2mH.	**Understand**	**CO1**
(OR)			
6 b)	Explain in detail about V-I characteristics of MOSFET	**Remember**	**CO1**
7 a)	A 230 Volt, 50 Hz, 1 pulse SCR is triggered at a firing angle of 40° and the load current extinguishes at an angle of 210°. Find the average output voltage and current for R = 2Ω and L =2mH.	**Understand**	**CO2**
(OR)			
7 b)	When and why are thyristors connected in series?	**Analyze**	**CO2**
8 a)	Describe in detail about thyristor protection.	**Evaluate**	**CO3**
(OR)			
8 b)	**Classify** the different types of power modulator.	**Evaluate**	**CO3**
9 a)	Explain the construction and characteristics of a DC chopper	**Evaluate**	**CO4**
(OR)			
9 b)	**Explain** the working principle of on-off control method of an AC voltage controller. .	**Evaluate**	**CO4**
10 a)	**Explain** the working principle of on-off control method of an AC frequency controller.	**Evaluate**	**CO5**
(OR)			
10 b)	With proper circuit and voltage waveforms, **explain** the working of step up and step down chopper.	**Apply**	**CO5**
Group C			

Answer All the Questions (7 x 5 = 35)			
11 a)	Discuss about use of output capacitors in a converter.	**Remember**	**CO1**
(OR)			
11 b)	Describe in detail about resistive commutation of a thyristor.	**Understand**	**CO1**
12 a)	Describe in detail about Regenerartive commutation.	**Understand**	**CO2**
(OR)			
12 b)	Describe in detail about all classes of commutation.	**Understand**	**CO6**
13 a)	A single phase full bridge inverter has a resistive load of R=5 Ohm and the DC input voltage of 220 Volt. Find: (a) RMS output voltage, and (b) Output power.	**Understand**	**CO3**
(OR)			
13 b)	Explain with proper circuit diagram, the operation of full wave fully controlled rectifier.	**Remember**	**CO3**
14 a)	A 230 V, 50 Hz one pulse SCR controlled rectifier is triggered at a firing angle of 60 degree and the load current extinguishes at an angle of 220 degree. Find the circuit turn off time, average output voltage and average load current for R = 2Ohm, L=3mH.	**Create**	**CO4**
(OR)			
14 b)	A 230 V, 50 Hz one pulse SCR controlled rectifier is triggered at a firing angle of 60 degree and the load current extinguishes at an angle of 220 degree. Find the circuit turn off time, average output voltage and average load current for R = 5Ohm, L=8mH	**Create**	**CO4**
15 a)	Explain with proper circuit diagram, the operation of full wave fully controlled rectifier.	**Evaluate**	**CO6**
(OR)			
15 b)	Describe about working principle Voltage source Inverter.	**Evaluate**	**CO5**
16 a)	Describe about working principle current source Inverter.	**Understand**	**CO6**
(OR)			
16 b)	**Discuss** the advantages and disadvantages of 120 degree mode of operation of an inverter.	**Create**	**CO6**
17 a)	Explain in detail about V-I characteristics of IGBT	**Understand**	**CO5**
(OR)			
17 b)	Explain with proper circuit diagram, the operation of full wave fully controlled rectifier.	**Understand**	**CO5**

EEE12021	**Control Systems Lab**	L	T	P	C
Version 1.0		0	0	3	2
Pre-requisites/Exposure	Electric Circuits				
Co-requisites					

Course Objectives

1. Analyse stability of first order and second order systems in time domain using MATLAB.
2. Analyse stability of first order and second order systems in frequency domain using MATLAB.
3. Apply MATLAB to determine overall transfer function of complicated systems.

Course Outcomes

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

CO1. **Memorize** frequently used functions of MATLAB and Simulink, in control system engineering.

CO2. **Apply** MATLAB functions in m-file to determine overall transfer function of a given system.

CO3. **Analyse** step response and impulse response of first and second order system, and **use** MATLAB to evaluate their time domain characteristics.

CO4. **Analyse** steady state errors of systems of different Types for standard inputs.

CO5. **Analyse** and **appraise** stability of a system using root locus method using MATLAB.

CO6. **Analyse** and **appraise** behaviour a system in frequency domain, using MATLAB.

Catalog Description

The knowledge of Control System is essential for engineering graduates in solving many stability design problems arising in electrical, mechanical, aerospace, biomedical and chemical systems. Since control system is an integral part of our modern society, it finds a wide range of applications in aircraft, robots and process control systems.

This course introduces principles and techniques required in the design and implementation of control algorithms in practical systems. This course focus on modelling of physical systems including electrical and mechanical systems, time response analysis and transfer function based analysis techniques. This course also deal with stability of different types of time invariant systems using Routh's array, root locus technique, frequency response based analysis including Bode plot and Nyquist plot. It also covers design of compensators, P, PI, PID controllers and their applications to get a desired output.

Course Content

1. Familiarization with MATLAB, Simulink tool box and m-file.
2. Determination of overall transfer function from the block diagram of a system.

3. Determination of impulse response and step response of 1st order and 2nd order systems. From the step response of a 2nd order system, determine time-domain specifications like rise time, peak time, settling time, peak overshoot etc. with/without MATLAB.
4. Determination of steady state errors of Type-0, Type-1 and Type-2 systems for step, ramp and parabolic inputs using MATLAB.
5. Determination of Root Locus of different types of systems using MATLAB, and their time domain specifications with/without MATLAB.
6. To plot root locus diagram of an open loop transfer function and determine range of gain K for stability.
7. Determination of Bode plot for different systems using MATLAB, and their frequency domain specifications with/without MATLAB.
8. Determination of Nyquist plot for different systems using MATLAB, and their frequency domain specifications with/without MATLAB.
9. To draw a Nyquist plot of an open loop transfer function and examine the stability of the closed loop system.
10. Determinations of approximate transfer function from Bode plot.

Text Books:

1. Kastuhiko Ogata, *Modern Control Engineering*, 5th Ed., Pearson Education, 2015.
2. FaridGolnaraghi and Bengamin C. Kuo, *Automatic Control Systems*, 9thEd., Wiley, 2014.
3. Norman S. Nise, *Nise's Control Systems Engineering*, Wiley India Edition, Wiley, 2018.

Reference Books:

1. Richard C. Dorf and Robert H. Bishop, *Modern Control Systems*, 12th Ed., Pearson Education India, 2013.
2. Naresh K. Sinha, *Control Systems*, 4th Ed., New Age International Pvt. Ltd., 2013.

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	**Memorize** frequently used functions of MATLAB and Simulink, in control system engineering.	**PO2, PO3, PO4, PO5, PSO1, PSO2**
CO2	**Apply** MATLAB functions in m-file to determine overall transfer function of a given system.	**PO1, PO2, PO3, PO5, PSO1, PSO2**
CO3	**Analyse** step response and impulse response of first and second order system, and **use** MATLAB to evaluate their time domain characteristics.	**PO1, PO2, PO3, PO5, PO6, PSO2**
CO4	**Analyze** steady state errors of systems of different Types for standard inputs.	**PO1, PO2, PO3, PO4, PO5, PSO2**
CO5	**Analyze** and **appraise** stability of a system using root locus method using MATLAB.	**PO3, PO4, PO5, PO6, PO10, PSO2**
CO6	**Analyze** and **appraise** behaviour a system in frequency domain, using MATLAB.	**PO3, PO4, PO5, PO6, 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 or team work	Communication	Project management and finance	Life-long Learning	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12021	Control Systems Lab	3	3	3	3	3	3	-	-	-	2	-	-	2	3	-

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

[redacted]

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

Course: EEE12021 – Control Systems Lab

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	**Define** the function of following MATLAB commands: (i) atan, (ii) atand, (iii) eye, (iv) cloop.	**R**	**CO1**
2.	**Determine** step response using MATLAB, of a unity feedback closed-loop system with forward path transfer function $G(s) = \frac{K}{s(s+10)}$.	**An**	**CO2**
3.	**Obtain** steady state error from the step response of a unity feedback closed-loop system with forward path transfer function $G(s) = \frac{K}{s(s+10)}$, using MATLAB.	**Ap**	**CO3**
4.	**How** to obtain angle of departure using MATLAB?	**Ap**	**CO4**
	SECTION B (Attempt any **Two Questions)**		
5.	**Obtain** the Nyquist plot using MATLAB and also **determine** the phase margin and gain margin, and **comment** on the stability of the closed-loop system whose loop transfer function is given by, $G(s)H(s) = \frac{K}{s(s^2+s+2)}$.	**Ap**	**CO6**
6.	Consider a unity feedback control system has the following open-loop transfer function: $G(s) = \frac{4s+1}{4s^2}$**,** then **obtain** (i) unit impulse response and (ii) unit step response.	**Ap**	**CO2**
7.	For a given unity-feedback system, the open-loop transfer function is given by, $G(s) = \frac{K}{s(s+2)(s^2+6s+25)}$	**Ap**	**CO5**

	(a) **Sketch** the root locus plot using MATLAB. (b) Using MATLAB, **determine** the frequency of oscillation of the system, at the verge of instability.		
	SECTION C is Compulsory		
8.	The open-loop transfer function of a unity-feedback system is given by $G(s) = \dfrac{100}{s^2(s+4)(s^2+5s+25)}$ Using MATLAB, **find** the static error coefficient and steady-state error of the system when it is subjected to an input of $r(t) = 2 + 4t + 2t^2$.	**Ap**	**CO4**

EEE15033	**Technical Seminar**	L	T	P	C
Version 1.0		0	0	2	1
Pre-requisites/Exposure	Basic idea of the topic to be presented				
Co-requisites	Basic idea of preparing ppt				

Course Objectives

1. To develop skill in doing literature survey, technical presentation and report presentation.
2. To enable project identification and execution on preliminary works.

Course Outcomes

On completion of this course, the students will be able to
CO1. **Identify** the advanced technologies and globalization.
CO2. **Develop** communication and representation skills towards becoming a good team leader and manager.
CO3. **Appreciate** importance of lifelong learning towards industry readiness.

Catalog Description

The seminar should provide an active learning format in which students can develop the ability to read critically and conceptually, and therefore to speak and write with discrimination. Thus develop skills in doing literature survey, technical presentation and report preparation.

Course Content

The course involves presentation and report submission by every student. Reference search and technical writing skills along with effective presentation skills are focused. The course strengthens the research attributes including literature survey.

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 advanced technologies and globalization.	**PO2, PO9, PO10, PO11, PO12, PSO3**
CO2	**Develop** communication and representation skills towards becoming a good team leader and manager.	**PO1, PO8, PO9, PO10, PO12, PSO1**
CO3	**Appreciate** importance of lifelong learning towards industry readiness.	**PO2, PO8, PO10, PO11, PO12, PSO3**

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE15033	Technical Seminar	2	3	-	-	-	-	-	3	3	3	3	3	2	-	3

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

EEE11034	**Electric Drives**	L	T	P	C
Version 1.0		3	1	0	4
Pre-requisites/Exposure	Electrical Machines – I and II, Power Electronics				
Co-requisites	--				

Course Objectives

1. To illustrate about various DC and AC machines used in drives.
2. To illustrate the performance of the fundamental control practices associated with DC and AC machines (starting, reversing, braking, plugging etc.) using power electronics.
3. To develop capability to choose a suitable Motor and Power Electronic Converter package from a description of drive requirement.

Course Outcomes

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

CO1. **Illustrate** about various DC and AC machines used in drives.

CO2. **Illustrate** the working principle and design details of frequency-controlled converters used in AC motor drives.

CO3. **Develop** capability to choose a suitable DC Motor and Power Electronic Converter package from a description of drive requirement.

CO4. **Model** AC-DC Converters and DC-DC Converters for steady-state and transient operation.

Catalog Description

In this course students will be introduced with different electric drives. An electrical drive is defined as a form of machine equipment designed to convert electrical energy into mechanical energy and provide electrical control of the processes. The system employed for motion control is called an electrical drive, which we use in our daily lives to make our work convenient.

Course Content

Unit I: Concept of Electric Drives: 10 lecture hours

Classifications, four quadrant operation of an electric drive, types of loads and components of load toques, dynamics of motor-load combination, equivalent value of drive parameters for loads with rotational and translational motion, steady state stability of an electric drive system, transient stability, multi quadrant operation of drives, load equalization.

Unit II: Thermal Model for Motor Heating and Cooling: 8 lecture hours

Classes of Motor duty, determination of rating of motors for various applications, equivalent current and equivalent torque, effect of load inertia over motor rating, methods of determination of rating for fluctuating and intermittent loads, effect of load inertia and environmental factors.

Unit III: Review of Characteristics of DC Motors: 8 lecture hours

Modification of characteristics of DC shunt and series motors, Methods of starting DC motor, fundamental parameters of speed control, methods of speed control of DC shunt and series motors, concept of electric braking, regenerative dynamic and counter current braking of DC motors, phase controlled and chopper controlled DC separately excited motor and series motor drives, closed loop control scheme for DC motor.

Unit IV: Review of Characteristics of Three Phase Induction Motors: 10 lecture hours

Modification of speed torque characteristics due to variation of stator voltage stator frequency and rotor resistance, methods of starting for squirrel cage and slip ring induction motors, methods of speed control of induction motors, slip power recovery, control of IM by three phase AC-AC voltage controller, chopper control of rotor resistance, speed control using slip power recovery schemes, PWM inverter fed induction motor drives, current source inverter fed induction motor drives, comparison of VSI & CSI fed drives.

Unit V: Variable Frequency Control: 9 lecture hours
Self control, voltage source inverter fed synchronous motor drive, vector control, introduction to solar and battery powered drive, stepper motor, switched reluctance motor drive industrial application, drive consideration for textile mills steel rolling mills cement mills paper mills machine tools, cranes andhoist drives.

Text Books:

1. G. K. Dubey, *Fundamentals of Electrical Drives*, 2nd Ed., Narosa, 2010.
2. VedamSubrahmanyam, *Electric Drives: Concepts and Applications*, 2nd Ed., McGraw Hill Education, 2017.

Reference Books:

1. Ned Mohan, *Electric Machines and Drives: A First Course*, Wiley, 2013.
2. S. K. Pillai, *A First Course on Electrical Drives*, 3rdEd., New Age International, 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** about various DC and AC machines used in drives.	**PO1, PO2, PO4, PO6, PSO1, PSO2**
CO2	**Illustrate** the working principle and design details of frequency-controlled converters used in AC motor drives.	**PO1, PO3, PO4, PO6, PSO2**
CO3	**Develop** capability to choose a suitable DC Motor and Power Electronic Converter package from a description of drive requirement.	**PO1, PO2, PO3, PO10, PO12, PSO2**
CO4	**Model** AC-DC Converters and DC-DC Converters for steady-state and transient operation.	**PO2, PO3, PO4, PO10, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11034	Electric Drives	3	3	3	3	-	3	-	-	-	3	-	3	2	3	-

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

ADAMAS UNIVERSITY
END SEMESTER EXAMINATION
(MARCH-2022)

Name of the Program:	B.Tech	**Semester:**	
Paper Title:	Electric Drives	**Paper Code:**	EEE11034
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)	**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	**Deduce** the condition for steady state stability of a motor load condition?	**Remember**	**CO1**
2	**Write** four advantage of an electric drive system?	**Understand**	**CO2**
3	**Derive** an expression for Dynamics of motor load System?	**Remember**	**CO3**
4	**Explain** the operation of various converters used in Drives.	**Remember**	**CO4**
5	Write the importance of power modulator in Electric Drives	**Apply**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Explain** Speed torque characteristics of DC series motor?	**Understand**	**CO1**
(OR)			
6 b)	With the aid of neat sketches describe the working of power steering system.	**Remember**	**CO1**
7 a)	Describe the different speed control techniques of a DC Motor.	**Understand**	**CO2**
(OR)			
7 b)	Describe the different braking techniques of a DC Motor.	**Analyze**	**CO2**
8 a)	Draw the power transmission layout of electric two wheelers. Compare the conventional two wheeler and electric two wheeler.	**Evaluate**	**CO3**
(OR)			
8 b)	Explain in detail about the construction and working of Lead acid battery.	**Evaluate**	**CO3**
9 a)	Explain the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.	**Evaluate**	**CO4**
(OR)			
9 b)	A one quadrant chopper is used for rheostatic breaking of a separately excited dc motor. Ra=0.1ohm, breaking resistance =7.5ohm,voltage constant 1.4v/A-rad/sec, armature current 120A and field current is 1.6A. The duty cycle of chopper is	**Evaluate**	**CO4**

	0.35. **Find** (a) average voltage across chopper, (b) power dissipated in breaking resistance and (c) Motor speed.		
10 a)	Explain in detail the construction of an Electric Drive fed with a DC-Dc Converter.	**Evaluate**	**CO5**
(OR)			
10 b)	Explain in detail about layout of Electric Drive	**Apply**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Discuss the methods of downward, forward and uoward operation of a DC drive with relevant sketches.	**Remember**	**CO1**
(OR)			
11 b)	List out the points to be considered while designing a driver's seat.	**Understand**	**CO1**
12 a)	Describe in detail about Regenerative braking system.	**Understand**	**CO2**
(OR)			
12 b)	Explain the operation of a frequency controlled AC drive,	**Understand**	**CO6**
13 a)	Explain any two types of braking in an induction motor drive.	**Understand**	**CO3**
(OR)			
13 b)	Briefly discuss about a single phase half waves converter drive fed to Separately Excited DC motor?	**Remember**	**CO3**
14 a)	A one quadrant chopper is used for rheostatic breaking of a separately excited dc motor. Ra=0.1ohm,breaking resistance =7.5ohm,voltage constant 1.4v/A-rad/sec, armature current 120A and field current is 1.6A. The duty cycle of chopper is 0.35. **Find** (a) average voltage across chopper, (b) power dissipated in breaking resistance and (c) Motor speed.	**Create**	**CO4**
(OR)			
14 b)	Discuss about the servicing and maintenance of three wheeler.	**Create**	**CO4**
15 a)	Describe about working principle BLDC motors.	**Evaluate**	**CO6**
(OR)			
15 b)	Describe about working principle SRM motors.	**Evaluate**	**CO5**
16 a)	A full wave fully controlled controlled single phase converter feeds a separately excited dc motor. Input voltage is 240V, Ra=6 ohm and I=1.8A. **Find** firing angle.	**Understand**	**CO6**
(OR)			
16 b)	A half controlled single phase converter feeds a separately excited dc motor. Input voltage is 240V, α= 100, Ra=6 ohm and I=1.8A. **Find** back emf.	**Create**	**CO6**
17 a)	A half controlled single phase converter feeds a separately excited dc motor. Input voltage is 240V, α= 10, Ra=60 ohm and I=1.8A. **Find** back emf.	**Understand**	**CO5**
(OR)			
17 b)	Briefly discuss about a single phase half waves converter drive fed to Separately Excited DC motor?	**Understand**	**CO5**

EEE11024	Modern Control Systems	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Control Systems				
Co-requisites	--				

Course Objectives

1. To introduce the concept of state-space modeling and its applications in real-time systems.
2. To comment on controllability and observability of system.
3. To design full order and minimum order controllers and observers.

Course Outcomes

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

CO1. **Discuss** state-space representation of a continuous-time control system.

CO2. **Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system.

CO3. **Describe** applications of pole-placement technique.

CO4. **Design** full order and minimum order controllers and state observer for continuous-time control system.

Catalog Description

This course focuses on applications of state-space approach over transfer function based analysis of different real-time systems. This course also deals with finding solution of homogeneous and non-homogeneous state equations, checking controllability and observability of systems, studying pole-placement techniques, designing full order and minimum order state controllers and observers.

Course Content

Unit I: State Space Representation of Continuous-Time Control Systems: 11 lecture hours State-space representation of transfer function systems, important terminologies used in state space approach, state space representation in different canonical forms: controllable canonical form, observable canonical form, diagonal canonical form, Jordon canonical form; eigenvalues of system matrix, diagonalization, invariance property of eigenvalues, non-uniqueness of a set of state variables, transformation from state space model to transfer function.

Unit II: Analysis of Continuous-Time Control Systems in State Space: 12 lecture hours Homogeneous and non-homogeneous systems, solution of homogeneous state equations: traditional approach and Laplace transform approach; solution of non-homogeneous state equations: traditional approach and Laplace transform approach; Caley-Hamilton theorem, state transition matrix (STM), computation of state transition matrix using Laplace transform approach, Caley-Hamilton theorem; properties of state transition matrices, concept of controllability and observability.

Unit III: Introduction to Digital Control Systems: [12]
Introduction, Types of signals: continuous-time analog signal, continuous-time quantized signal, sampled-data signal, digital signal, difference between continuous-time control system and digital control system, signal forms in a digital control system, important terminologies in digital control

system, sample-and-hold circuit, Shannon sampling theorem, zero-order hold circuit and first-order hold circuit.

Unit IV: The z-transform: [10]
Representation of discrete-time signals, the z-transform, the z-transform of elementary functions: unit-step function, unit-ramp function, exponential function, sinusoidal function, cosine function; important properties and theorems of the z-transform, the inverse z-transform: direct division method, computational method, partial-fraction-expansion method, inversion integral method; z-transform method for solving difference equations. region of convergence, stability.

Text Books:

1. K. Ogata, *Modern Control Engineering*, 5th Ed., PHI Learning Pvt. Ltd, 2010.
2. N. S. Nise, *Nise's Control Systems Engineering*, Wiley India Edition, 2018.

Reference Books:

1. Bernard Friedland, *Control System Design: An Introduction to State-Space Methods*, Dover Publications Inc., 2005.
2. Cheng Siong Chin, *Computer-Aided Control Systems Design: Practical Applications using MATLAB® and Simulink®*, 1st Ed., CRC Press, 2017.

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	**Discuss** state-space representation of a continuous-time control system.	**PO2, PO3, PO4, PO5, PO6, PSO2**
CO2	**Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system.	**PO1, PO2, PO3, PO4, PO5, PSO1, PSO2**
CO3	**Describe** applications of pole-placement technique.	**PO1, PO2, PO3, PO4, PO5, PO6, PSO1, PSO2**
CO4	**Design** full order and minimum order controllers and state observer for continuous-time control system.	**PO2, PO3, PO4, PO5, PO6, PSO1, PSO2**

PO5, PO6, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11024	Modern Control Systems	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-

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

[redacted]

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

Course: EEE11024 – Modern Control Systems

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**

Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:

Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

Section A (Attempt **any Three)**

1.	A system is represented by the state equation as $$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-1 & 1\\ 0 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}\begin{bmatrix}r_1\\ r_2\end{bmatrix}$$ $$\begin{bmatrix}y_1\\ y_2\end{bmatrix} = \begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$$ **Derive** the transfer functions.	**An**	**CO1**
2.	For a linear time-invariant system, the system matrix is, $\mathbf{A} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$. **Determine** the characteristic equation and Eigenvalues.	**An**	**CO2**
3.	Using Caley-Hamilton theorem, **determine** the state transition matrix (STM) of the system whose system matrix is given by: $\mathbf{A} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$.	**Ap**	**CO3**
4.	**Construct** the state model in controllable canonical form, for the following differential equation. $\ddot{y} + 6\dot{y} + 3y = \dot{u} + 4u$	**Ap**	**CO1**
	SECTION B (Attempt any **Two Questions)**		
5.	A system is described by its transfer function $$\frac{Y(s)}{R(s)} = T(s) = \frac{8(s+5)}{s^3+12s^2+44s+48}$$ (a) Determine its controllable state variable model, and (b) Determine the state transition matrix.	**Ap**	**CO3**

6.	Given the homogeneous state equation, where $\mathbf{A} = \begin{bmatrix} -3 & 1 \\ -2 & -1 \end{bmatrix}$. **Determine** the steady-state value of state variables, *i.e.* $x_{ss} = \underset{t \to \infty}{\mathrm{Lt}}\, x(t)$, for given the initial state value of $x(0) = [10 \quad 10]^T$.	**Un**	**CO2**
7.	**Determine** observability of the following system. $\dot{\mathbf{x}}(t) = \begin{bmatrix} -3 & 1 & 0 \\ 1 & -2 & 1 \\ 1 & 1 & 0 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix} u(t)$, $y(t) = [1 \quad 2 \quad 1]\mathbf{x}(t)$.	**An**	**CO4**
	SECTION C is Compulsory		
8.	**Show** that the system described by the following state model is observable: $\dot{\mathbf{x}}(t) = \begin{bmatrix} -2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix} u(t)$, $y(t) = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \end{bmatrix} \mathbf{x}(t)$.	**An**	**CO4**

Prof. Elective – III

		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	**PO1, PO2**

	first-order logic, to solve complex problems effectively.	**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	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
ECEXXXXX	Intro-duction to Artificial	3	3		3	3	2	2		2	2			3	2

	Intell-igence														

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

EEE11051	**Introduction to Electric Vehicles**	L	T	P	C
Version 1.0	**Contact Hours – 45**	3	0	0	3
Pre-requisites/Exposure	Power System, Energy System				
Co-requisites					

Course Outcome

CO1: Understand basics of Electric Vehicles Development.

CO2: Understand basic scheme of electric vehicle storage system and hybrid electric vehicle.

CO3: Analyse need of different controlling system for electric vehicle.

CO4: Apply new topologies to electric vehicle.

CO5: Evaluate performance parameters of electric hybrid vehicle.

CO6: Understand recent industrial power electronic applications for electric vehicle.

Syllabus:

Unit 1: Introduction to Electric Vehicle 4 lecture hours

Air pollution and global warming, social and environmental importance of electric vehicles, impact of modern drive-trains on energy supplies. Basics of vehicle performance, vehicle motion and the dynamic equations for the vehicle, fuel economy characteristics of internal combustion engine, vehicle power source characterization transmission characteristics, and mathematical models to describe vehicle performance including braking performance.

Unit 2: Electric Drive Trains 8 lecture hours

Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis, drive cycle implications and fuel efficiency estimations and well to wheel fuel efficiency analysis.

Unit 3: Hybrid Electric Drive 8 lecture hours

Trains - Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, basic architecture of hybrid drive train and analysis series drive train, power flow control in hybrid drive-train topologies, fuel efficiency analysis; analysis of parallel, series parallel and complex drive trains and power flow in each case.

Unit 4: Electric Propulsion Unit 6 lecture hours

Introduction to electric components used in hybrid and electric vehicles, configuration and control of DC Motor drives, configuration and control of induction motor drives, configuration and control of permanent magnet motor drives, configuration and control of switch reluctance motor drives, drive system efficiency.

Unit 5: Energy Storage 4 lecture hours

Introduction to energy storage requirements in hybrid and electric vehicles, battery based energy storage and its analysis, fuel cell based energy storage and its analysis, super capacitor based energy storage and its analysis, and flywheel based energy storage and its analysis, hybridization of different energy storage devices.

Unit 6: Sizing the Drive System 5 lecture hours

Matching the electric machine and the internal combustion engine (ICE), sizing the propulsion motor, sizing the power electronics, sizing of components for different hybrid drive train topologies, sizing of components for different electric drive train topologies, selecting the energy storage technology, communications, supporting subsystems.

Unit 7: Energy Management Strategies 5 lecture hours

Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies

Text Books:

1. James Larminie and John Lowry. (2012) Electric Vehicle Technology Explained, WileyBlackwell.

2. Hussain, Iqbal. (2003) Electric and Hybrid Vehicles: Design Fundamentals, CRC Press.

Reference Books:

1. MehrdadEhsani, Yimin Gao, Sebastien E. Gay and Ali Emadi, (2004) Modern Electric,Hybrid Electric, and Fuel Cell Vehicles: Fundamentals, Theory, and Design (Power Electronics and Applications Series), CRC 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	Understand basics of Electric Vehicles Development..	**PO1, PO2, PO5, PSO1**
CO2	Understand basic scheme of electric vehicle storage system and hybrid electric vehicle.	**PO1, PO2, PO3, PO5, PSO2**
CO3	Analyse need of different controlling system for electric vehicle.	**PO1, PO2, PO3, PO5, PSO2**
CO4	Apply new topologies to electric vehicle.	**PO1, PO2, PO3, PO5, PSO1, PSO2**
CO5	Evaluate performance parameters of electric hybrid vehicle.	**PO1, PO2, PO3, PO5, PO10, PSO2**
CO6	Understand recent industrial power electronic applications for electric vehicle.	**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 or team work	Communication	Project management and finance	Life-long Learning	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEEXXXX	Introduction to Electric Vehicle	3	3	3	2	-	3	-	3	-	3	-	2	3	3	-

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(ODD SEMESTER 2022)**

Name of the Program:	B. TECH	**Semester:**	V
Paper Title:	Introduction to Electric Vehicle	**Paper Code:**	EEE11051
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	02
(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 braking system?	**Remember**	**CO1**
2	**Define** power steering	**Remember**	**CO2**
3	**What** is meant by Constant Power Speed Ratio?	**Remember**	**CO3**
4	**What** are the main components of an EV.	**Remember**	**CO4**
5	**What** is the function of a DC/DC converter in electric vehicles	**Understand**	**CO5**
	Group B **Answer All the Questions (5 x 2 = 10)**		
6 a)	**What** is the future of automotive industry in India?	**Understand**	**CO1**
	(OR)		
6 b)	**What** is fuel cell technology?	**Remember**	**CO1**
7 a)	**What** is meant by “gradeablity”?	**Remember**	**CO2**
	(OR)		
7 b)	**What** is hybrid vehicle?	**Remember**	**CO3**

8 a)	A vehicle with power plant power output at the drivetrain considering all losses is 100kW. The maximum total resistance the vehicle experiences is 3.6 kN. Calculate the velocity the vehicle can achieve in km/h under this condition?	**Evaluate**	**CO3**
(OR)			
8 b)	**What** are censors? Why these are used in EV?	**Understand**	**CO4**
9 a)	**Define** variable valve timing and their use.	**Remember**	**CO4**
(OR)			
9 b)	**Define** power steering and four examples where is it used?	**Analyze**	**CO4**
10 a)	**What** is the advantage of AC motor over DC motors for EV applications?	**Remember**	**CO5**
(OR)			
10 b)	**Explain** diesel particulate emission control system.	**Understand**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Write** a short note on basics of vehicle performance	**Understand**	**CO1**
(OR)			
11 b)	**Compare** conventional vehicle with Hybrid electric vehicle.	**Analyze**	**CO1**
12 a)	**Discuss** the history of hybrid electric vehicles.	**Remember**	**CO2**
(OR)			
12 b)	**Dissect** the environmental importance of EV and their social impacts.	**Understand**	**CO2**
13 a)	**What** are factors affecting the performance of batteries used in EVs?	**Understand**	**CO3**
(OR)			
13 b)	**Draw** six different configurations of drivetrains in electric vehicle.	**Analyze**	**CO3**
14 a)	Explain the two-quadrant operation of chopper DC motor drive with suitable waveforms for electric vehicle.	**Understand** **Analyse**	**CO4,**
(OR)			
14 b)	**What** are different modes of charging batteries? Compare them in detail	**Understand**	**CO4**
15 a)	**What** is the significance of a communication network in electric/hybrid vehicle.	**Understand**	**CO4**
(OR)			
15 b)	**Why** an energy management control system is required in an HEV?	**Understand**	**CO4**
16 a)	**Explain** the role of drive cycle for a city bus in designing the size of energy storage for electric vehicle	**Analyse**	**CO4**
(OR)			
16 b)	**What** are the sizing constraints for the electric motor?	**Understand**	**CO4**
17 a)	**Explain** rolling resistance and aerodynamic drag in vehicles.	**Analyse**	**CO5**
(OR)			
17 b)	**With** the help of a neat block diagram explain different subsystems of electric drive train.	**Remember** **Analyse**	**CO5**

EEE11052	**Energy Systems-II**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Objectives

1. To illustrate the concept of power generation.
2. To analyse the impact of grid integration.
3. To study concept of Micro grid and its configuration.

Course Outcomes

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

CO1. **Understand** the basics Hydel and Tidal energy systems.
CO2. **Understand** the utilization of few other energy sources.
CO3**. Have** a fundamental concept of electric power generation, transmission and distribution.
CO4. **Analyse** the impact of power transmission systems and grid infrastructure
CO5. **Gain** a perspective on the current and future trends of electric power operation.

Course Content

Module 1: Hydel and Tidal Systems: (9 Hrs)

Basic working principle, Classification of hydel systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems. Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

Module 2: OTHER ENERGY SOURCES (9 Hrs)

Bio-Mass, Geothermal& Ocean Energy: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I. C. Engine operation and economic aspects.

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

Module 3: (9 Hrs)

Principles of electric power generation, turbine-based generation vs. thermoelectric generation, distributed generation. Principles of electric power transmission and distribution: AC and DC power transmission systems, voltage levels in AC networks, high voltage grid infrastructure (transformers, converters, cables, switchgear), efficiency and power loss, protection and fault detection.

Module 4: (9 Hrs)

Traditional power system planning and operation: electricity grid systems; global grid models, European and National Grid, network operation, TSOs, DSOs and load profiles, control and communication networks for grid management, economics of electricity generation and distribution infrastructures, regulatory frameworks.

Module 5: (9 Hrs)

Current and future trends in power system operation - the path to the smart grid: grid-infrastructure, smart operation and flexible loads (microgrids, virtual power plants, smart homes), the role of ICT, market mechanisms, business models.

Text Books :

1. Renewable Energy- Power for a sustainable future, third edition, Edited by Godfrey Boyle, Oxford University Press, 2013.

2. H. Lee Willis, Walter G. Scott , 'Distributed Power Generation – Planning and Evaluation', Marcel Decker Press, 2000.

3. M.Godoy Simoes, Felix A.Farret, 'Renewable Energy Systems – Design and Analysis with Induction Generators', CRC press.

Reference Books :

1. G. S. Sawhney, *Non-Conventional Resources of Energy*, Prentice Hall of India, 2012.
2. DorinNeacsu, "Power Switching Converters: Medium and High Power", CRC Press, Taylor & Francis, 2006.

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the basics Hydel and Tidal energy systems.	**PO1, PO2, PO3, PO4, PO7, PO12, PSO1, PSO2**
CO2	**Understand** the utilization of few other energy sources.	**PO1, PO2, PO3, PO4, PO7, PO12, PSO1, PSO2**
CO3	**Have** a fundamental concept of electric power generation, transmission and distribution.	**PO1, PO2, PO3, PO4, PO12, PSO1**
CO4	**Analyse** the impact of power transmission systems and grid infrastructure.	**PO1, PO2, PO3, PO4, PO12, PSO1**
CO5	**Gain** a perspective on the current and future trends of electric power operation.	**PO1, PO2, PO3, PO4, 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 or team work	Communication	Project management and finance	Life-long Learning	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1=weakly mapped	Energy System-II	3	3	3	3	-	-	3	-	-	-	-	3	3	-	-

2= moderately mapped3=strongly mapped

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(EVEN SEMESTER 2022)**		
Name of the Program:	B. TECH EE	**Semester:**	VI
Paper Title:	Energy System- II	**Paper Code:**	EEE11052
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)	**52.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **53.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **54.** 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 wind shear	**Remember**	**CO1**
2	**What** is implication of solidity?	**Remember**	**CO2**
3	**What** is biofuels?	**Remember**	**CO3**
4	**What** are the greenhouse gases?	**Remember**	**CO4**
5	**Name** the place of world's first geothermal electric power plant	**Remember**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**What** are conventional and non-conventional Energy sources?	**Remember**	**CO1**
(OR)			
6 b)	**What** do you understand by geothermal energy?	**Remember**	**CO1**
7 a)	**Classify** the turbines for hydro plants.	**Remember**	**CO2**
(OR)			
7 b)	**What** is anaerobic digestion?	**Remember**	**CO3**
8 a)	A cylindrical parabolic concentrator is 9 m long and 2 m wide. The diameter of absorber tube is 10 cm. Find the concentration ratio.	**Evaluate**	**CO3**
(OR)			
8 b)	**What** it ethanol fermentation in biogas plant?	**Understand**	**CO4**
9 a)	**Discuss** on solidity and tip speed ratio.	**Remember**	**CO4**
(OR)			
9 b)	A windmill has rotor of 6 m with 30 blades. Each blade has width of 0.30 m. find the solidity.	**Evaluate**	**CO4**
10 a)	**What** do you understand by meteorological data on wind speed?	**Remember**	**CO5**
(OR)			
10 b)	**What** do you understand by bulb turbine?	**Understand**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Mention** the comparisons between conventional power plant and geothermal power plant.	**Understand**	**CO1**
(OR)			
11 b)	Explain emission or carbon trading.	**Analyze**	**CO1**

12 a)	**Derive** an expression for power generated by a tidal system.	**Understand**	**CO2**
	(OR)		
12 b)	**Discuss** the limitations of tidal energy conversion plants.	**Understand**	**CO2**
13 a)	**Write** down the differences between fixed dome type and floating dome type bio-gas plants.	**Understand**	**CO3**
	(OR)		
13 b)	**Write** a short note on wind energy storage.	**Remember**	**CO3**
14 a)	A 4m waves has period of 10 s. Find the energy and power density of the wave. Take water density as 1025 kg/m3.	**Evaluate**	**CO4,**
	(OR)		
14 b)	**Explain** the working principle of ocean thermal energy conversion plant. What are the merits of the OTEC plant	**Understand**	**CO4**
15 a)	**Write** short notes on utilization of geothermal resources in India.	**Understand**	**CO4**
	(OR)		
15 b)	**Explain** the working of double basin tidal system.	**Understand**	**CO4**
16 a)	**Write** short notes on the current status of geothermal energy in India.	**Analyse**	**CO4**
	(OR)		
16 b)	**Describe** various stages of exploration and development of geothermal resources.	**Understand**	**CO4**
17 a)	**Write** short notes on biomass gasification.	**Analyse**	**CO5**
	(OR)		
17 b)	**Comment** on the future availability trend of fossil fuels in the world	**Analyse**	**CO5**

Prof. Elective – IV

		L	T	P	C
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	**PO1, PO2, PO5**

	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.	**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**

		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	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
ECEXXXX X	Intro-duction to	3	3		3	3	3	3	3	3	3				

	Artificial Intell-igence													3	3

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

EEE11053	**Basic modelling, analysis and control**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Control Systems				
Co-requisites	--				

Course Objectives

4. To introduce the concept of state-space modeling and its applications in real-time systems.
5. To comment on controllability and observability of system.
6. To design full order and minimum order controllers and observers.

Course Outcomes

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

CO1. **Discuss** state-space representation of a continuous-time control system.
CO2. **Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system.
CO3. **Describe** applications of pole-placement technique.
CO4. **Design** full order and minimum order controllers and state observer for continuous-time control system.

Catalog Description

This course focuses on applications of state-space approach over transfer function based analysis of different real-time systems. This course also deals with finding solution of homogeneous and non-homogeneous state equations, checking controllability and observability of systems, studying pole-placement techniques, designing full order and minimum order state controllers and observers.

Course Content

Unit I: State Space modeling and representation: 11 lecture hours

State-space representation of transfer function systems, important terminologies used in state space approach, state space representation in different canonical forms: controllable canonical form, observable canonical form, diagonal canonical form, Jordon canonical form; eigenvalues of system matrix, diagonalization, invariance property of eigenvalues, non-uniqueness of a set of state variables, transformation from state space model to transfer function.

Unit II: Analysis of Continuous-Time Control Systems in State Space: 12 lecture hours

Homogeneous and non-homogeneous systems, solution of homogeneous state equations: traditional approach and Laplace transform approach; solution of non-homogeneous state equations: traditional approach and Laplace transform approach; Caley-Hamilton theorem, state transition matrix (STM), computation of state transition matrix using Laplace transform approach, Caley-Hamilton theorem; properties of state transition matrices,

Unit III: Controllability and observability analysis: 12 lecture hours
concept of controllability and observability, condition for complete state controllability, condition for output controllability, condition for complete observability.

Unit IV: Design of Continuous-Time Control Systems in State Space: 12 lecture hours
Pole placement, necessary and sufficient condition for arbitrary pole placement, obtain gain matrix in pole placement technique: direct substitution method and Ackermann's formulae; choosing the locations of desired closed-loop poles.

Text Books:

3. K. Ogata, *Modern Control Engineering*, 5th Ed., PHI Learning Pvt. Ltd, 2010.
4. N. S. Nise, *Nise's Control Systems Engineering*, Wiley India Edition, 2018.

Reference Books:

3. Bernard Friedland, *Control System Design: An Introduction to State-Space Methods*, Dover Publications Inc., 2005.
4. Cheng Siong Chin, *Computer-Aided Control Systems Design: Practical Applications using MATLAB® and Simulink®*, 1st Ed., CRC Press, 2017.

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	**Discuss** state-space representation of a continuous-time control system.	**PO2, PO3, PO4, PO5, PO6, PSO2**
CO2	**Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system.	**PO1, PO2, PO3, PO4, PO5, PSO1, PSO2**
CO3	**Describe** applications of pole-placement technique.	**PO1, PO2, PO3, PO4, PO5, PO6, PSO1, PSO2**
CO4	**Design** full order and minimum order controllers and state observer for continuous-time control system.	**PO2, PO3, PO4, PO5, PO6, PSO1, PSO2**

PO5, PO6, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11053	Basic modell Basic	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-

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

[redacted]

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

Course: EEE11053 – Basic modelling, analysis and control

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**

Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	A system is represented by the state equation as $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix}=\begin{bmatrix}-1 & 1\\ 0 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}+\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}\begin{bmatrix}r_1\\ r_2\end{bmatrix}$ $\begin{bmatrix}y_1\\ y_2\end{bmatrix}=\begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$ **Derive** the transfer functions.	**An**	**CO1**
2.	For a linear time-invariant system, the system matrix is, $\mathbf{A}=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$. **Determine** the characteristic equation and Eigenvalues.	**An**	**CO2**
3.	Using Caley-Hamilton theorem, **determine** the state transition matrix (STM) of the system whose system matrix is given by: $\mathbf{A}=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$.	**Ap**	**CO3**
4.	**Construct** the state model in controllable canonical form, for the following differential equation. $\dddot{y}+6\ddot{y}+3y=\dot{u}+4u$	**Ap**	**CO1**
	SECTION B (Attempt any **Two Questions)**		
5.	A system is described by its transfer function $\frac{Y(s)}{R(s)}=T(s)=\frac{8(s+5)}{s^3+12s^2+44s+48}$ (c) Determine its controllable state variable model, and (d) Determine the state transition matrix.	**Ap**	**CO3**

6.	Given the homogeneous state equation, where $\mathbf{A} = \begin{bmatrix} -3 & 1 \\ 2 & -1 \end{bmatrix}$. **Determine** the steady-state value of state variables, *i.e.* $x_{ss} = \operatorname{Lt}_{t \to \infty} x(t)$, for given the initial state value of $x(0) = \begin{bmatrix} 10 & -10 \end{bmatrix}^T$.	**Un**	**CO2**
7.	**Determine** observability of the following system. $\dot{\mathbf{x}}(t) = \begin{bmatrix} -3 & 1 & 0 \\ 1 & -2 & 1 \\ 1 & 1 & 0 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix} u(t)$, $y(t) = \begin{bmatrix} 1 & 2 & 1 \end{bmatrix} \mathbf{x}(t)$.	**An**	**CO4**
	SECTION C is Compulsory		
8.	**Show** that the system described by the following state model is observable: $\dot{\mathbf{x}}(t) = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix} u(t)$, $y(t) = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \end{bmatrix} \mathbf{x}(t)$.	**An**	**CO4**

EEE11054	**Control of Energy Systems**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Control systems				
Co-requisites	--				

Course Objectives

1. To gain understanding of the working of Off-grid and Grid-connected Renewable Energy Generation Schemes.
2. To give emphasis on the control and integrated operation of about the main renewable sources of energy.
3. To give the students a perspective to learn about the energy conversion technologies.

Course Outcomes

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

CO1. **Illustrate** the basics of feedback control.

CO2. **Design** compensator using Root-Locus Plots.

CO3. **Design** compensator using Bode Plots.

CO4. **Analyse** the state-space representation of a continuous-time control system.

Course Content

Module 1: Basic Principles of Feedback Control

Introduction to Block diagram of on-off control, proportional control, integral control, derivative control, PI, PD control, PID control, Feedback Control Systems characteristics, Proportional Mode of Feedback, integral Mode of Feedback Control, Derivative Mode of Feedback Control.

Module 2: Compensator Design Using Root-Locus Plots

Design of root locus, Selective illustration of root locus, Reshaping the root locus, Cascade Lead Compensation, Cascade Lag Compensation, Cascade Lag Lead Compensation.

Module 3: Compensator Design Using Bode Plots:

Design of bode plot, Selective illustration of bode plot, Reshaping the Bode Plot, Cascade Lead Compensation, Cascade lag compensator, Cascade Lag-Lead Compensation, Cascade PID compensation.

Module 4: State Space Analysis of Continuous – time Control Systems:

Introduction to State space, State variable representation including Electrical, Mechanical, Electro-mechanical system, Conversion of state variable Models to Transfer function via direct, cascade, parallel decomposition, solution of state equation, State Transmission Matrix, Concepts of Controllability and observability..

Text books:

1. K. Ogata, *Modern Control Engineering*, 5th Ed., PHI Learning Pvt. Ltd, 2010.
2. N. S. Nise, *Nise's Control Systems Engineering*, Wiley India Edition, 2018.

Reference Books:

1. Bernard Friedland, *Control System Design: An Introduction to State-Space Methods*, Dover Publications Inc., 2005.
2. Cheng Siong Chin, *Computer-Aided Control Systems Design: Practical Applications using MATLAB® and Simulink®*, 1st Ed., CRC Press, 2017.

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 feedback control.	**PO1, PO2, PO3, PO4, PO7, PO12, PSO1, PSO2**
CO2	**Design** compensator using Root-Locus Plots.	**PO1, PO2, PO3, PO4, PO7, PO12, PSO1, PSO2**
CO3	**Design** compensator using Bode Plots.	**PO1, PO2, PO3, PO4, PO7, PO12, PSO1, PSO2**
CO4	**Analyse** the state-space representation of a continuous-time control system.	**PO1, PO2, 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 or team work	Communication	Project management and finance	Life-long Learning	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11054	Control of Energy Systems	3	3	3	3	-	-	3	-	-	-	-	3	3	3	

1=weakly mapped

2= moderately mapped3=strongly mapped

ECO111505	**HSSM – IV (Economics for Engineers)**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Engineering Mathematics – I and Engineering Mathematics – II				
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. **Understand** 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. **Understand** 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 involving engineering design and analysis.

Course Content

Unit I: Basic Concepts of Economics: 5 lecture hours

Introduction to the Literature of Micro-economic scentering around Decision Making at Individual Level. Some Fundamental Concepts: Maximization, Equilibrium and Efficiency.

Unit II: 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.

Unit III: Sustainability Study of a Project: 10 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.

Unit IV: 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.

Unit V: 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	**Understand** the basic economic concepts and make economic analyses in the decision making.	**PO2, PO3, PO11, PSO3**
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.	**PO2, PO4, PO11, PSO1**
CO3	**Develop** the ability to account for time value of money using factors and formulas, estimate annual and future worth comparisons for cash flows.	**PO2, PO3, PO4, PSO1**

CO4	**Understand** how factor market works, identify the manpower and resources management, need of credit/finance for initiating and accelerating projects.	**PO2, PO3, PO11, PSO3**

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
HEC42180	HSSM – IV (Economics for Engineers)	-	3	3	3	-	-	-	-	-	-	3	-	3	-	3

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

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

Course: ECO11505 – HSSM – IV (Economics for Engineers)

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	**Explain** what do you mean by Opportunity cost?	**U**	**CO1**
2.	**What** do you mean by Income elasticity of demand? **Explain** with diagram.	**U**	**CO2**
3.	**Explain** Risk and Liquidity in Asset Market.	**U**	**CO3**
4.	**What** are the properties of Indifference Curves (ICs)?	**R**	**CO1**
	SECTION B (Attempt any **Two Questions)**		
5.	**Define** equilibrium. Suppose there has been good rains and as a result supply of tomatoes have increased in the market. **How** will your equilibrium change?	**R**	**CO1**
6.	**How** can you derive relationship between price and quantity demanded using Indifference Curve analysis?	**Ap**	**CO1**
7.	**Explain** the characteristics of infrastructure assets that differentiate them from other assets.	**U**	**CO4**
	SECTION C is Compulsory		
8.	Enumerate various cost concepts. Establish the cost-output relationship in the short run with suitable diagram.	**An**	**CO3**

EEE12038	**Electric Drives Lab**	L	T	P	C
Version 1.0		0	0	3	2
Pre-requisites/Exposure	Electrical Machines – I and II, Electric Drives				
Co-requisites					

Course Objectives

1. To illustrate about various DC and AC machines used in drives.
2. To illustrate the performance of the fundamental control practices associated with DC and AC machines (starting, reversing, braking, plugging, etc.) using power electronics.
3. To develop capability to choose a suitable Motor and Power Electronic Converter package from a description of drive requirement.

Course Outcomes

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

CO1. **Design** and **test** a DC motor drive using thyristor.

CO2. **Design** frequency controlled converters used in AC motor drives.

CO3. **Analyze** different speed control techniques of a DC motor drive.

CO4. **Develop** an ability to determine accurate modeling/simulation parameters for various general-purpose electrical machines and power electronics devices required for designing an electric drive.

Catalog Description

In this course students will be introduced with different electric drives. An electrical drive is defined as a form of machine equipment designed to convert electrical energy into mechanical energy and provide electrical control of the processes. The system employed for motion control is called an electrical drive, which we use in our daily lives to make our work convenient.

Course Content

1. Simulation of six step inverter fed 3-phase Induction Motor Drive.
2. Simulation of Brushless DC Motor Drive.
3. Simulation of four quadrant Chopper fed DC Motor Drive. 4.
   Study of Thyristor Controlled DC drive.
4. Simulation of PWM inverter fed 3 phase Induction Motor drive using .
5. Speed Control of a separately excited DC Motor Drive fed by step-down chopper. 7.
   Study of Chopper fed DC Drive.
6. Speed Control of single phase Induction Motor using AC voltage controller. 9.
   Speed Control of DC Motor Using a Full Controlled converter.
7. Speed Control of Three Phase Induction Motor using V/f Control Technique.

Text Books:

1. G. K. Dubey, *Fundamentals of Electrical Drives*, 2ndEd., Narosa, 2010.
2. Vedam Subrahmanyam, *Electric Drives: Concepts and Applications*, 2ndEd., McGraw Hill Education, 2017.

Referencet Books:

1. Ned Mohan, *Electric Machines and Drives: A First Course*, Wiley, 2013.
2. S. K. Pillai, *A First Course on Electrical Drives*, 3rd Ed., New Age International, 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	**Design** and **test** a DC motor drive using thyristor.	**PO2, PO4, PO5, PO6, PSO3**
CO2	**Design** frequency controlled converters used in AC motor drives.	**PO1, PO4, PO5, PO6, PSO1**
CO3	**Analyze** different speed control techniques of a DC motor drive.	**PO1, PO2, PO3, PO5, PSO1**
CO4	**Develop** an ability to determine accurate modeling/simulation parameters for various general-purpose electrical machines and power electronics devices required for designing an electric drive.	**PO2, PO3, PO4, PO5, PO6, PSO3**

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12038	Electric Drives Lab	3	3	3	3	3	3	-	-	-	-	-	-	3	-	3

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

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech	**Semester:**	III
Paper Title:	Electric Drives Lab	**Paper Code:**	EEE12038
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)	**55.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **56.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **57.** 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	**Deduce** the condition for steady state stability of a motor load condition?	**Remember**	**CO1**
2	**Write** four advantage of an electric drive system?	**Understand**	**CO2**
3	**Derive** an expression for Dynamics of motor load System?	**Remember**	**CO3**
4	**Explain** the operation of various converters used in Drives.	**Remember**	**CO4**
5	Write the importance of power modulator in Electric Drives	**Apply**	**CO5**
Group B Answer All the Questions (5 x 2 = 10)			
6 a)	**Explain** Speed torque characteristics of DC series motor?	**Understand**	**CO1**
(OR)			
6 b)	With the aid of neat sketches describe the working of power steering system.	**Remember**	**CO1**
7 a)	Describe the different speed control techniques of a DC Motor.	**Understand**	**CO2**
(OR)			
7 b)	Describe the different braking techniques of a DC Motor.	**Analyze**	**CO2**
8 a)	Draw the power transmission layout of electric two wheelers. Compare the conventional two wheeler and electric two wheeler.	**Evaluate**	**CO3**
(OR)			
8 b)	Explain in detail about the construction and working of Lead acid battery.	**Evaluate**	**CO3**
9 a)	Explain the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.	**Evaluate**	**CO4**
(OR)			
9 b)	A one quadrant chopper is used for rheostatic breaking of a separately excited dc motor. Ra=0.1ohm, breaking resistance =7.5ohm,voltage constant 1.4v/A-rad/sec, armature current 120A and field current is 1.6A. The duty cycle of chopper is	**Evaluate**	**CO4**

	0.35. **Find** (a) average voltage across chopper, (b) power dissipated in breaking resistance and (c) Motor speed.		
10 a)	Explain in detail the construction of an Electric Drive fed with a DC-Dc Converter.	**Evaluate**	**CO5**
	(OR)		
10 b)	Explain in detail about layout of Electric Drive	**Apply**	**CO5**
	Group C **Answer All the Questions (7 x 5 = 35)**		
11 a)	Discuss the methods of downward, forward and uoward operation of a DC drive with relevant sketches.	**Remember**	**CO1**
	(OR)		
11 b)	List out the points to be considered while designing a driver's seat.	**Understand**	**CO1**
12 a)	Describe in detail about Regenerative braking system.	**Understand**	**CO2**
	(OR)		
12 b)	Explain the operation of a frequency controlled AC drive,	**Understand**	**CO6**
13 a)	Explain any two types of braking in an induction motor drive.	**Understand**	**CO3**
	(OR)		
13 b)	Briefly discuss about a single phase half waves converter drive fed to Separately Excited DC motor?	**Remember**	**CO3**
14 a)	A one quadrant chopper is used for rheostatic breaking of a separately excited dc motor. Ra=0.1ohm,breaking resistance =7.5ohm,voltage constant 1.4v/A-rad/sec, armature current 120A and field current is 1.6A. The duty cycle of chopper is 0.35. **Find** (a) average voltage across chopper, (b) power dissipated in breaking resistance and (c) Motor speed.	**Create**	**CO4**
	(OR)		
14 b)	Discuss about the servicing and maintenance of three wheeler.	**Create**	**CO4**
15 a)	Describe about working principle BLDC motors.	**Evaluate**	**CO6**
	(OR)		
15 b)	Describe about working principle SRM motors.	**Evaluate**	**CO5**
16 a)	A full wave fully controlled controlled single phase converter feeds a separately excited dc motor. Input voltage is 240V, Ra=6 ohm and I=1.8A. **Find** firing angle.	**Understand**	**CO6**
	(OR)		
16 b)	A half controlled single phase converter feeds a separately excited dc motor. Input voltage is 240V, α= 100, Ra=6 ohm and I=1.8A. **Find** back emf.	**Create**	**CO6**
17 a)	A half controlled single phase converter feeds a separately excited dc motor. Input voltage is 240V, α= 10, Ra=60 ohm and I=1.8A. **Find** back emf.	**Understand**	**CO5**
	(OR)		
17 b)	Briefly discuss about a single phase half waves converter drive fed to Separately Excited DC motor?	**Understand**	**CO5**

EEE12029	**Modern Control Systems Lab**	L	T	P	C
Version 1.0		0	0	3	2
Pre-requisites/Exposure	Control Systems and Modern Control Systems				
Co-requisites	--				

Course Objectives

1. To introduce the concept of state-space modeling and its applications in real-time systems using MATLAB.
2. To comment on controllability and observability of system using MATLAB.
3. To design full order and minimum order controllers and observers using MATLAB.

Course Outcomes

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

CO1. **Discuss** state-space modeling of a continuous-time control system using MATLAB.

CO2. **Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system using MATLAB.

CO3. **Describe** applications of pole-placement technique using MATLAB.

CO4. **Design** full order and minimum order controllers and state observer for continuous-time control system using MATLAB.

Catalog Description

This course focuses on applications of state-space approach over transfer function based analysis of different real-time systems. This course also deals with finding solution of homogeneous and non-homogeneous state equations, checking controllability and observability of systems, studying pole-placement techniques, designing full order and minimum order state controllers and observers.

Course Content

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1. Obtaining transfer function of a given system from state variable model and vice versa.
2. State variable analysis of physical system, and obtaining step response of system using MATLAB.
3. Obtaining step response, impulse response and initial condition response of given state variable models by Simulation.
4. Obtaining different canonical forms of given SISO and MIMO

   systems.
5. 5. Obtaining transfer function of given state variable models.
6. Determination of Eigen values from state model & stability analysis.
7. Checking state controllability and output controllability of given state variable

   models.

8. checking state observability of given state variable models.

1. Obtaining steady state error of given state variable model for step, ramp and parabolic inputs, using MATLAB.
2. Calculate of state feedback gains in pole placement design and obtaining close loop system response for unit step input.
3. Finding state model of second order system cascaded with active lead circuit and obtaining its

step response.

Text Books:

1. K. Ogata, *Modern Control Engineering*, 5th Ed., PHI Learning Pvt. Ltd, 2010.
2. N. S. Nise, *Nise's Control Systems Engineering*, Wiley India Edition, 2018.

Reference Books:

1. Bernard Friedland, *Control System Design: An Introduction to State-Space Methods*, Dover Publications Inc., 2005.
2. Cheng Siong Chin, *Computer-Aided Control Systems Design: Practical Applications using MATLAB® and Simulink®*, 1st Ed., CRC Press, 2017.

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	**Discuss** state-space modeling of a continuous-time control system using MATLAB.	**PO2, PO3, PO4, PO5, PO6, PSO2**
CO2	**Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system using MATLAB.	**PO1, PO2, PO3, PO4, PO5, PSO1, PSO2**
CO3	**Describe** applications of pole-placement technique using MATLAB.	**PO1, PO2, PO3, PO4, PO5, PO6, PSO1, PSO2**

CO4	**Design** full order and minimum order controllers and state observer for continuous-time control system using MATLAB.	**PO2, PO3, PO4, PO5, PO6, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11029	Modern Control Systems Lab	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-

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

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

Course: EEE11029 – Modern Control Systems Lab

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	A system is represented by the state equation as $$\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-1 & 1\\ 0 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}\begin{bmatrix}r_1\\ r_2\end{bmatrix}$$ $$\begin{bmatrix}y_1\\ y_2\end{bmatrix} = \begin{bmatrix}1 & 0\\ 1 & 1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$$ **Derive** the transfer functions using MATLAB.	**An**	**CO1**
2.	For a linear time-invariant system, the system matrix is, $\mathbf{A} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$. **Determine** the characteristic equation and eigenvalues using MATLAB.	**An**	**CO2**
3.	Using Caley-Hamilton theorem and MATLAB, **determine** the state transition matrix (STM) of the system whose system matrix is given by: $\mathbf{A} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$.	**Ap**	**CO3**
4.	**Construct** the state model in controllable canonical form, for the following differential equation, using MATLAB. $\ddot{y} + 6\dot{y} + 3y = \dot{u} + 4u$	**Ap**	**CO1**
	SECTION B (Attempt any **Two Questions)**		
5.	A system is described by its transfer function $$\frac{Y(s)}{R(s)} = T(s) = \frac{8(s+5)}{s^3+12s^2+44s+48}$$ (a) Determine its controllable state variable model, and (b) Determine the state transition matrix, using MATLAB.	**Ap**	**CO3**

6.	Given the homogeneous state equation, where $\mathbf{A} = \begin{bmatrix} -3 & 1 \\ -2 & -1 \end{bmatrix}$. **Determine** the steady-state value of state variables using MATLAB, *i.e.* $x_{ss} = \mathrm{Lt}_{t \to \infty} x(t)$, for given the initial state value of $x(0) = \begin{bmatrix} 10 & -10 \end{bmatrix}^T$.	**Un**	**CO2**
7.	**Determine** observability of the following system using MATLAB. $\dot{\mathbf{x}}(t) = \begin{bmatrix} -3 & 1 & 0 \\ 1 & -2 & 1 \\ 1 & 1 & 0 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix} u(t), \quad y(t) = \begin{bmatrix} 1 & 2 & 1 \end{bmatrix} \mathbf{x}(t)$.	**An**	**CO4**
	SECTION C is Compulsory		
8.	**Show** that the system described by the following state model is observable, using Simulink: $\dot{\mathbf{x}}(t) = \begin{bmatrix} -2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 3 & -1 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix} u(t), \quad y(t) = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \end{bmatrix} \mathbf{x}(t)$.	**An**	**CO4**

Prof. Elective – I/II Lab

		L	T	P	C
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	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
ECEXXXXX	Intro-duction to Machine Learning Lab	3	3	3	2	2	2			2	2			3	2

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

EEE12055	**Machine Design Lab**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Basic Mathematics, Basic Physics, Fundamentals of Materials Science and Engineering.				
Co-requisites	--				

Course Objectives

- Explain the basics of electric and hybrid electric vehicles, their architecture, technologies, and fundamentals.
- Explain plug-in hybrid electric vehicle architecture, design and component sizing and the power electronics devices used in hybrid electric vehicles.
- Analyze various electric drives suitable for hybrid electric vehicles.
- Discuss different energy storage technologies used for hybrid electric vehicles and their control.
- Demonstrate different configurations of electric vehicles and its components, hybrid vehicle configuration by different techniques, sizing of components and design optimization and energy management

Course Outcomes

CO1. Identify the different electrical machines
CO2. Learn the construction and operation of different motors and generators.
CO3. Learn the construction and operation of single phase and three phase transformers.
CO4. Understand the set up and working of ceiling fans.

Course Content

1. Cut section of single-phase transformer
2. Cut section of single-phase transformer
3. Cut section of three-phase transformer.
4. Cut section of slip-ring induction motor.
5. Cut section of single-phase induction motor.
6. Cut section of three-phase squirrel cage induction motor.
7. Single phase ceiling fan & table fan set up.
8. Motor driven coil winding machine with turn counter.
9. Coil varnish drying chamber (electrical operated)
10. Cut section of synchronous machine.
11. Cut section of dc shunt machine.

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

Components	Performance & Assignment	End Term
The 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 different electrical machines	PO01, PO02, PO12
CO2	Learn the construction and operation of different motors and generators.	PO01, PO02, PO04
CO3	Learn the construction and operation of single phase and three phase transformers.	PO01, PO02, PO05, PO07
CO4	Understand the set up and working of ceiling fans	PO10, 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			
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	PSO 3
EEE12055	Machine Design Lab	3	3	1	1	1		1			1		3	3	1	1

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

	Sensors and Actuators 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:

3. Alan V. Oppenheim and Ronald W. Schafer, *Digital Signal Processing*, 1st Ed., Pearson Education, 2015.
4. S. Salovahanan, *Digital Signal Processing,* 3rd Ed., McGraw Hill Education, 2017.

Reference Books:

2. 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
Examination Scheme:

Components	Mid Term	Attendance	Class Assessment	End Term
Weightage (%)	**20**	**10**	**30**	**40**

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	EEE12032
	Course Title	Sensors and Transducers 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	-

	HSSM – V (Industrial Management)	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Human Values and Professional Ethics				
Co-requisites					

Course Objectives

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 Outcomes

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

CO1. **Understand** operational complexities of a business.
CO2. **Explain** the concept of process, functions and theories of management.
CO3. **Explain** the knowledge about quality control processes.
CO4. **Explain** the concept of different strategies relating to people management.

Catalog 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 are 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

Unit I: Introduction: 6 lecture hours

Industrial management - Introduction: Concept, Development, application and scope of Industrial Management. Productivity: Definition, measurement, productivity index, types of production system, Industrial Ownership.

Unit II: Managerial Functions: 10 lecture hours
Management Function: Principles of Management – Time and motion study, work simplification – process charts and flow diagrams, Production Planning. Inventory Control: Inventory, Cost, Deterministic Models, and Introduction to supply chain management.

Unit III: Quality Assurance: 6 lecture hours
Quality Control: Process control, SQC, Control charts, Single, Double and Sequential Sampling, Introduction to TQM.
Unit IV: Materials Management: 8 lecture hours
Fundamentals of Materials Management; Material cycle; Forecasting; Material Classification-need and usage, Single and Multidimensional classifications; Materials Codification-Usage, Codification types.

Unit V: Production Planning: 8 lecture hours

Production Planning and Materials Requirements, Materials Procurement; Tendering; Types of Tenders, Storage and warehousing concepts, Receipt, Warehouse type, Layout, issue of materials and Updation of records; Manpower and equipment.

Unit VI: Project Management: 7 lecture hours

Project Management concept, Project Feasibility Studies, Project Identification, Market and Demand Analysis, Technical Analysis, Project Scheduling with PERT/CPM, Project Cost Estimate, Financial Appraisal of Single Project, Financial Appraisal of Multiple Projects, Project Cost Control (PERT/Cost).

Text Books:

1. Arnold, Chapman: Introduction to Materials Management: Pearson, 5th edition, 2008.
2. Gopal Krishnan & Sundarsan: Material Management: An Integrated Approach, Prentice Hall of India Private Limited, New Delhi, 2003.

Reference Books:

1. O. P. Khanna, Industrial Engineering and Management, Dhanpat Rai Publications, Delhi. Management Information Systems by Larry Long (Prentice Hall).

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** operational complexities of a business.	PO1, PO2, PO8, PO12, PSO3
CO2	**Explain** the concept of process, functions and theories of management.	PO1, PO3, PO8, PO11, PSO3
CO3	**Explain** the knowledge about quality control processes.	PO1, PO2, PO8, PO12, PSO3
CO4	**Explain** the concept of different strategies relating to people management.	PO2, PO3, PO8, PO11, PO12, PSO3

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MGT11402	HSSM – I (Industrial Management)	3	3	3	-	-	-	-	3	-	-	3	3	-	-	3

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

[redacted]

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

Course: MGT11402 – **HSSM – V (Industrial Management)**

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**

Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:

Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

	Section A (Attempt **any Three)**		
1.	**Explain** what do you mean by Opportunity cost?	**U**	**CO1**
2.	**What** do you mean by Income elasticity of demand? **Explain** with diagram.	**U**	**CO2**
3.	**Explain** Risk and Liquidity in Asset Market.	**U**	**CO3**
4.	**What** are the properties of Indifference Curves (ICs)?	**R**	**CO1**
	SECTION B (Attempt any **Two Questions)**		
5.	**Define** equilibrium. Suppose there have been good rains and as a result supply of tomatoes have increased in the market. **How** will your equilibrium change?	**R**	**CO1**
6.	**How** can you derive relationship between price and quantity demanded using Indifference Curve analysis?	**Ap**	**CO1**
7.	**Explain** the characteristics of infrastructure assets that differentiate them from other assets.	**U**	**CO4**
	SECTION C is Compulsory		
8.	Enumerate various cost concepts. Establish the cost-output relationship in the short run with suitable diagram.	**An**	**CO3**

Prof. Elective – V

		L	T	P	C
EEE11064	**Artificial Intelligence (AI) in Electrical Engineering**	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, Introduction to Artificial Intelligence				

Course Objectives

1. To provide insight into fundamentals of Artificial Intelligence Techniques to the students.
2. To convey application of Artificial Intelligence techniques in electrical engineering.
3. To evaluate the performance of AI Techniques and to provide solutions for various problems in power systems.

Course Outcomes

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

CO1: *Understand* the concepts of artificial intelligence techniques.

CO2: *Categorize* the concepts of Neural network architectures & feedback in Neural Network

CO3: *Analyse* and appreciate the concepts of fuzzy set over classical set theory

CO4: *Learn* the computational and mathematical theory, and application of fundamental AI algorithms for electrical engineering problems

CO5: *Apply* ANN, fuzzy logic control and GA to electrical engineering problems

Catalog Description:

This course introduces representations, techniques, and architectures used to Artificial Intelligence techniques and to account for intelligence from a computational point of view. This course also explores applications of artificial neural network, fuzzy logic, and evolutionary algorithms. In addition, it covers applications of Artificial Intelligence techniques in electrical engineering other learning paradigms.

Course Content

Unit 1: Artificial Intelligence: 6 hours

Introduction, Intelligence, Communication, Learning, Early Works, Importance, Definitions, Programming Methods, Techniques, Progress of Artificial Intelligence, Growth of AI, AI and Industry, AI and the world, Current Trends in Applied AI, Modeling, Simulation and AI, Intelligent Systems, Role of IS, Comparisons with conventional programs, Fundamentals of various IS

Unit 2: Artificial Neural Network: 8 hours

Difference between human machine and intelligence, biological neural network, artificial neuron model, Concept of Perceptron, ADALINE, Feedback in Neural Network, Neural Network Architectures: Neural Learning, Application of Neural Network in Power System

Unit 3: Fuzzy Logic: 12 hours

Introduction, Foundation of Fuzzy Systems, Representing Fuzzy Elements, Basic Terms and Operations, Properties of Fuzzy Sets, Fuzzification, Arithmetic Operations of Fuzzy Numbers, The alpha cut method, The extension method, Linguistic Descriptions and their Analytical Forms, Fuzzy Linguistic Descriptions, Fuzzy Relation Inferences, Fuzzy Implication and Algorithms, Defuzzification Methods, Centre of Area and Centre of Sums Defuzzification, Fuzzy set theory in power systems

Unit 4: Genetic Algorithms and Evolutionary Programming: 9 hours

Introduction, Genetic Algorithms, Procedure of Genetic Algorithms, Genetic Representations, Initilization and Selection, Genetic Operators, Mutation, Working of Genetic Algorithms, Evolutionary Programming, working of Evolutionary Programming, Genetic Algorithm solution based on real power search

Unit 5: Application of AI in Power Systems: 10 hours

Application of Neural Network and Expert Systems in Voltage Control, Application of ANN for security assessment, Schedule Maintenance of Electrical Power Transmission Networks using Genetic Algorithm, Intelligent Systems for Demand Forecasting, Fuzzy logic in power system protection

Text Books

1. Artificial Intelligence and Intelligent Systems, OXFORD University Press, New Delhi, 2005- N. P. Padhy

2. Understanding Neural Networks and Fuzzy Logic: Basic concepts and Applications, Prentice Hall India Private Limited, New Delhi,2002- Stamations V. Kartalopoulos

3. Artificial Intelligence Techniques in Power Systems, IEE Power Engineering Series, UK, 1997- Kevin Warwick, Arthur Ekwue and Raj Aggarwal

4. Intelligent Systems and Signal Processing in Power Engineering, Springer Berlin Heidelberg, New York- Abhisek Ukil

5. Principles of Soft Computing, Wiley India Pvt. Ltd. - S. N. Sivanandam & S. N. Deepa

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 concepts of artificial intelligence techniques.	**PO1, PO2, PO5**
CO2	*Categorize* the concepts of Neural network architectures & feedback in Neural Network.	**PO1, PO2 PO4, PO5, PO6**
CO3	*Analyse* and appreciate the concepts of fuzzy set over classical set theory.	**PO1, PO2, PO4, PO5, PO6**
CO4	*Learn* the computational and mathematical theory, and application of fundamental AI algorithms for electrical engineering problems.	**PO1, PO2, PO4, PO5, PO6, PO9, PO10**
CO5	*Apply* ANN, fuzzy logic control and GA to electrical engineering problems.	**PO1, PO2, PO6, PO7, PO8, 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	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
ECEXXXXX	Artificial Intelligence (AI) in Electrical Engineering	3	3		3	3	3	3	3	3	3			3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

EEE11057	POWER ELECTRONICS AND DRIVES FOR AUTOMOBILES	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Electrical Machines, Power Electronics, Drives				
Co-requisites	--				

Course Outcomes

CO1: Understand the working principle of Semiconductor devices.

CO2: Describe the construction and operation of Converters and Inverters.

CO3: Explain the construction and working principle of various Electric motor types.

CO4: Make use of power electronics components in hybrid electric vehicle and fuel cell vehicle.

UNIT I: BASIC POWER ELECTRONIC DEVICES

Diodes, Thyristors, Bipolar Junction Transistors, Metal–Oxide–Semiconductor Field Effect Transistors, Insulated Gate Bipolar Transistors, Ultracapacitors. Basic Principle of DC–DC Converter, Step-Down (Buck) Converter, Step-Up (Boost) Converter, Buck–Boost Converter, DC–DC Converters Applied in Hybrid Vehicle Systems, Isolated Buck DC–DC Converter, Four-Quadrant DC–DC Converter.

UNIT II: RECTIFIERS AND INVERTERS

Single-phase Diode Rectifiers, Three-phase Diode Rectifiers, Poly-phase Diode Rectifiers, Filtering Systems in Rectifier Circuits, High-frequency Diode Rectifier Circuits. Single-phase Voltage Source Inverters, Three-phase Voltage Source Inverters, Current Source Inverters, Closed-loop Operation of Inverters, Regeneration in Inverters, Multistage Inverters.

UNIT III: ELECTRIC MOTOR DRIVES

DC motor operation and its types, DC Motor and Control, Operation of DC Motor, Torque and Rotating Field Production, Motor Torque–Speed Characteristics and Typical Technical Parameters, Sensorless BLDC Motor Control, AC Induction Motor and Control, Basic Principle of AC Induction Motor Operation, Controls of AC Induction Motor.

UNIT IV: Power Electronics and Control for Hybrid and Fuel Cell Vehicles

Series Hybrid Vehicle Propulsion System, Parallel Hybrid Vehicle Propulsion System, Fuel Cell Vehicles, Power Electronics Requirements, Propulsion Motor Control Strategies, Control System in Series Hybrid Vehicles, Fuel Cell for Applications.

Reference Books:

1. Rashid M.H., "Power Electronics Circuits, Devices and Applications", Prentice Hall India,Third Edition, New Delhi, 2011.

2. Ali Emadi, “Handbook of Automotive Power Electronics and Drives”, Taylor & Francis Group, First Edition, USA, 2005.

3. Bimal K Bose, "Modern Power Electronics and AC Drives", Pearson Education, second Edition, 2003.

4. Dubey. G.K., "Thyristorised power controllers", new age International, New Delhi, 2002.

5. Bhimbhra P.S., "Power Electronics", Khanna Publishers, New Delhi, 2005.

6. P.C. Sen, “Modern Power Electronics”, Wheeler Publishing Co, Third edition, New Delhi,2008.

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

Components	Mid Term	Attendance	Class Assessment	End Term
Weightage (%)	20	10	30	40

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	Understand the working principle of Semiconductor devices.	**PO1, PO2**
CO2	Describe the construction and operation of Converters and Inverters.	**PO2, PO3, PO4, PO5, PSO1**
CO3	Explain the construction and working principle of various Electric motor types.	**PO3, PO4, PO5**
CO4	Make use of power electronics components in hybrid electric vehicle and fuel cell vehicle.	**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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11013	Power Electronics and drives for Automobiles	3	3	3	2	-	3	-	3	-	3	-	3	3	3	-

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(MARCH-2022)**		
Name of the Program:	B.Tech	**Semester:**	III
Paper Title:	Power Electronics and drives for automobiles	**Paper Code:**	EEE11057
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)	**58.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **59.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **60.** 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 full form of SEPIC converter?	**Remember**	**CO1**
2	**Illustrate** the use of battery in Electric Vehicle?	**Understand**	**CO2**
3	**What** is meant by the term Snubber circuit?	**Remember**	**CO3**
4	**Which** converter can be used for controlling frequency?	**Remember**	**CO4**
5	Write about the technical specifications and features of Indian	**Apply**	**CO5**

	models of auto rickshaw.		
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	Explain the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.	**Understand**	**CO1**
(OR)			
6 b)	Explain in detail about V-I characteristics of IGBT and MOSFET	**Remember**	**CO1**
7 a)	**Compare** the advantages and disadvantages of electrical and mechanical measurement systems	**Understand**	**CO2**
(OR)			
7 b)	**Distinguish** clearly between absolute and secondary instruments.	**Analyze**	**CO2**
8 a)	Describe in detail about plugging system.	**Evaluate**	**CO3**
(OR)			
8 b)	**Classify** the different types of errors in a measuring instrument?	**Evaluate**	**CO3**
9 a)	Explain the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.	**Evaluate**	**CO4**
(OR)			
9 b)	A Four stroke four cylinder gasoline engine has a bore of 60 mm and a stroke of 100 mm. On test, it develops a torque of 66.5 Nm when running at 3000 rpm. If the clearance volume in each cylinder is 60 cc, the relative efficiency with respect to break thermal efficiency is 0.5 and calorific value of the fuel is 42 MJ/kg, determine the fuel consumption in kg/h and the break mean effective pressure.	**Evaluate**	**CO4**
10 a)	Describe about working principle of sensors and actuators present in an automobile.	**Evaluate**	**CO5**
(OR)			
10 b)	Explain in detail about layout of Electric vehicle	**Apply**	**CO5**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	Discuss about use of ultra capacitors in an electric vehicle.	**Remember**	**CO1**
(OR)			
11 b)	Describe in detail about Ressitive braking system.	**Understand**	**CO1**
12 a)	Describe in detail about Regenerartive braking system.	**Understand**	**CO2**
(OR)			
12 b)	Describe in detail about starting system.	**Understand**	**CO6**
13 a)	**Illustrate** the various operating forces needed for proper operation of an analog indicating instrument.	**Understand**	**CO3**
(OR)			
13 b)	Describe about working principle SRM motors.	**Remember**	**CO3**
14 a)	Discuss about the servicing and maintenance of three wheeler.	**Create**	**CO4**
(OR)			
14 b)	Discuss about the servicing and maintenance of three wheeler.	**Create**	**CO4**
15 a)	Describe about working principle BLDC motors.	**Evaluate**	**CO6**
(OR)			
15 b)	Describe about working principle SRM motors.	**Evaluate**	**CO5**
16 a)	**Show** that the final balance expressions are independent of supply frequency in a Maxwell's bridge.	**Understand**	**CO6**
(OR)			
16 b)	**Discuss** the advantages and disadvantages of Maxwell's bridge for measurement of unknown inductance.	**Create**	**CO6**
17 a)	Explain in detail about V-I characteristics of IGBT	**Understand**	**CO5**
(OR)			
17 b)	Explain in detail about the technical specifications and features of Indian models of auto rickshaw.	**Understand**	**CO5**

EEE11058	**FACTS controllers**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Power Systems				
Co-requisites	--				

Course Objectives

1. To help the student to acquire knowledge on facts devices.
2. To help understand the operation of the compensators and their applications in power system.
3. To give emphasis about the emerging FACTS controller.
4. To enable students analyse the performance of FACTS controllers.

Course Outcomes

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

CO1. **Understand** the basics of FACTS devices.

CO2**. Apply** voltage source converters

CO3. **Understand** the operation of the compensator and its applications in power system.

CO4. **Utilise** various emerging control schemes

CO5. **Analyse** the performance of steady state and transients of facts controllers.

Course Content

Module 1: Facts Concepts (9)

Transmission interconnections power flow in an AC system, loading capability limits, Dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers.

Module 2: Voltage Source Converters (9)

Single phase three phase full wave bridge converters transformer connections for 12 pulse 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source Converters, and comparison of current source converters with voltage source converters.

Module 3: Static Shunt Compensation (9)

Objectives of shunt compensation, mid-point voltage regulation voltage instability prevention, improvement of transient stability, Power oscillation damping, Methods of controllable VAR generation, variable impedance type static VAR generators switching converter type VAR generators hybrid VAR generators.

Module 4: SVC And STATCOM (9)

The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping operating point control and summary of compensator control.

Module 5: Static Series Compensators (9)

Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, and functional requirements of GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC) Control schemes for GSC TSSC and TCSC.

TEXT BOOKS:

1. R.Mohan Mathur, Rajiv K.Varma,"Thyristor–Based Facts Controllers for Electrical Transmission Systems", IEEE press andJohnWiley&Sons,Inc,2002.

2. NarainG. Hingorani, "Understanding FACTS-Concepts and Technology of Flexible AC Transmission Systems", Standard Publishers Distributors,Delhi-110006,2011.

3. T.J.E Miller, Power Electronics in power systems, John Wiley and sons.

REFERENCES

1. K.R. Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Limited, Publishers, New Delhi, 2008

2. A.T.John,"FlexibleA.C.TransmissionSystems",InstitutionofElectrical and Electronic Engineers(IEEE), 1999.

3. V.K.Sood, HVDC and FACTS controllers–Applications of Static Converters in Power System, APRIL2004,KluwerAcademic Publishers,2004.

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the basics of FACTS devices.	**PO1, PO2, PO3, PO5, PO12, PSO1**

CO2	**Apply** voltage source converters.	**PO1, PO2, PO3, PO4, PO12, PSO1**
CO3	**Understand** the operation of the compensator and its applications in power system.	**PO1, PO2, PO3, PO4, PO12, PSO1**
CO4	**Utilise** various emerging control schemes.	**PO1, PO2, PO3, PO4, PO5, PO12, PSO1**
CO5	**Analyse** the performance of steady state and transients of facts controllers.	**PO1, PO2, PO4, PO5, PO12, PSO1**

1-weakly mapped
2-moderately

	Course Code	
	Course Title	FACTS controllers
Engineering Knowledge	PO1	3
Problem analysis	PO2	3
Design/development of solutions	PO3	3
Conduct investigations of complex problems	PO4	3
Modern tool usage	PO5	3
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	3

3	PSO1	To educate students in Electrical Engineering domain and guide their instincts towards....
-	PSO2	To provide quality knowledge on Sustainable Energy that can be used for solving problems...
-	PSO3	To see our students as ethical and responsible engineering professionals...

ADAMAS UNIVERSITY	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** **(ODD SEMESTER 2022)**		
Name of the Program:	B. TECH	**Semester:**	V
Paper Title:	FACTS controllers	**Paper Code:**	EEE11049
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	17	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)	**61.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **62.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **63.** 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 SVC?	**Remember**	**CO1**
2	**What** is compensator?	**Remember**	**CO2**
3	**Define** transient stability.	**Remember**	**CO3**
4	**What** is STATCOM?	**Remember**	**CO4**
5	**What** is SSSC ?	**Understand**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	**Write** the basic diagram of TCPAR.	**Understand**	**CO1**
(OR)			
6 b)	**Write** the basic diagram of TCVR.	**Remember**	**CO1**
7 a)	**Write** the two applications of SVC.	**Remember**	**CO2**
(OR)			
7 b)	**Write** the two applications of STATCOM.	**Remember**	**CO3**
8 a)	**What** are the basic types of FACTS controllers?	**Evaluate**	**CO3**
(OR)			
8 b)	**What** is the purpose of shunt controllers?	**Understand**	**CO4**
9 a)	**What** is the purpose of series controllers?	**Remember**	**CO4**

(OR)			
9 b)	**How** the voltage instability identified in the power system?	**Analyze**	**CO4**
10 a)	**Explain** the basic operating principle and characteristics of IPFC.	**Remember**	**CO5**
(OR)			
10 b)	**State** the two salient features of UPFC.	**Understand**	**CO4**
Group C **Answer All the Questions (7 x 5 = 35)**			
11 a)	**Explain** the different mode of operations of TCSC.	**Understand**	**CO1**
(OR)			
11 b)	**Explain** the mid-point voltage regulation for segmentation.	**Analyze**	**CO1**
12 a)	**Explain** with necessary diagrams how the transient stability can be improved with a series FACTS controller?	**Remember**	**CO2**
(OR)			
12 b)	**Compare** in between SVC and SATCOM.	**Understand**	**CO2**
13 a)	**Explain** how SVC and STATCOM functions under dynamic situation for shunt compensation along with appropriate diagram and characteristic.	**Understand**	**CO3**
(OR)			
13 b)	**Compare** the performance of SVC and STATCOM from the point of view of transient improvement.	**Analyze**	**CO3**
14 a)	Compare the performance of SVC and STATCOM from the point of view of transient improvement.	**Understand** **Analyse**	**CO4,**
(OR)			
14 b)	**Compare** the performance of SVC and STATCOM from the point of view of transient improvement.	**Understand**	**CO4**
15 a)	**Explain** importance of controllable parameters basic types of FACTS controllers	**Understand**	**CO4**
(OR)			
15 b)	**Explain** loading capability limits, dynamic stability considerations of FACTS controllers	**Understand**	**CO4**
16 a)	**Explain** the role of drive cycle for a city bus in designing the size of energy storage for electric vehicle	**Analyse**	**CO4**
(OR)			
16 b)	**Explain** the design of SVC voltage regulator. Also discuss the influence of SVC on system voltage	**Understand**	**CO4**
17 a)	**Explain** midpoint voltage regulation of Static shunt compensation.	**Analyse**	**CO5**
(OR)			
17 b)	**Explain** power oscillation damping of Static shunt compensation	**Remember** **Analyse**	**CO5**

Prof. Elective III/IV/V Lab

		L	T	P	C
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	An ability to develop their problem-solving skills and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas
Course Code	Cours e 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
ECEXX XXX	Intro-ductio n to Artific ial Inte-lligen ce Lab		3	3	3	3				2				3	3

1=weakly mapped

2= moderately mapped

3=strongly mapped

EEE12059	**Simulation Lab**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Electrical Machines, Power Electronics				
Co-requisites	--				

Course Objectives

4. To introduce the concept of state-space modeling and its applications in real-time systems using MATLAB.
5. To comment on controllability and observability of system using MATLAB.
6. To design full order and minimum order controllers and observers using MATLAB.

Course Outcomes

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

CO1. **Discuss** state-space modeling of a continuous-time control system using MATLAB.

CO2. **Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system using MATLAB.

CO3. **Describe** applications of pole-placement technique using MATLAB.

CO4. **Design** full order and minimum order controllers and state observer for continuous-time control system using MATLAB.

Catalog Description

This course focuses on applications of state-space approach over transfer function based analysis of different real-time systems. This course also deals with finding solution of homogeneous and non-homogeneous state equations, checking controllability and observability of systems, studying pole-placement techniques, designing full order and minimum order state controllers and observers.

Course Content

1. Obtaining transfer function of a given system from state variable model and vice versa.
2. State variable analysis of physical system, and obtaining step response of system using MATLAB.
3. Obtaining step response, impulse response and initial condition response of given state variable models by Simulation.
4. Obtaining different canonical forms of given SISO and MIMO systems.
5. 5. Obtaining transfer function of given state variable models.
6. Determination of Eigen values from state model & stability analysis.
7. Checking state controllability and output controllability of given state variable models.
8. checking state observability of given state variable models.

9. Obtaining steady state error of given state variable model for step, ramp and parabolic inputs, using MATLAB.
10. Calculate of state feedback gains in pole placement design and obtaining close loop system response for unit step input.
11. Finding state model of second order system cascaded with active lead circuit and obtaining its step response.

Text Books:

1. K. Ogata, *Modern Control Engineering*, 5th Ed., PHI Learning Pvt. Ltd, 2010.
2. N. S. Nise, *Nise's Control Systems Engineering*, Wiley India Edition, 2018.

Reference Books:

1. Bernard Friedland, *Control System Design: An Introduction to State-Space Methods*, DoverPublications Inc., 2005.
2. Cheng Siong Chin, *Computer-Aided Control Systems Design: Practical Applications usingMATLAB® and Simulink®*, 1st Ed., CRC Press, 2017.

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	**Discuss** state-space modeling of a continuous-time control system using MATLAB.	**PO2, PO3, PO4, PO5, PO6, PSO2**
CO2	**Solve** non-homogeneous state equation and relate the same for concluding on controllability and observability of the system using MATLAB.	**PO1, PO2, PO3, PO4, PO5, PSO1, PSO2**
CO3	**Describe** applications of pole-placement technique using MATLAB.	**PO1, PO2, PO3, PO4, PO5, PO6, PSO1, PSO2**

CO4	**Design** full order and minimum order controllers and state observer for continuous-time control system using MATLAB.	**PO2, PO3, PO4, PO5, PO6, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE11059	Simulation	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-

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

[redacted]

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

Course: EEE12059 Simulation Lab

Program: B. Tech. (Electrical Engineering) Hons. **Time: 03 Hrs.**
Semester: Odd 2020-21 **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 10 marks)**. Section C** is Compulsory (carrying 8 marks)**.**

Section A (Attempt **any Three)**

1.	A system is represented by the state equation as $\begin{bmatrix}\dot{x}_1\\ \dot{x}_2\end{bmatrix} = \begin{bmatrix}-1 & 1\\ 0 & -2\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix} + \begin{bmatrix}1 & -1\\ 0 & 1\end{bmatrix}\begin{bmatrix}r_1\\ r_2\end{bmatrix}$ $\begin{bmatrix}y_1\\ y_2\end{bmatrix} = \begin{bmatrix}1 & 0\\ 1 & -1\end{bmatrix}\begin{bmatrix}x_1\\ x_2\end{bmatrix}$ **Derive** the transfer functions using MATLAB.	**An**	**CO1**
2.	For a linear time-invariant system, the system matrix is, $\mathbf{A} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$. **Determine** the characteristic equation and eigenvalues using MATLAB.	**An**	**CO2**
3.	Using Caley-Hamilton theorem and MATLAB, **determine** the state transition matrix (STM) of the system whose system matrix is given by: $\mathbf{A} = \begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$.	**Ap**	**CO3**
4.	**Construct** the state model in controllable canonical form, for the following differential equation, using MATLAB. $\ddot{y} + 6\dot{y} + 3y = \dot{u} + 4u$	**Ap**	**CO1**
	SECTION B (Attempt any **Two Questions)**		
5.	A system is described by its transfer function $\frac{Y(s)}{R(s)} = T(s) = \frac{8(s+5)}{s^3+12s^2+44s+48}$ (c) Determine its controllable state variable model, and (d) Determine the state transition matrix, using MATLAB.	**Ap**	**CO3**

6.	Given the homogeneous state equation, where $\mathbf{A} = \begin{bmatrix} -3 & 1 \\ -2 & -1 \end{bmatrix}$. **Determine** the steady-state value of state variables using MATLAB, *i.e.* $x_{ss} = \underset{t \to 0}{\text{Lt}}\; x(t)$, for given the initial state value of $x(0) = [10 \quad 10]^{T}$.	**Un**	**CO2**
7.	**Determine** observability of the following system using MATLAB. $\dot{\mathbf{x}}(t) = \begin{bmatrix} -3 & 1 & 0 \\ 1 & -2 & 1 \\ 1 & 1 & 0 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 2 \\ 2 \end{bmatrix} u(t), \quad y(t) = [1 \quad 2 \quad 1]\, \mathbf{x}(t)$.	**An**	**CO4**
	SECTION C is Compulsory		
8.	**Show** that the system described by the following state model is observable, using Simulink: $\dot{\mathbf{x}}(t) = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix} \mathbf{x}(t) + \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix} u(t), \quad y(t) = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \end{bmatrix} \mathbf{x}(t)$.	**An**	**CO4**

EEE12060	**Controller design Lab**	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	Electrical Machines, Power Electronics				
Co-requisites	--				

Course Objectives

1. To illustrate various types of solar power plant.
2. To compare the different sites for solar power plant.
3. To analyse different PV module and inverter circuits to be used for solar power plant.

Course Outcomes

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

CO1. **Discuss** various types of controllers.

CO2. **Analyse** working of different controllers.

CO3. **Design** controllers for different systems.

Course Content

1. Design of P, PI and PD controller.
2. Design of P, PI and PD controller with and without filter.
3. Compensator Design Using Root-Locus Plots.
4. Compensator Design Using Bode Plots
5. Obtaining different canonical forms of given SISO and MIMO systems.
6. Obtaining transfer function of given state variable models.
7. Determination of Eigen values from state model & stability analysis.
8. Checking state controllability and output controllability of given state variable models.
9. Checking state observability of given state variable models.
10. Obtaining steady state error of given state variable model for step, ramp and parabolic inputs, using MATLAB.
11. Calculate of state feedback gains in pole placement design and obtaining close loop system response for unit step input.

Text books:

1. Chetan Singh Solanki, Solar Photovoltaics: Fundamentals, Technologies, and Application, PHI, 2009.
2. Tomas Markvart, Solar Electricity, 2nd Ed., Wiley, 2000.
3. Gilbert M. Masters, Renewable and Efficient Electric Power Systems, Wiley, 2004.
4. Photovoltaics Design and Installation Manual, NSP, 2007.

Reference Books:

1. Suneel Deambi, Photovoltaic System Design, Procedures, Tools and Applications, CRC Press August 2016.
2. Luis Castaner and Santiago Silvestre, Modeling of Photovoltaic Systems using PSPICE, Wiley, 2002.
3. Roger A. Messenger, Photovoltaic Systems Engineering, 3rd Ed., CRC Press, 2010.

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Discuss** various types of controllers.	**PO1, PO2, PO3, PO4, PO6, PO7, PO12, PSO1, PSO2**
CO2	**Analyze** working of different controllers.	**PO1, PO2, PO4, PO7, PO8, PO12, PSO1, PSO2**
CO3	**Design** controllers for different systems.	**PO1, PO2, PO3, PO4, PO7, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE12060	Controller design Lab	3	3	3	3	-	2	3	3	-	-	-	3	3	3	

1=weakly mapped

2= moderately mapped3=strongly mapped

EEE14040	Summer Internship	L	T	P	C
-		-	-	-	2
Pre-requisites/Exposure	Knowledge of the course subjects				
Co-requisites	--				

Course Objectives

1. To prepare graduates with a broad knowledge of electrical 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 electrical 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. **Understand** 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. **Understand** 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	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 operation of the industrial facility in which the student worked.	**PO1, PO6, PO7, PSO1, PSO2**
CO2	**Understand** problem solving by analyzing modern tools and devices.	**PO1, PO5, PO8, PO12, PSO1**
CO3	**Apply** existing engineering knowledge in similar or new situations.	**PO2, PO6, PO9, PO10, PSO2**
CO4	**Identify** when new engineering knowledge is required.	**PO2, PO9, PO10, PO12, PSO2**
CO5	**Understand** lifelong learning processes through critical reflection of internship experiences.	**PO8, PO9, PO10, 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 or team work	Communication	Project management and finance	Life-long Learning	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE14040	Summer Internship	3	-	-	-	1	3	1	3	3	3	-	3	3	3	-

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

EEE14039	Minor Project	L	T	P	C
Version 1.0		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 you have been taught.
2. To carry out budget and time planning for the project.
3. To do effective trouble-shooting of the minor project.
4. 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. **Investigate** a real world problem.

CO2. **Utilize** the modern tools to solve the problems.

CO3. **Create** a culture to work in a group to promote team spirit and leadership quality among the students.

CO4. **Understand** importance of projects involving both technological aspects and finance.

CO5. **Identify** newer areas of in depth study and research and lifelong learning.

Catalog Description

The seminar should provide an active learning format in which students can develop the ability to read critically and conceptually, and therefore to speak and write with discrimination. Thus develop skills in doing literature survey, technical presentation and report preparation.

Course Content

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.

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	**Investigate** a real world problem.	**PO4, PO9, PO10, PO12, PSO2**
CO2	**Utilize** the modern tools to solve the problems.	**PO4, PO5, PO8, PO10, PO12, PSO1**
CO3	**Create** a culture to work in a group to promote team spirit and leadership quality among the students.	**PO2, PO8, PO9, PO10, PO12, PSO2**
CO4	**Understand** importance of projects involving both technological aspects and finance.	**PO8, PO9, PO10, PO11, PSO3**
CO5	**Identify** newer areas of in depth study and research and lifelong learning.	**PO8, PO9, PO10, PO12, PSO3**

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE14039	Minor Project	-	1	-	3	1	-	-	3	3	3	3	3	1	3	3

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

		L	T	P	C
EEE14041	**Industry Work Experience/ SIRE/ Major Project**	L	T	P	C
-		-	-	12	6
Pre-requisites/Exposure	Knowledge of the course subjects				
Co-requisites	--				

Course Objectives

1. To be able to apply some of the techniques/principles you have been taught.
2. To carry out budget and time planning for the project.
3. To do effective trouble-shooting of the minor project.
4. 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. **Investigate** a real world problem.
CO2. **Utilize** the modern tools to solve the problems.
CO3. **Create** a culture to work in a group to promote team spirit and leadership quality among the students.
CO4. **Understand** importance of projects involving both technological aspects and finance.
CO5. **Identify** newer areas of in depth study and research and lifelong learning.

Catalog Description

The seminar should provide an active learning format in which students can develop the ability to read critically and conceptually, and therefore to speak and write with discrimination. Thus develop skills in doing literature survey, technical presentation and report preparation.

Course Content

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.

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	**Investigate** a real world problem.	**PO4, PO9, PO10, PO12, PSO2**
CO2	**Utilize** the modern tools to solve the problems.	**PO4, PO5, PO8, PO10, PO12, PSO1**
CO3	**Create** a culture to work in a group to promote team spirit and leadership quality among the students.	**PO2, PO8, PO9, PO10, PO12, PSO2**
CO4	**Understand** importance of projects involving both technological aspects and finance.	**PO8, PO9, PO10, PO11, PSO3**
CO5	**Identify** newer areas of in depth study and research and lifelong learning.	**PO8, PO9, PO10, PO12, PSO3**

		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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE44402	Major Project	-	1	-	3	1	-	-	3	3	3	3	3	1	3	3

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

EEE15042	Comprehensive Viva Voce	L	T	P	C
-		-	-	-	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**, **visualize**, **illustrate**, **demonstrate**, **criticize and** appraise **the** aspects of electrical engineering and the interaction among them.

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	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	**Recall**, **recognize**, **visualize**, **illustrate**, **demonstrate**, **criticize** and **appraise** the aspects of electrical engineering and the interaction among them.	**PO1, PO2, PO4, PO6, PO10, 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	To educate students in Electrical Engineering domain and guide their instincts towards....	To provide quality knowledge on Sustainable Energy that can be used for solving problems...	To see our students as ethical and responsible engineering professionals...
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
EEE44502	Comprehensive Viva Voce	3	3	-	3	-	3	-	-	-	3	-	3	3	3	-

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

SCHOOL OF ENGINEERING & TECHNOLOGY

CO – PO & PSO MAPPING

Name of the Programme: B. Tech. in Electrical Engineering

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MTH11501	Engineering Mathematics-I	-	3	3	3	-	-	-	-	-	-	-	3	-	-	-
PHY11201	Applied Science	3	2	-	3	2	2	-	-	-	-	-	1	-	-	-
CSE11001	Introduction to Programming	3	-	1	2	2	-	-	-	1	-	1	-	-	-	-
GEE11001	Electrical and Electronics Technology	3	2	3	3	2	2	2	1	1	1	1	2	-	-	-
ENG11053	English Communication	-	-	-	-	-	2	2	3	2	3	-	2	-	-	-
BIT11003	Life Sciences	2	2	1	-	3	2	-	1	1	-	-	2	3	3	-
DGS11001	Design Thinking	3	2	-	1	2	-	-	-	-	-	2	-	-	-	-
PHY12202	Applied Science Lab	3	2	2	-	2	-	-	-	2	-	-	-	-	-	-

CSE12002	Programming Lab	3	1	1	2	2	-	1	-	-	-	1	-	1	-	-
GEE12002	Electrical and Electronics Technology Lab	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CEE12001	Engineering Drawing and CAD	-	3	3	-	-	-	-	-	3	-	-	3	-	3	-
MEE12001	Engineering Workshop	3	1	-	-	-	-	-	-	3	-	-	-	3	-	-
ENG11043	Communication and Collaboration Skill –I	-	1	-	-	-	-	-	-	3	3	-	-	-	-	-
MTH11502	Engineering Mathematics– II	3	1	3	3	2	-	1	-	-	-	-	1	-	-	-
GEE11001	Electrical and Electronics Technology	3	2	3	3	2	2	2	1	1	1	1	2	-	-	-
CSE11001	Introduction to Programming	3	-	1	2	2	-	-	-	1	-	1	-	-	-	-
MEE11002	Engineering Mechanics	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
EVS11112	Environmental Science	1	3	3	-	3	3	2	-	-	1	-	-	-	-	-
GEE11011	Basic Civil & Mechanical Engineering	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-

EIC11001	Venture Ideation	-	-	-	-	-	3	-	3	-	-	3	-	-	-	-
GEE12002	Electrical and Electronics Technology Lab	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CSE12002	Programming Lab	3	1	1	2	2	-	1	-	-	-	1	-	1	-	-
MEE12001	Engineering Workshop	3	1	-	-	-	-	-	-	3	-	-	-	3	-	-
CEE12001	Engineering Drawing and CAD	-	3	3	-	-	-	-	-	3	-	-	3	-	3	-
ENG11044	Communication and Collaboration Skill -II	-	1	-	-	-	-	-	2	3	3	-	-	3	3	-
MTH11535	Engineering Mathematics – III B	3	2	3	2	-	-	-	-	3	-	-	3	3	-	-
CSE11104	Data Structure & Algorithm	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
EEE11003	Electrical Machines – I	3	3	3	3	-	3	-	-	-	-	-	3	3	3	3
EEE11002	Electrical and Electronics Measurement	2	3	3	3	-	3	2	-	-	-	-	2	3	3	-
EEE11043	Signals and Networks	2	3	3	3	3	3	-	-	-	-	-	-	3	3	-

EEE12006	Electrical Machines – I Lab	3	3	3	3	3	3	-	3	-	3	-	-	3	3	-
EEE12005	Electrical and Electronic Measurement Lab	3	3	3	2	3	-	-	-	-	-	-	-	2	3	-
MTH12531	Numerical Techniques Lab	3	3	3	-	-	2	-	-	2	-	2	3	3	-	-
IDP14001	Interdisciplinary Project	3	-	-	-	-	-	-	-	3	-	-	-	3	-	-
SOC14100	# Community Service	-	-	-	-	-	3	-	-	3	-	-	3	-	-	3
ECE11009	Digital Signal Processing	3	3	3	3	1	3	-	-	-	-	-	-	3	3	-
EEE11007	Electrical Machines – II	-	3	3	-	-	3	-	-	-	-	-	3	3	3	-
EEE11044	Electromagnetic Fields	3	3	3	-	-	-	-	2	-	3	-	-	3	3	2
EEE11009	Analog and Digital Electronics	-	3	-	3	3	-	-	-	-	-	-	-	3	-	3
EEE11045	Electrical Machine Design	-	3	3	2	-	3	3	2	3	3	2	2	3	3	-
PSG11021	Human Values and Professional Ethics	-	-	-	-	-	2	-	3	-	-	-	-	-	-	3

EEE12010	Electrical Machines II Lab	-	3	3	3	3	3	-	3	-	3	-	-	3	3	-
EEE12012	Analog and Digital Electronics Lab	3	3	-	-	3	-	2	-	-	3	-	2	3	3	-
ECE11015	Microcontrollers & Interfacing	3	2	1	-	3	-	-	-	-	-	1	-	1	-	-
EEE11015	Power Electronics	3	3	3	3	3	3	2	-	-	-	-	-	3	3	-
EEE11046	Power Systems	3	3	3	2	-	3	-	3	-	3	-	2	3	3	-
ECE11016	1. Data Communication and Computer Networks	3	3	3	2	3	-	-	-	-	-	-	-	-	3	-
EEE11016	2. Special Electrical Machines	2	3	3	2	-	3	-	2	-	3	-	2	3	3	-
EEE11047	3. Energy Systems-I	3	3	3	3	-	3	3	-	-	-	-	3	3	3	-
ECE11018	1. Introduction to IoT	3	3	3		3	-	-	-	-	3	-	-	3	3	-
EEE11048	2. Electric and hybrid vehicles	3	3	3	2	-	3	-	3	-	3	-	2	3	3	-
EEE11049	3. FACTS controllers	3	3	3	3	3	-	-	-	-	-	-	3	3	-	-

ECE12023	Microcontrollers & Interfacing Lab	3	1	1	-	1	-	-	-	-	-	1	-	3	-	-
EEE12022	Power Electronics Lab	3	3	3	3	3	-	3	-	-	-	-	-	3	3	-
EEE12050	Power Systems Lab	3	3	3	2	3	3	-	-	-	2	-	-	-	3	2
EEE11014	Control Systems	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-
EEE11034	Electric Drives	3	3	3	3	-	3	-	-	-	3	-	3	2	3	-
ECE11026	1. Sensors and Actuators for IOT	3	3	3	1	1	1	-	-	-	1	-	-	-	3	2
EEE11051	2. Energy Storage and management system	3	3	3	-	3	-	-	-	-	1	-	-	3	3	-
EEE11052	3. Energy systems-II	3	3	3	3	-	-	3	-	-	-	-	3	3	-	-
CSE11261/	1. Data Analytics	2	3	2	3	2	1	-	-	-	-	-	-	-	-	-
EEE11053/	2. Power Train Management	3	3	3	2	-	3	-	3	-	3	-	2	3	3	-
EEE11054	3. Control and Integration of renewable energy	3	3	3	3	-	-	3	-	-	-	-	3	3	3	-

CSE11251	1. Object Orientated Programming	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CEE11030	2. Dream House Construction	3	3	3	2	-	3	-	3	-	3	-	2	3	3	-
ECO11505	Economics for Engineers	-	3	3	3	-	-	-	-	-	-	3	-	3	-	3
EEE12021	Control Systems Lab	3	3	3	3	3	3	-	-	-	2	-	-	2	3	-
EEE12038	Electric Drives Lab	3	3	3	3	3	3	-	-	-	-	-	-	3	-	3
CSE12262	1. Python for IOT Lab	2	3	2	3	2	1	-	-	-	-	-	-	-	-	-
EEE12055	2. Smart Vehicle Lab	3	3	1	1	1	-	1	-	-	1	-	3	3	1	1
EEE12056	3. Energy Systems Lab	3	3	3	3	-	-	3	-	-	-	-	3	3	3	-
MGT11402	Industrial Management	3	3	3	-	-	-	-	3	-	-	3	3	-	-	3
EEE11024	Modern Control Systems	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-
ECE11035	1. Applications of IOT	3	3	3	-	3	-	-	-	-	3	-	-	-	3	3

EEE11057	2. Power Electronics for Automobiles	3	3	3	2	-	3	-	3	-	3	-	2	3	3	-
EEE11058	3. Smart grid analysis	3	3	3	3	3	-	-	-	-	-	-	3	3	-	-
CSE11253	1. DBMS	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CSE11254	2.Big Data Tools and Techniques	3	3	3	3	-	-	-	-	-	-	-	-	-	-	-
CSE11257	1.Cyber Security	3	3	3	-	3	-	-	-	-	-	-	-	-	-	-
CSE11258	2. Neural Network and deep learning	2	3	2	3	2	1	-	-	-	-	-	-	-	-	-
EEE12029	Modern Control Systems Lab	3	3	3	3	3	3	-	-	-	-	-	-	3	3	-
ECE12038	1. Application of IOT Lab	3	3	3	3	2	-	-	-	-	-	-	-	3	-	-
EEE12059	2. Modelling and Simulation Of EV	3	3	3	-	3	3	-	-	3	3	-	3	3	3	-
EEE12060	3. Photovoltaic Lab	3	3	3	3	-	3	3	3	-	-	-	3	3	3	-
EEE14040	Summer Internship#	3	-	-	-	1	3	1	3	3	3	-	3	3	3	-

EEE14039	Minor Project	-	1	-	3	1	-	-	3	3	3	3	3	1	3	3
EEE14041	Industry Work Experience / SIRE* / Major Project	-	1	-	3	1	-	-	3	3	3	3	3	1	3	3
EEE15042	Comprehensive Viva Voce	3	3	-	3	-	3	-	-	-	3	-	3	3	3	-