ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING

AND

TECHNOLOGY

DEPARTMENT

OF

COMPUTER SCIENCE AND ENGINEERING

B. Sc (Computer Science)

W.e.f. AY 2020-21

SoET 2.0
(Engineering +)

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND 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.

MISION 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 COMPUTER SCIENCE AND 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, and communication and leadership skills.

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

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

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

DEAN / SCHOOL CONCERNED

ADAMAS UNIVERSITY, KOLKATA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION OF THE DEPARTMENT

Graduates of the Department of Computer Science and Software Engineering will be recognized as innovative leaders in the fields of computer science and software engineering. This recognition will come from their work in software development in a myriad of application areas, as well as through their work in advanced study and research. The faculty is, and will continue to be, known for their passion for teaching and for their knowledge, expertise, and innovation in advancing the frontiers of knowledge in computer science and software engineering.

MISSION STATEMENTS OF THE DEPARTMENT

M.S 01: Our mission is to teach and prepare liberally educated, articulate, and skilled computer scientists and software engineers for leadership and professional careers and for advanced study.

M.S 02: A central objective of our program is to contribute to society by advancing the fields of computer science and software engineering through innovations in teaching and research, thus enhancing student knowledge through interactive instruction, global engagement, and experiential learning.

M.S 03: The program will serve as a resource to inform society about innovations related to the production and uses of computers and software.

M.S 04: To impart moral and ethical values, and interpersonal skills to the students.

HOD

DEAN / SCHOOL CONCERNED

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Name of the Programme: B. Sc (Computer Science)

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO-1: Graduates will improve their core skills by strengthening their mathematical, scientific and basic sciences fundamentals.

PEO-2: Graduates will be trained in diversified and applied areas to create novel products and solutions to meet current industrial and societal needs at regional, national and international level.

PEO-3: Graduates will exhibit high professionalism by inculcating technical knowledge, ethical standards and soft skills.

PEO-4: Graduates will promote collaborative learning and spirit of team work through multidisciplinary projects and diverse professional activities.

PEO-5: Graduates will be encouraged for higher studies, research activities and entrepreneurial skills by imparting interactive quality learning.

HOD **DEAN / SCHOOL CONCERNED**

ADAMAS UNIVERSITY, KOLKATA

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Name of the Programme: B. Sc (Computer Science)

GRADUATE ATTRIBUTE / PROGRAMME OUTCOME (PO)

GA 1 / PO 1: Computational knowledge: Acquire Knowledge of mathematical foundations, computer application theory and algorithm principles in the design and modelling of computer based system.

GA 2 / PO 2: Design/development of solutions: Avail appropriately system design notations and apply system design engineering process in order to design, plan, and implement software systems.

GA 3 / PO 3: Problem analysis: Earn caliber to design, analyze and develop principles in the construction of complex hardware and software design computer systems.

GA 4 / PO 4: The engineer and society: Own Skills of observations and drawing logical inferences from the scientific experiments and develop application programs to meet the desired results including attainable constraints such as social, economic, environmental, functional, and technological.

GA 5 / PO 5: Conduct investigations of complex problems: Implement document solutions to significant computational problems and apply mathematical and scientific reasoning to a variety of computational problems for the research in the computer application field.

GA 6 / PO 6: Environment and sustainability: Appraise regarding the social and environmental issues to fulfil the local and global needs and give relevant solutions for them.

GA 7 / PO 7: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

GA 8/ PO 8: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

GA 9 / PO 9: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

GA 10 / PO 10: Communication: Assist and manage the execution of a productive project planning through effective communication among range of professional/non-professional audience.

GA 11 / PO 11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

GA 12 / PO 12: Life-long learning: Understand and adopt emerging technologies, research, strategies for lifelong learning at national and international level.

ADAMAS UNIVERSITY
PURSUE EXCELLENCE

ADAMAS UNIVERSITY, KOLKATA
SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Name of the Programme: B. Sc (Computer Science)

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO-1: Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.

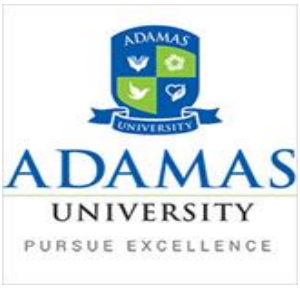
PSO-2: Competence to use research, experiment, contemporary issues to solve industrial problems.

PSO-3: Envisage and work on laboratory and multi- disciplinary tasks in computer science.

PSO-4: Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.

HOD

DEAN / SCHOOL CONCERNED



ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING

AND

TECHNOLOGY

DEPARTMENT

OF

COMPUTER SCIENCE AND ENGINEERING

Course Structure & Syllabus

Of

B. Sc (Computer Science)

W.e.f. AY 2020-21

FIRST YEAR

SEMESTER -I								
Sl. No	**Type**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	THEORY	CSE11301	COMPUTER PROGRAMMING	3	1	0	4	4
2.	THEORY	HEN11056	COMMUNICATIVE ENGLISH	2	0	0	2	2
3.	THEORY	MTH11211	LINEAR ALGEBRA	3	1	0	4	4
4.	THEORY	CSE11302	COMPUTER ORGANIZATION	3	1	0	4	4
5.	PRACTICAL	CSE12303	COMPUTER PROGRAMMING LAB	0	0	3	3	2
6.	PRACTICAL	CSE12304	COMPUTER ORGANIZATION LAB	0	0	3	3	2
Total				**11**	**3**	**6**	**20**	**18**

SEMESTER -II								
Sl. No	**Type**	**Course Code**	**Course Title**	**L**	**T**	**P**	**Contact Hrs/wk**	**Credits**
1.	THEORY	MTH11518	DISCRETE MATHEMATICS	3	1	0	4	4
2.	THEORY	SDS11502	PROBABILITY & STATISTICS	3	1	0	4	4
3.	THEORY	EVS11108	ENVIRONMENTAL SCIENCE	2	0	0	2	2
4.	THEORY	CSE11305	DATA STRUCTURES	3	1	0	4	4
5.	THEORY	CSE11306	PROGRAMMING IN JAVA	3	1	0	4	4
6.	PRACTICAL	CSE12307	DATA STRUCTURES LAB	0	0	3	3	2
7.	PRACTICAL	CSE12308	PROGRAMMING IN JAVA LAB	0	0	3	3	2
Total				**14**	**4**	**6**	**24**	**22**

Total Credit (First Year): 40

SECOND YEAR

SEMESTER -III								
Sl. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/week**	**Credits**
1.	THEORY	CSE11309	OPERATING SYSTEM	3	1	0	4	4
2.	THEORY	CSE11310	DESIGN AND ANALYSIS OF ALGORITHM	3	1	0	4	4
3.	THEORY	CSE11311	COMPUTER ARCHITECTURE	3	1	0	4	4
4.	THEORY	CSE11312	WEB DESIGN AND PROGRAMMING	3	1	0	4	4
5.	PRACTICAL	CSE11313	OPERATING SYSTEM LAB	0	0	3	3	2
6.	PRACTICAL	CSE12314	DESIGN AND ANALYSIS OF ALGORITHM LAB	0	0	3	3	2
7.	PRACTICAL	CSE12315	WEB PROGRAMMING LAB	0	0	3	3	2
Total				**12**	**4**	**9**	**25**	**22**

SEMESTER -IV								
Sl. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/week**	**Credits**
1.	THEORY	CSE11316	DATABASE MANAGEMENT SYSTEM	3	1	0	4	4
2.	THEORY	CSE11317	SOFTWARE ENGINEERING	3	1	0	4	4
3.	THEORY	CSE11318	COMPUTER NETWORKS	3	1	0	4	4
4.	THEORY	CSE11319	THEORY OF COMPUTATION	3	1	0	4	4
5.	PRACTICAL	CSE12320	DATABASE MANAGEMENT SYSTEM LAB	0	0	3	3	2
6.	PRACTICAL	CSE12321	SOFTWARE ENGINEERING LAB	0	0	3	3	2
7.	PRACTICAL	CSE12322	COMPUTER NETWORKS LAB	0	0	3	3	2
Total				**12**	**4**	**9**	**25**	**22**

Total Credit (Second Year): 44

THIRD YEAR

SEMESTER -V								
Sl. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/week**	**Credits**
1.	THEORY	CSE11323	ARTIFICIAL INTELLIGENCE	3	1	0	4	4
2.	THEORY	CSE11324	WEB TECHNOLOGY	3	1	0	4	4
3.	THEORY		ELECTIVE – I	3	0	0	3	3
4.	THEORY		ELECTIVE – II	3	0	0	3	3
5.	PRACTICAL		ELECTIVE – I LAB	0	0	3	3	2
6.	PRACTICAL		ELECTIVE – II LAB	0	0	3	3	2
			Total	**12**	**2**	**6**	**20**	**18**

SEMESTER -VI								
Sl. No	**Type**	**Course Code**	**Subject Name**	**L**	**T**	**P**	**Contact Hrs/week**	**Credits**
1.	THEORY	CSE11337	COMPUTER GRAPHICS	3	1	0	4	4
2.	THEORY		ELECTIVE – III	3	0	0	3	3
3.	THEORY		ELECTIVE – IV (INDUSTRY ORIENTED CERTIFICATION COURSE)	0	0	0	0	3
4.	PROJECT	CSE14344	PROJECT/DISSERTATION	0	0	12	12	8
			Total	**6**	**1**	**12**	**19**	**18**

Total Credit (Third Year): 36

Total Credits (Over three years): 40+44+36 = 120

LIST OF ELECTIVES:

ELECTIVE – I (Theory)

1. Image and Video Processing (CSE11325)
2. Cryptography & Cyber Security (CSE11326)
3. Cloud Computing (CSE11327)

ELECTIVE – I (Lab)

1. Image and Video Processing Lab (CSE12331)
2. Cryptography & Cyber Security Lab (CSE12332)
3. Cloud Computing Lab (CSE12333)

ELECTIVE – II (Theory)

1. Computer Vision (CSE11328)
2. Internet of Things (IoT) (CSE11329)
3. Machine Learning (CSE11330)

ELECTIVE – II (Lab)

1. Computer Vision Lab (CSE12334)
2. Internet of Things (IoT) Lab (CSE12335)
3. Machine Learning Lab (CSE12336)

ELECTIVE – III (Theory)

1. Big Data Analytics (CSE11338)
2. Artificial Neural Network and Deep Learning (CSE11339)
3. Computer Communication Theory (CSE11340)

ELECTIVE – IV (INDUSTRY ORIENTED CERTIFICATION COURSE)

1. Internet of Things (IOT) using Augmented Reality (AR) (CSE11341)
2. AWS / Azure Cloud Computing Course (CSE11342)
3. SAS Global Certification Course for Big Data Analytics (CSE11343)

CSE11301	Computer Programming	L	T	P	C
Version 1.0	Contact Hour -60	3	1	0	4
Pre-requisites/Exposure	H. Sc. level Computer Knowledge or Basic Computer Skills				
Co-requisites	--				

Course Objectives:

1. To **provide** students with understanding of code organization and functional hierarchical decomposition with using complex data types.
2. To **gain** a thorough understanding of the fundamentals of C programming
3. To **give** stress on fundamental parts of programming language, so that the students will have a basic concept for understanding and using other programming language.

Course Outcomes

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

CO1. **Define** basics concepts of programming structure and implement the basics concepts of programming.
CO2. **Solve** and execute various problems using programming language select the best solution
CO3. **Apply** modularized solution and design such programs to appraise the solution
CO4. **Identify** the basic usage of memory and construct such memory in terms of array in a program. Also, students be able to define user defined data types using structure and union.
CO5. **Create** and manipulate permanent storage access through File Handling.
CO6. **Apply** the stack and queue to solve real time application.

Course Description:

This course introduces basic concepts in programming language to solve numerical problems. All the lectures will be devoted on discussions of basic theories and advanced topics, focusing on practical implementation of knowledge. Classes will be conducted by lecture as well as power point presentation, audio visual virtual lab session. The tutorials will familiarize the students with practical problem-solving techniques led by the course coordinator. Students will strongly grab the basic concepts of the subject via exercise and discussions with the course coordinator.

Course Content:

Unit-I **6 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 **12 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 **14 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 **22 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 **6 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. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni and Computer Science Press.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs, POs and PSOs

Course Outcomes (COs)		Mapped POs and PSOs
CO-1	**Define** basics concepts of programming structure and implement the basics concepts of programming.	**PO1, PSO1**
CO-2	**Solve** and execute various problems using programming language select the best solution	**PO3, PO4, PSO1**
CO-3	**Apply** modularized solution and design such programs to appraise the solution	**PO2, PO3**
CO-4	**Identify** the basic usage of memory and construct such memory in terms of array in a program. Also, students be able to define user defined data types using structure and union.	**PO3, PO4, PSO1**
CO-5	**Create** and manipulate permanent storage access through File Handling.	**PO2, PSO1**
CO-6	**Apply** the stack and queue to solve real time application.	**PO1, PSO1**

Course Code		
CSE11301	Course Title	
Computer Programming		
3	PO1	Computational knowledge
2	PO2	Design/development of solutions
2	PO3	Problem analysis
2	PO4	The engineer and society
-	PO5	Conduct investigations of complex problems
-	PO6	Environment and sustainability
-	PO7	Modern tool usage
-	PO8	Individual and team work
-	PO9	Ethics
-	PO10	Communication
-	PO11	Project management and finance
-	PO12	Life-long learning
3	PSO1	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.
-	PSO2	Competence to use research, experiment, contemporary issues to solve industrial problems.
-	PSO3	Envisage and work on laboratory and multi- disciplinary tasks in computer science.
-	PSO4	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.

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

Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science)
Semester: I
Code- CSE11301 **Stream- CSE**
Time: 03 Hrs.
Paper title– Computer Programming **Total pages- 2**
Max. Marks: 40 **Total no. of questions- 12**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks). **Any Two Questions from Section C** (Each Carrying 10 Marks).

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

Section A (Answer **All the Questions) (5 x 1 = 5)**

1.	**What** will be the output?
	int main()
	{
	int a = 10, b = 25;
	a = b++ + a++;
	b = ++b + ++a;
	printf("%d %d \n", a, b);
	}
		R	**CO1**

2.	**What** will be the output?
	{ int i = 0;
	do
	{
	i++;
	if (i == 2)
	continue;
	printf("In while loop ");
	} while (i < 2);
	printf("%d\n", i);
		R	**CO2**

	}		
3.	**Classify** break keyword	**U**	**CO2**
4.	**What** is call is by value function calling?	**R**	**CO3**
5.	**Define** Structure	**R**	**CO4**
SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**			
6.	**Solve** the addition of n numbers using for loop.	**AP**	**CO1**
7.	**Compare** the difference between = and == symbols in C language.	**U**	**CO2**
8.	**Find** the key features of C programming language.	**U**	**CO3**
9.	**List** the difference between call by value and call by reference method with a help of example.	**U**	**CO4**
SECTION C (Attempt Any **Two Questions) (2 x 10 = 20)**			
10.	**Solve** a program in C to read the file and store lines into an array.	**AP**	**CO5**
11.	**What** is the description of Syntax error? **Solve** the following pattern using C language: 1 1 2 1 2 3 1 2 3 4	**R** **AP**	**CO2** **CO3**
12.	**Develop** a program to implement pop, push and display operation of stack by using three different functions. Use switch case statement to implement those functions.	**AP**	**CO6**

HEN11056	COMMUNICATIVE ENGLISH	L	T	P	C
Version 1.0	Contact Hours -30	2	0	0	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 professional skills
2. To enhance the knowledge of the students on vocabulary, syntax, and grammatical skills
3. To improve writing skills by applying writing techniques, tools in practice sessions
4. To achieve an overall enhancement in terms of reading, listening and speaking

Course Outcomes:

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

CO1. **Understand** of communication processes and to know the practical implications and its challenges at the workplace

CO2. **Apply** grammar correctly and unambiguously

CO3. **Differentiate** formats of business communication like reports, letters, and other technical writings

CO4. **Acquire** competence in speaking, reading, listening, and writing in English.

CO5. **Understand** English pronunciation and use neutral accent successfully

CO6. **Comprehend** different other accents of spoken English

Catalog Description

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

Course Content

Module I: **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 and Professional Purposes, Cambridge Univ. Press, 2006.
4. Quirk R., Greenbaum S., Leech G., and Svartik, J. A Comprehensive Grammar of the English language, Longman:London, 1985.
5. Balasubramaniam, T. A Textbook of English Phonetics for Indian Students. Macmillan: 2012.

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

Components	Internal Assessment	Mid Semester Examination	End Semester Examination

Weightage (%)	**30**	**20**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** of communication processes and to know the practical implications and its challenges at the workplace	**PO 11, PSO4**
CO2	**Apply** grammar correctly and unambiguously	**PO 11, PSO4**
CO3	**Differentiate** formats of business communication like reports, letters, and other technical writings	**PO 11, PO8**
CO4	**Acquire** competence in speaking, reading, listening, and writing in English.	**PO5, PO6, PO8, PO11**
CO5	**Understand** English pronunciation and use neutral accent successfully	**PO5, PO6**
CO6	**Comprehend** different other accents of spoken English	**PO5, PO6, PO11**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3	PSO 4
HEN11056	Communicative English	-	-	-	-	3	3	-	2	-	-	3	-	-	-	-	2

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

Model Question Paper

Name: **Enrolment No:**	

Course: HEN11056 – Communicative English
Program: B. Sc (Computer Science) **Semester: I**

Time: 03 hrs. **Max. Marks:40**

Instructions:

Attempt all questions from **Group A** (each carrying 1 mark); any **Three Questions** from **Group B** (each carrying 5 marks)**; any Two questions from Group C** (each carrying 10 marks)**.**

	Group A (Answer all the questions) (5×1=5)		
1.	**Where** were you ___ 28 February, 2019? (Fill in the blank with appropriate preposition)	**U**	**CO1** **CO2**
2.	**What** is non-verbal communication?	**U**	
3.	**Name** one word substitute for: "One who loves books"	**U**	
4.	**What** is the antonym of "Happiness"?	**U**	
5.	**Name** an example of an idiom.	**U**	
	Group B (Attempt any **Three Questions) (3×5=15)**		
6.	**What** are the barriers to communication? Explain some physical and psychological barriers of communication	**U**	**CO1**
7.	**What** do you understand by communication? Write a note on the importance of effective communication.	**U**	**CO1**
8.	Fill in the blanks using suitable article. Please copy the sentences given, while answering: a. He was ____ first man to arrive. b. Would you like to be _____ teacher? c. I am going to buy _____ hat. d. Picasso was ____ famous painter. e. The Ganga is ____ sacred river.	**R**	**CO2**
9.	**Change** the following sentences from active to passive voice:	**R**	**CO2**

	a. The cat killed a mouse b. People lined the road c. He was singing a song yesterday d. I have read this book. e. Who broke the jug?		
	Group C (Attempt any **Two Questions) (2×10=20)**		
10.	**Write** a paragraph on the impact of COVID 19 in our society.	**R**	**CO3**
11.	**Develop** 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	**Ap**	**CO3**
12.	**Read** the following passage and answer the questions that follow. A few countries already use powerful electromagnets to build high speed trains. These trains are called maglev trains. Maglev is the shortened form of magnetic levitation. Maglev trains work on the principles of magnetism and float over a guideway. The maglev train is different from a conventional train in that it does not have an engine. At least it does not have the kind of engines that pull train cars along steel tracks. It does not consume fossil fuels either. Since maglev trains float in the air, there is no friction between the train and the track. This lack of friction and the aerodynamic design of these trains allow them to reach speeds of over 500 kilometer per hour. Japan and Germany pioneer research in the maglev train technology. They have already built their prototypes and are in the process of testing them. Transrapid is an electromagnetic suspension system developed by German engineers. The idea of maglev transportation has been in existence for over a century. The first commercial maglev train made its debut in Shanghai, China in 2002. This train was developed by a German company. Right now the Shanghai Transrapid line connects Longyang Road station and Pudong airport. China is planning to extend this line to Hangzhou by building a 99 miles guideway. Several other countries are also planning to build their own maglev train system, but right now the Shanghai maglev train is the only commercial maglev line. Complete the sentences: (2×5=10) (a) The two main differences between maglev trains and conventional trains are: ……., …….. (b) Maglev trains are environment friendly because ……	**R**	**CO4** **CO5** **CO6**

	(c) The two nations that lead the research in maglev train technology are …….. (d) The two factors that help maglev trains to achieve high speeds are ……. (e) A suitable title for the passage would be …….		

MTH11211	Linear Algebra	L	T	P	C
Version 1.0	Contact Hours - 60	3	1	0	4
Pre-requisites/Exposure	12^{th} level Mathematics				
Co-requisites					

Course Objectives:

1. To help the students to acquire the knowledge of matrix theory
2. To enable the students to evaluate determinant of a square matrix
3. To give knowledge of elementary row operations on a matrix
4. To give the idea about the solution procedures for solving system of linear equations and matrix equations
5. To help the students to understand the concepts of row space, column space and null space of a matrix
6. To enable the students to evaluate the eigen values and eigen vectors of a matrix.
7. To help the students to acquire the knowledge of vector spaces
8. To enable the students to get an idea of linear independence, span, and basis
9. To give knowledge of linear transformations and their various properties.

Course Outcomes:

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

CO1. **Define** matrix including matrix operations, inverses and determinants

CO2. **Find** solution of a system of linear algebraic equations using multiple methods of matrix calculus and the application of of linear systems

CO3. **Find** the rank and nullity of a matrix along the concept of row space, column space and null space of a matrix

CO4. **Extend** the knowledge of Matrix polynomial, Characteristic equation, eigenvalues and eigen-vectors and use them in applications.

CO5. **Define** real vector spaces, subspaces and develop the idea of linear independence, span and basis

CO6. **Define** linear transformation and its various properties

Course Description:

This course is intended to provide some tools for performing basic operations on matrices and use those tools for solving system of linear equations and matrix equations. Furthermore, some basic ideas about row-space, column-space, and null-space are there. Concepts of eigen values

and eigen vectors of a matrix and their applications in real world will be discussed in this course. Moreover, some basic ideas about vector spaces, linear transformation and its relationship with matrix algebra can be found in this course.

Course Content:

Unit I [**14 lecture hours**]

Matrices of real and complex numbers, algebra of matrices, symmetric and skew-symmetric matrices. Hermitian and skew-Hermitian matrices, orthogonal matrices, definition & basic properties of determinants, minors and cofactors, adjoint of a square matrix, invertible matrix, non-singular matrix, inverse of an orthogonal matrix, elementary operations on matrices, echelon matrix, rank of a matrix, determination of rank of a matrix, elementary matrices.

Unit-II [**10 lecture hours**]

Systems of linear equations and the invariance of its solution set under row-equivalence, row reduction and echelon forms, the matrix equation AX= B, solution sets of linear systems, applications of linear systems.

Unit-III [**12 lecture hours**]

Row space and column space of matrix, row rank and column rank of matrix, equality of row rank, column rank and rank of a matrix, linear system of equations, solution space, Solutions of system of equations by Matrix method, Rank-Nullity theorem.

Unit IV [**10 lecture hours**]

Eigenvalues and eigenvectors of square matrices, Cayley-Hamilton theorem, simple properties of eigenvalues and eigenvectors, AM and GM., Eigen values, Eigen Vectors and Characteristic Equation of a matrix, the dimension of the solution space of a system of independent homogeneous linear equations.

Unit V [**14 lecture hours**]

Vector space & Linear Transformation: Definitions and examples of vector spaces, subspaces, linear combination of vectors, linear span, dimension of a vector space, linear independence, basis and dimension, dimension of subspaces. Linear transformations, null space, range, rank and nullity of a linear transformation, matrix representation of a linear transformation.

Text Books:

T1. S. Kumaresan, Linear Algebra- A Geometric Approach, Prentice Hall of India, 1999.

T2. S. K. Mapa, Higher Algebra- Abstract and Linear, revised Ninth Edition, Sarat

Book House, 2003.

T3. R. Larson, Elementary Linear Algebra, 8th Edition, Cengage Learning ,2017

Reference Books:

R1. A. Kurosh, Higher Algebra, Mir Publisher.

R2. Hoffman and Kunze, Linear algebra, Pearson.

R3. John Smith, Modern Engineering Mathematics, 5th Edition, Pearson Education.

R4. David C. Lay, Linear Algebra and its Applications (3rd Edition), Pearson Education.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs, POs and PSOs

Course Outcomes (COs)		Mapped POs and PSOs
CO-1	**Define** matrix including matrix operations, inverses and determinants	PO1, PO7, PSO4
CO-2	**Find** solution of a system of linear algebraic equations using multiple methods of matrix calculus and the application of of linear systems	PO1, PO2, PSO4
CO-3	**Find** the rank and nullity of a matrix along the concept of row space, column space and null space of a matrix	PO1, PO2, PSO4
CO-4	**Extend** the knowledge of Matrix polynomial, Characteristic equation, eigenvalues and eigenvectors and use them in applications	PO1, PO4 PO7, PSO4
CO-5	**Define** real vector spaces, subspaces and develop the idea of linear independence, span and basis	PO1, PO4, PO7, PSO4
CO-6	**Define** linear transformation and its various properties	PO1, PSO4

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO 4
MTH11211	Linear Algebra	3	2	-	2	-	-	2	-	-	-	-	-	-	-	-	3

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

Model Question Paper

Name:

Enrolment No:

Name of the Program: B. Sc (Computer Science) **Semester: I**
Stream: CSE
PAPER TITLE: LINEAR ALGEBRA
PAPER CODE:MTH11211
Maximum Marks: 40 **Time duration: 3 hours**
Total No of questions: 12 **Total No of Pages: 2**

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**Define** a basis.	**R**	**CO5**
2.	**What** is symmetric matrix? Give an example.	**R**	**CO1**
3.	**Find** the rank of the matrix $A=\begin{bmatrix} 2 & 0 \\ 3 & 2 \end{bmatrix}$.	**R**	**CO3**
4.	**Find** the eigenvalues of the matrix $\begin{pmatrix} 1 & 5 \\ 9 & 0 \end{pmatrix}$.	**U**	**CO4**
5.	**Show** that the mapping $T: \mathbb{R}^3 \to \mathbb{R}^3$ is a linear mapping where $T(x,y,z) = (3x+3y, x+y+z, 0)$	**R**	**CO6**
SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**			
6.	**Find** K, such that $\begin{bmatrix} Cos\theta & -Sin\theta & 0 \\ Sin\theta & Cos\theta & 0 \\ 0 & 0 & K \end{bmatrix}$ is orthogonal.	**R**	**CO1**
7.	**Show** that the eigen vectors corresponding to two distinct eigen values of a real symmetric matrix are orthogonal.	**U**	**CO4**
8.	**Find** A^{-1}. using Caylay-Hamilton theorem for the matrix $A=\begin{bmatrix} 2 & 0 \\ 3 & 2 \end{bmatrix}$.	**U**	**CO4**
9.	**Show** that $\{(1,2,3), (1,0,0), (-1,0,1)\}$ is a basis of $\mathbb{R}^3$.	**R**	**CO5**
SECTION C (Answer Any Two Questions) (2 x 10 = 20)			

10.	**Find** the inverse of the matrix $A=\begin{bmatrix}3 & 1 & 1\\ 4 & 2 & -1\\ 7 & 3 & 1\end{bmatrix}$ by row transformation.	**R**	**CO1**
11.	a) **Show** that for any two square matrices A and B, $adj(AB)=adj(B)adj(A)$. b) If the roots of the equation $x^3+qx+r=0$ are in A.P., then **Show** that the rank of the matrix $\begin{bmatrix}\alpha & \beta & \gamma\\ \beta & \gamma & \alpha\\ \gamma & \alpha & \beta\end{bmatrix}$ is 2. (4+6)	**R** **R**	**CO1** **CO3**
12.	a) If λ is an eigen value of a non singular matrix A, then **show** that λ^{-1} is an eigen value of A^{-1}. b) If possible, **find** the solution the following system of equations: $x+2y+z=0$ $2x+y+3z=0$ $2x+4y+2z=0$. (4+6)	**U** **R**	**CO4** **CO2**

CSE11302	Computer Organization	L	T	P	C
Version 1.0	Contact hours -60	3	1	0	4
Prerequisites/Exposure	Digital Electronics, Microprocessor				
Co-requisites	Programming Concepts				

Course Objectives:

1. To study the basic organization and architecture of digital computers (CPU, memory, I/O, software).
2. To discuss digital logic and microprogramming.
3. to better understanding and utilization of digital computers, and can be used in the design and application of computer systems or as foundation for more advanced computer-related studies.

Course Outcomes

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

CO1. **Define** functional block of a computer and relate data representation.
CO2. **Explain** and understand memory hierarchy design, memory access time formula, performance improvement techniques, and trade-offs.
CO3. **Illustrate** pipelined execution, parallel processing and principles of scalable performances.
CO4. **Analyze** the concepts of memory utilization in a computer system.
CO5. **Define** the implementation of parallel processors and Analyze the synchronization techniques

Catalog Description:

The architecture of computer systems and associated software. Topics include addressing modes, interrupt systems, input/output systems, external memory systems, assemblers, loaders, multiprogramming, performance evaluation, and data security.

Course Content:

Unit I: 07 lecture hours

Basic Structure of Computers (Qualitative Discussion):

Computer Types, Basic Functional Units, Basic Operational Concept, Bus Structure, Software, Performance, Multiprocessor and Multicomputer, IAS Computer, Historical perspectives.

Unit II: 07 lecture hours

IRegister Transfer and Micro-operation:

Register Transfer Language, Register Transfer, Bus and Memory Transfers, Three State Bus Buffers, memory Transfer, Arithmetic and Logical micro-operations, Shift and Arithmetic shifts.

Unit III: 09 lecture hours

Basic Computer Organization and Design:

Instruction Codes, Stored Program Organization, Indirect Address, Computer Registers, Common Bus System, Computer Instruction, Timing and Control, Instruction Cycle, fetch Decode, Register Reference Instructions, Memory Reference Instruction, Input-Output and Interrupt, Design of Basic Computer, Design of Accumulator Logic.

Unit IV: 09 lecture hours

CPU Organization: Arithmetic and Logic Unit (ALU)- Combinational ALU, 2'S Complement Addition, Subtraction Unit, Booths Algorithm for Multiplication, Division Hardware using Restoration Division Algorithm. General register organization, Control Word, Accumulator Based, Register Based, Stack Type CPU organization.

Unit V: **28 lecture hours**

Control Unit: Hardwired Control Unit, Micro-programmed Control Unit: Control memory, Address Sequencing, conditional branching, mapping of instructions, subroutine, Design of Control Unit

CPU Registers: Program Counter, Stack Pointer Register, Memory Address Register, Instruction Register, Memory Buffer Register, Flag registers, Temporary Registers.

Instructions: Operational Code, Operands, Zero, One, Two and Three Address Instruction, Instruction Types, Addressing modes, Data Transfer and Manipulation instructions, Program control instructions.

CISC and RISC processors: Introduction, relative merits and De-merits.

Input / Output Organization: Polling, Interrupts, subroutines, Memory mapped IO, IO mapped IO, DMA, I/O Bus and Protocol, SCSI, PCI, USB, Bus Arbitration.

Text Books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

Reference Books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

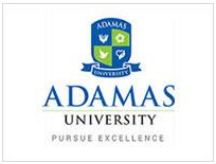
Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Define** functional block of a computer and relate data representation.	**PO1,PO2,PO3,PO12,PSO1,PSO2,PSO3**
CO2	**Explain** and understand memory hierarchy design, memory access time formula, performance improvement techniques, and trade-offs.	**PO1,PO2,PO3,PO12,PSO1,PSO2,PSO4**
CO3	**Illustrate** pipelined execution, parallel processing and principles of scalable performances.	**PO1,PO2,PO3,PO12,PSO1,PSO2,PSO3**
CO4	**Analyze** the concepts of memory utilization in a computer system.Define the implementation of parallel processors and Analyze the synchronization techniques	**PO1,PO2,PO3,PO12,PSO1,PSO2,PSO3**
CO5	**Define** the implementation of parallel processors and Analyze the synchronization techniques	**PO1,PO2,PO3,PO12,PSO1**

		,PSO2,PSO4

			Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs
Course Code	Course Title	Course Title	PO1	PO2	PO3	PO4	PO5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	P O 12	PSO1	PSO 2	PSO 3	PSO 4
CSE11302	Computer Organization	3	2	3	-	-	-	-	-	-	-	-	3	3	3	3	2	3

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

Model Question Paper

Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: I**
Code- CSE11302 **Stream- CSE**
Time: 03 Hrs.
Paper title– Computer Organization **Total pages- 2**
Max. Marks: 40 **Total no. of questions- 12**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks)**.** Any **Two Questions from Section C** (Each Carrying 10 Marks)**.**
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively.**

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

1.	**What** is an Instruction?	**R**	**CO1**
2.	**What** is an Instruction?	**R**	**CO1**
3.	**What** do you understand by byte addressable memory?	**R**	**CO2**
4.	**What** is a processor clock?	**R**	**CO1**
5.	**What** do you understand by RTN?	**R**	**CO1**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	Let us assume that a complete execution of a program requires the execution of 100 machine language instruction. Some instructions may be executed more than once when they are inside loop, So we can assume that the average no of steps needed to execute one basic instruction is 7, such that each and every basic step completes in 1 clock cycle. If a 10 Hz – processor is used then **calculate** time required by the processor to execute the program. What is an Interrupt? What is branching?	**C**	**CO2**
7.	**Discuss** the properties of memory hierarchy with diagram? Discuss LRU & FIFO page replacement policies with example If the memory block requests are in the order then which algorithm will	**Ap, R**	**CO2**

	result less page faults 3, 5, 2, 8, 0, 6, 3, 9, 16, 20, 17, 25, 18, 30, 24, 2, 63, 5, 82, 17, 24		
8.	**Explain** clearly, the register-indirect, the indexed and the base register with indexed addressing modes. Next, point out the exact difference between the three..	**U**	**CO3**
9.	**Draw** the schematic diagram of hardware needed to implement "shift-subtract" restoring division technique (positive integers); next, give a step by step illustration of the above division technique with dividend D = $(1000)_2$ and divisor M = (0011).	**U**	**CO2**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		
10.	**State** the algorithm designed to overcome the disadvantage of Booths multiplication algorithm along with the flowchart. Represent each and every step of the proposed algorithm for multiplying 7 and (-2).	**C**	**CO3**
11	The main memory of a system has a word length of 32-bits & is both word and byte addressable. The system has a 16 bit address bus. The lowest numbered byte in a word occupies bits 0 through 7. The byte number of lowest numbered byte in a word is the byte address for that word. Both bytes and words are numbered starting from 0. Now, **Find** the following: Byte address of the 9^{th} memory word Word address of the 9^{th} byte Word address of the word containing byte with byte address = 34 Number of words in this byte addressable memory	**C**	**CO3**
12.	**Discuss** the properties of memory hierarchy with diagram? Write a short note on Indexed & Indirect memory addressing scheme.	**C**	**CO3**

CSE12303	Computer Programming Lab	L	T	P	C
Version 1.0	Contact Hour -45	0	0	3	2
Pre-requisites/Exposure	Knowledge of C Programming Language.				
Co-requisites					

Course Objectives:

1. To introduce students to the basic knowledge of programming fundamentals of C language.
2. To impart writing skill of C programming to the students and solving problems.
3. To impart the concepts like looping, array, functions, pointers, file, structure.

Course Outcomes

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

CO1. **Understand** various Unix commands.
CO2. **Plan** how to Write, Compile and Debug program in C language
CO3. **Solve** programs connecting decision structure and loops
CO4. **Utilize** user defined functions to solve real time problems
CO5. **Develop** C programs using Pointers to access arrays, strings, functions, structures & files.
CO6.**Utilize** the knowledge of utilization of computer programming in numerical techniques solutions.

Course Description:

This course introduces basic concepts in programming language to solve numerical problems.
All the lectures will be devoted on discussions of basic theories and advanced topics, focusing on practical implementation of knowledge. Classes will be conducted by lecture as well as power point presentation, audio visual virtual lab session. The tutorials will familiarize the students with practical problem-solving techniques led by the course coordinator. Students will strongly grab the basic concepts of the subject via exercise and discussions with the course coordinator.

Course Content:

Experiment 1:
To be familiar with syntax and structure of C- programming and learn problem solving techniques using C language.

Experiment 2:
Implement different data types, Operators and Expressions in C.

Experiment 3:
Implement the knowledge using Decision Statements (if, if-else, if-else-if ladder, switch and GOTO)

Experiment 4:
Familiarize and usage of Loop & nested loop Statements (for, while, do-while)

Experiment 5:
Implement C program using different dimensions of Array.

Experiment 6:

Understand and develop function programming, its types and function-call.

Experiment 7:
Implement C programming with Pointer, String and Function call by reference.

Experiment 8:
Implement C programming with Structure.

Experiment 9:
Implement the concept of data files and file handling in C

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

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
Weightage (%)	**50**	**50**

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

Mapping between COs, POs and PSOs

Course Outcomes (COs)		Mapped POs and PSOs
CO-1	**Understand** various Unix commands.	**PO1, PSO3**
CO-2	**Plan** how to Write, Compile and Debug program in C language	**PO1, PO2, PO3, PSO2**
CO-3	**Solve** programs connecting decision structure and loops	**PO1, PO2, PO3, PSO3**
CO-4	**Utilize** user defined functions to solve real time problems	**PO1, PO2, PO3, PO4, PSO2**
CO-5	**Develop** C programs using Pointers to access arrays, strings, functions, structures & files.	**PO1, PO2, PO3, PSO2**
CO-6	**Utilize** the knowledge of utilization of computer programming in numerical techniques solutions.	**PO1, PO2, PO3, PO4 PSO2**

		Engineering knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE12303	Computer Programming Lab	3	3	3		-	-	-	-	-	-	-	-	-	3	2	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: I Stream: CSE
PAPER TITLE: Computer Programming Lab
PAPER CODE: CSE12303
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

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

Section A (Answer All the Questions) (5 x 8 = 40)			
1.	**Write** to program to **Show** how comment can be implemented to make your programs readable.	**U**	**CO2**
2.	**Build** a program to generate Fibonacci series.	**AP**	**CO3**
3.	**Develop** a program to display the following pattern. * * * * * * * * * * * * * * *	**AP**	**CO3**
4.	**Find** a procedure to calculate sum of digits of the number using Recursive Function.	**R**	**CO4**
5.	**Solve** a C Program to count number of lines in a file	**AP**	**CO5**

CSE12304	Computer Organization Lab	L	T	P	C
Version 1.0	Contact hours -45	0	0	3	2
Prerequisites/Exposure	Digital Electronics, Microprocessor				
Co-requisites	Programming Concepts				

Course Objectives

1. To study the basic organization and architecture of digital computers (CPU, memory, I/O, software).
2. To Discuss digital logic and microprogramming.
3. To better understanding and utilization of digital computers, and can be used in the design and application of computer systems or as foundation for more advanced computer-related studies.

Course Outcomes:

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

CO1 Write VHDL & Verilog programs.
CO2 Design Logic circuit & ALU

Catalog Description:

The architecture of computer systems and associated software. Topics include addressing modes, interrupt systems, input/output systems, external memory systems, assemblers, loaders, multiprogramming, performance evaluation, and data security.

Course Content:

Experiments:

1. Construct an Arithmetic Unit capable of performing 4-bit subtraction and Addition using 2's complement method. Use Parallel Adders and other necessary logic gates.
2. Construct a logical Unit using logic gates capable of performing 4-bit, Bitwise ORing, ANDing, XORing and inversion.
3. Construct an 4-bit ALU unit which can perform the following operation; Selection Function S1 S0 0 0 Addition 0 1 Subtraction 1 0 XOR-ing 1 1 Complement
4. Construct a 2-bit Carry Look Ahead Adder using logic gates.
5. Study and Construct a 1-digit BCD/Decimal adder using parallel adders and other necessary logic gates.
5. Construct a Binary Multiplier using basic logic gates.
6. Construct a Binary Divider using basic logic gates.
7. Subtraction with 1's complement method using parallel adders and other necessary logic gates.
8. Construction of BCD Subtractor with 9'S complement method using parallel adders and logic gates.
9. Construction of BCD Subtractor with 10'S complement method using parallel adders and logic gates.
10. Binary magnitude comparators (up to 4 bits) using parallel adder and logic gates.
11. Construct a Binary 4-bit and 8-bit adder using logic gates.
12. Construct a Serial in Serial out 4-Bit register.
13. Construct a 4-Bit Universal Shift register.
14. Construct a 4 bit ring counter.
15. Construct a 4 - Bit Johnson Counter.
16. Construct RAM (4-bit) and extend it
17. Horizontal and Vertical Cascading of Memory modules.
18. Code converters using memory modules.

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

Components	Continuous Evaluation	End Semester Examination
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	**Write** VHDL & Verilog programs.	**PO1,PO3,PSO1**
CO2	**Design** Logic circuit & ALU .	**PO5,PO12,PSO2,PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE12304	Computer Organization Lab	3	-	3	-	3	-	-	-	-	-	-	3	3	3	3	-

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

Model Question Paper

Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: I**
Code- CSE12304
Paper title– Computer Organization lab **Total pages- 1**
Max. Marks: 40 **Total no. of questions- 5**

Instructions:
Attempt Any two Questions**.**
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively.**

Section A (Answer All the Questions) (5 x 8 = 40)

1.	**Construct** a Binary Multiplier using basic logic gates.	**C**	**CO1, CO2**
2.	**Construct** a Binary Divider using basic logic gates.	**C**	**CO1, CO2**
3.	**Construct** a Binary 4-bit and 8-bit adder using logic gates.	**C**	**CO1, CO2**
4.	**Construct** a Serial in Serial out 4-Bit register.	**C**	**CO1, CO2**
5.	**Construct** a 4-Bit Universal Shift register.	**C**	**CO1, CO2**

MTH11518	DISCRETE MATHEMATICS	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	12th level Mathematics				
Co-requisites	--				

Course Objectives:

1. To develop an in-depth understanding of the algebraic structures like group, ring and field, combinatorics, generating function, Recurrence relation, Graphs and Trees, mathematical logic.
2. Students should be able to demonstrate application using the above mathematical tools in com puter science related courses.

Course Outcomes:

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

CO1. **Define** the fundamental knowledge to state the mathematical skills in Discrete Structure & Logic and allied fields.
CO2. **Define** the fundamental knowledge to state the mathematical skills in basic and advance algebraic structures.
CO3. **Demonstrate** basic concepts of combinatory including generating functions.
CO4. **Develop** the advance concept of graph theory in various mathematical fields.

Course Description:

For any program related to Computer Science Discrete study of Mathematics is very much important. The purpose of this course is to understand and use (abstract) discrete structures and advance algebraic structure that are backbones of computer science. In particular, this course is meant to introduce logic, proofs, sets, relations, functions, counting, recurrence relation and graphs, with an emphasis on applications in computer science.

Course Content:

Unit I: [14 lecture hours]

Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products, Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a function, Sum and Product of Functions, Injective, Surjective and Bijective functions, Composition of Functions, Inverse of functions.

Propositional Logic: Syntax, Semantics, Validity and Satisfiability, Basic Connectives and Truth Tables, Logical Equivalence: The Laws of Logic, Logical Implication, Rules of Inference.

Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency. Principles of Mathematical Induction: The Well-Ordering Principle, Recursive Definitions and Inductive proofs.

Unit II: [16 lecture hours]

Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.

The Division algorithm: Prime Numbers, The Greatest Common Divisor: Euclidean Algorithm, The Fundamental Theorem of Arithmetic.

Advanced Counting Techniques: Recurrence relations and their solutions, Divide and Conquer Relations, Generating Functions, Inclusion-Exclusion Principle.

Basics of Counting, Pigeonhole Principle, Permutations and Combinations, Discrete Probability, Generalized Permutations and Combinations, Generating Permutations.

Unit III: **[15 lecture hours]**

Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semigroups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups, Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields, Boolean Algebra, Boolean Expression and Boolean Function, Identities of Boolean Algebra, Duality. Boolean Ring

Unit IV: **[15 lecture hours]**

Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path, Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Shortest Path Problems, Graph Colouring, Colouring maps and Planar Graphs, Colouring Vertices, Colouring Edges, List Colouring, Perfect Graph, Rooted trees, trees and sorting, weighted trees and prefix codes, Bi-connected component and Articulation Points, Spanning trees and Minimum Spanning Trees.

Text Books:

T1. Kenneth H. Rosen,Discrete Mathematics and its Applications, Tata McGraw - Hill.
T2. V Somasundaram, Discrete Mathematics with Graph Theory and Combinatory, Tata McGraw- Hill.

Reference Books:

R1. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press.
R2. Discrete Mathematics for Computer Science", Illustrated Edition, Kenneth Bogart, Clifford Stein, Robert L. Drysdale, Key College Publishing.

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

Examination Scheme:

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

Course Outcomes (COs)		Mapped POs and PSOs
CO-1	**Define** the fundamental knowledge to state the mathematical skills in Discrete Structure &Logic and allied fields.	**PO1,PO2,PSO2**
CO-2	**Define** the fundamental knowledge to state the mathematical skills in basic and advance algebraic structures.	**PO1,PO2,PO5, PSO1**
CO-3	**Demonstrate** basic concepts of combinatory including generating functions.	**PO1,PO2, PO4,PSO1,PSO 2**
CO-4	**Develop** the advance concept of graph theory in various mathematical fields.	**PO1,PO2,PO5, PSO2**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful	Competence to use research, experiment, contemporary issues to solve industrial problems	Envisage and work on laboratory and multi- disciplinary tasks in computer science	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
MTH11518	Discrete Mathematics	3	3	-	2	2	-	-	-	-	-	-	-	2	3	-	-

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

Model Question Paper

Name: **Enrolment No:**			
Course: MTH11518 Discrete Mathematics **Program: B.Sc. (Computer Science)** **Time: 03 Hrs.** **Semester: II** **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.	**Show** that $r \vee s$ is a valid conclusion from the premises: $p \vee q, p \vee q \rightarrow \sim w, \sim w \rightarrow (u \wedge \sim v)$ & $(u \wedge \sim v) \rightarrow (r \vee s)$. (R)	**4**	**CO1**
2.	**Show** that $(R-\{1\},*)$ is an abelian group, where the binary operation " * "is defined as $\forall a,b \in R-\{1\}, a*b = a+b-ab$.(R)	**4**	**CO2**
3.	A computer company receives 50 applicants for the job of programmers. Among them 30 knew ORACLE and 28 knew JAVA and 8 did not know any of the language. **How** many of them knew both the language? (U)	**4**	**CO3**
4.	**Show** that a graph is a tree if and only if it is minimally connected. (AP)	**4**	**CO4**
SECTION B (Attempt any **Two Questions)**			
5.	i) **Show** that the cube roots of unity forms an abelian group under complex multiplication. (R) ii) Using the generating function, **find** $1^2 + 2^2 + \cdots + r^2$. (U)	**5+5**	**CO2** **CO3**
6.	**i) What** is the validity of the argument: If I pass B.Tech with high YGPA, I will be assured of a good job. If I am assured of a good job then my father will be happy. My father is not happy. Therefore I do not pass with high YGPA. (R) ii) **Show** that the following mathematical statement P(n) : $\frac{1}{1\cdot 2} + \frac{1}{2\cdot 3} + \frac{1}{3\cdot 4} + \ldots + \frac{1}{n\cdot(n+1)} = \frac{1}{n+1}$ is true by principle of mathematical induction. (R)	**4** **6**	**CO1** **CO2**
7.	i) **Find** the CNF of $\sim(p \vee q) \leftrightarrow (p \wedge q)$, without using truth table. (R) ii) **Classify** the coefficient of x^9 in $(1 + x^3 + x^8)^{10}$. (U)	**4** **6**	**CO1** **CO3**
	SECTION C is Compulsory		
8.	**Apply** graph theory to show that a graph is disconnected if and only if its vertex set is partitioned into two non empty disjoint subsets V_1 and V_2 such that there exists no edge in G whose one end vertex in V_1 and another is in V_2 . (AP)	**8**	**CO4**

SDS11502	Probability & Statistics	L	T	P	C
Version 1.0	Contact hours-60	3	1	0	4
Pre-requisites/Exposure	12th level Mathematics and basic statistics				
Co-requisites	--				

Course Objectives

To provide the students with a background knowledge to understand and analyze different chance phenomena arising in different spheres of life and work and to become confidant using statistical techniques for making decisions.

Course Outcomes

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

CO1. Define different measurements of statistical data and fit a polynomial using least square method.
CO2. Classify classical, statistical and axiomatic definition of probability and use Bay's theorem to measure happening of an event.
CO3. Compare discrete distribution and continuous distribution of random variables with their fundamental properties.
CO4. Explain sampling distribution and estimation of population parameters.
CO5. Make use of test of hypothesis for a meaningful decision on population parameters.
CO6. Illustrate relationship between random variables using correlation and regression method.

Catalog Description

This course introduces basic concepts and techniques of probability and statistical theory. It emphasizes the intuitive logic that underlie the theory and techniques, and valid interpretation of the results obtained using the techniques.
This course contains probability distribution of discrete and continuous random variables, different measures to obtain the nature of statistical data, sampling techniques and test of hypothesis, correlation and regression.
All the lectures will be devoted on discussions of basic theories and advanced topics, focusing on practical implementation of knowledge. Classes will be conducted by lecture as well as power point presentation, audio visual virtual lab session as per requirement. The tutorials will familiarize the students with practical problem-solving techniques led by the course coordinator. Students will strongly grab the basic concepts of the subject via exercise and discussions with the coordinator.

Course Content:

Unit I: **[16 Lecture Hours]**

Measures of location (or central tendency) and dispersion, moments, measures of skewness and kurtosis, bivariate data: Scatter diagram, principle of least-square and fitting of polynomials and exponential curves.

Unit II: **[18 Lecture Hours]**

Probability: Introduction, Probability of an event, additive rule and multiplication rule, conditional probability, total probability theorem, Bayes' rule and applications in engineering.

Probability Distributions: Random variable, discrete and continuous probability distribution, joint probability distribution, mathematical expectation, variance and co-variance of random variables, mean and co-variance of linear combination of random variables, Binomial, Hyper-geometric, Geometric, Poisson distribution, Uniform, Normal, Exponential Distribution, and its applications in engineering.

Unit III: Sampling Distribution: [16 Lecture Hours]

Sampling distribution of S^2, t- distribution, F-distribution.

Estimation of parameter: Methods of estimation, estimating the mean of a single sample, standard error, prediction interval, tolerance limits, estimating proportion and variance of a single sample, and maximum likelihood estimation.

Test of Hypothesis: one and two tailed test, test on a single mean when variance is known and variance is unknown, test on two means, test on a single mean population and test on two populations, χ^2-Test for goodness of fit and test for independence.

Unit IV: Correlation and Regression: [10 Lecture Hours]

Introduction to correlation analysis, Karl Pearson correlation coefficient, rank correlation, regression analysis, fitting straight lines, regression coefficients, properties of regression coefficients and applications.

Text Books:

T1. Ronald E. **Walpole**, Raymond H. Myers, Sharon L. Myers & Keying Ye, "*Probability & Statistics for Engineers & Scientists*", Eighth Edition, 2007, Pearson Education Inc., New Delhi.

T2. C.B. Gupta, S R Singh, Mukesh Kumar, Engineering Mathematics for Semester III and IV, Mc Graw Hill.

Reference Books:

R1. E. Kreyszig," Advanced Engineering Mathematics:, Eighth Edition, Wiley India

R2. Advanced Engineering Mathematics by H K Das ,S Chand

R3. Advanced Engineering Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.

R4. Dr. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs, POs and PSOs

Course Outcomes (COs)		Mapped POs and PSOs
CO-1	**Define** different measurements of statistical data and fit a polynomial using least square method.	**PO1, PSO2**
CO-2	**Classify** classical, statistical and axiomatic definition of probability and use Bay's theorem to measure happening of an event.	**PO1, PO2**
CO-3	**Compare** discrete distribution and continuous distribution of random variables with their fundamental properties.	**PO1, PO3, PO2**
CO-4	**Explain** sampling distribution and estimation of population parameters.	**PO1, PO4**
CO-5	**Make use of** test of hypothesis for a meaningful decision on population parameters.	**PO1, PO3, PO4, PSO2**
CO-6	**Illustrate** relationship between random variables using correlation and regression method.	**PO1**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career,	Competence to use research, experiment, contemporary issues to solve	Envisage and work on laboratory and multi- disciplinary tasks in computer science	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
SDS11502	Probability & Statistics	3	2	2	2	-	-	-	-	-	-	-	-	-	2	-	-

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

Model Question Paper

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

Course: Probability & Statistics
Program: B.Sc. (Computer Science)
Course Code: SDS11502 **Time: 03 Hrs.**
Semester: II **Max. Marks: 40**

Instructions:
Attempt any three questions from **Section A** (each carrying 4 marks); any **Two Questions** from **Section B** (each carrying 8 marks)**. Section C** is Compulsory (carrying 12 marks)**.**

	Section A (Attempt **any Three)**		
1.	The profits y of certain company in xth year of its life are given by x: 1 2 3 4 5 y: 2.18 2.44 2.78 3.25 3.83 **Find** profit of the company in 8th year. (R)	**4**	**CO1**
2.	A speaks the truth 3 out of 4 times and B 7 times out of 10. They agree in their statement that from a bag containing 6 balls of different colors, a white ball has been drawn. **Find** the probability that the statement is true. (U)	**4**	**CO2**
3.	The distribution function F(x) of a random variate X is defined as follows $F(x) = \begin{cases} A, & -\infty < x < -1 \\ B, & -1 \le x < 0 \\ C, & 0 \le x > 2 \\ D, & 2 \le x < \infty \end{cases}$ **Find** the value of the constants A, B, C, D given that $P(X = 0) = \frac{1}{6}$ and $(X > 1) = \frac{2}{3}$. (U)	**4**	**CO3**
4.	**Explain** any two different methods of sampling. (U)	**4**	**CO4**
5.	**Show** that the rank correlation coefficient for the following data is 0.7: A B C D E F G Judge I: 2 1 4 5 3 7 6 Judge II: 3 4 2 5 1 6 7 (U)	**4**	**CO6**
	SECTION B (Attempt any **Two Questions)**		
5.	Suppose you are working with a data set(X) that is normally distributed with mean(μ)as 200 and standard deviation (σ) as 47. Then **find** the following (i) the value of x for which 60% of the values are greater than x.	**8**	**CO3**

	(ii) $P(X \leq 250)$. (iii) How much percentage of the data is in the interval$[175,225]$? (U)		
6.	**Find** the maximum likelihood estimator of mean and variance of a normal population. (U)	**8**	**CO4**
7.	10 individuals are chosen at random from a population and their heights are found to be (in inches) 63, 63, 64, 65, 66, 69, 69, 70, 70, 71. **Construct** the model to discuss the suggestion that the mean height in the universe is 65 inches. Given that $t_{9,0.05} = 2.262$. (AP)	**8**	**CO5**
	SECTION C is Compulsory		
8.	a) If a random variable X follows normal distribution such that $P(9.6 \leq X \leq 13.8) = 0.7008$ and $P(X \geq 9.6) = 0.8159$ where $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{0.9} e^{-\frac{t^2}{2}}dt = 0.8159$, $\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{1.2} e^{-\frac{t^2}{2}}dt = 0.8849$, **find** mean and variance of X. (U) b)The following table gives the numbers of aircraft accidents that occurred during the various days of the week. **Identify** whether the accidents are uniformly distributed over the week. Given, $\chi^2_{5,0.05} = 11.07$ (AP) Day | Sun | Mon | Tue | Wed | Thu | Fri | Sat | Total No. of accidents | 14 | 16 | 8 | 12 | 11 | 9 | 14 | 84	**8** **4**	**CO3** **CO5**

EVS11108	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

- **CO1** **Distinguish** between various types of ecosystems, ecosystem dynamics, perceive and appreciate the surrounding nature.
- **CO2** **Evaluate** the intrinsic relation between humans and environment, our position in the ecosystem around us, and importance of biodiversity.
- **CO3** **Comprehend** the presence of various pollutants, their significance, and impacts, and develop the underlying concepts involved in various air pollution prevention and mitigation measures.
- **CO4** **Understand** the basic science which can explain the phenomena occurring around us.
- **CO5** **Develop** the in-depth knowledge about natural resources including energy resource.
- **CO6** **Understand** 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 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 about 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, importance of waste minimization.

Course Content:

Module 1: **06 Lecture Hours**

Basics of Environmental Sciences: Definition, Scope and objectives, classification of environment, interrelationship between the components, ecology and ecosystem, structural and functional component of ecosystem, energy flow in an ecosystem, biogeochemical cycles, human impact on the environment, The IPAT equation, Ecological foot print, ecology and environment, ecosystem concept, energy flow in an ecosystem

Module 2: **08 Lecture Hours**

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 Collector – Solar direct Thermal Application– Fundamentals of Solar Photo Voltaic Conversion- advantages and disadvantages of Solar Power generation, Wind Energy: site selection, Wind turbine: basic working principle and types, advantages and disadvantages of Wind Power generation, Hydroelectric power : How it is generated, advantages and disadvantages, Biomass energy: various types, generations of biofuel, Biogas, Geothermal Energy: source, advantages and disadvantages

Module 3: **06 Lecture Hours**

Air pollution and control: Classification of air pollutants, Criteria air pollutants and their impacts, Major global impacts of air pollution on man: Global warming, Ozone layer depletion, Acid rain; Air quality standards, Air pollution control methods

Module 4: **06 Lecture Hours**

Water pollution fundamentals and control strategies: Water quality: physical, chemical and biological characteristics, drinking water quality standard, effluent water quality, waste water sources and constituents, waste water treatment: preliminary treatment, primary treatment, secondary treatment, activated sludge process, lagoons, trickling filters, rotating biological contractor

Module 5: **04 Lecture Hours**

Solid waste management: 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. Hazardous Wastes Management and Handling Rules, 1989

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

Reference Books:

1 "Introduction to Environmental Engineering and Science", by Masters, G.M., Prentice Hall of India, Second Indian Reprint.
2 "Wastewater Engineering: Treatment and Reuse", 4th Edition, Metcalf and Eddy, Inc. McGraw-Hill, Inc., New York, 2002

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Distinguish** between various types of ecosystems, ecosystem dynamics, perceive and appreciate the surrounding nature.	**PO3, PO4, PO9**
CO2	**Evaluate** the intrinsic relation between humans and environment, our position in the ecosystem around us, and importance of biodiversity.	**PO3, PO4, PO8**
CO3	**Comprehend** the presence of various pollutants, their significance, and impacts, and develop the underlying concepts involved in various air pollution prevention and mitigation measures.	**PO6,PO7**
CO4	**Understand** the basic science which can explain the phenomena occurring around us.	**PO7, PO9**
CO5	**Develop** the in-depth knowledge about natural resources including energy resource.	**PO7, PO8, PSO4**
CO6	**Understand** the legal framework in our country for safeguarding the environment including pollution prevention, control, management, and wildlife management.	**PO6, PO8, PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
EVS11108	Environmental Science	-	-	2	2	-	2	3	3	2	-	-	-	-	-	-	2

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

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

Name of the Program: BSc (Computer Science) Semester II | Stream: CSE
PAPER TITLE: Environmental Science | PAPER CODE: EVS11108
Maximum Marks: 40 | 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, and 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)**		
6..	**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**
7..	**What** is electrostatic precipitator? **What** are the advantages of electrostatic precipitator? (2.5+2.5 = 5)	**U**	**CO3**
8.	**Describe** the distribution of water resources.	**R**	**CO5**
9.	**Draw** a simple flowchart describing the steps that are followed in an EIA process in India.	**R**	**CO6**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	**How** is photochemical smog formed? **What** are effects of photochemical smog? **Discuss** the factors affecting photochemical smog? (4+3+3=10)	**U**	**CO4**
11.	**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	**Ap**	**CO3**

	is flowing with saturated DO concentration of 9.2 mg/L. Saturated DO at 15°C is 10.2 mg/L. At 20°C, deoxygenation constant (k^1) is estimated to be 0.3 per day and reaeration constant (k^2) is 0.7 per day. Determine the critical oxygen deficit and its location. Also estimate the 20°C BOD_5 of a sample taken at the critical point. Use the temperature coefficients of 1.135 for k^1 and 1.024 for k^2. ((2+2+6=10)		
12.	What is hazardous waste? Discuss the methods of hazardous waste management? What is composting? (2+6+2=10)	**An**	**CO3**

CSE11305	DATA STRUCTURES	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Basic concept of programming				
Co-requisites	--				

Course Objectives:

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

Course Outcomes:

On completion of this course, the students 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

Catalog Description:

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

Course Content:

Unit I: **10 lecture hours**

Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off.
Arrays: Array Definition; Different array operations; Algorithms for various operations and Complexity Analysis,
Searching: Linear Search and Binary Search Techniques and their complexity analysis.

Unit II: **14 lecture hours**

Stacks and Queues: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation Drop off; Navigation; Range;

Dual Stack – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis.

Unit III: **10 lecture hours**

Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: Sentinel List all operations their algorithms and the complexity analysis.

Unit IV: **14 lecture hours**

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis.
Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.

Unit V: **12 lecture hours**

Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort and Updated Selection Sort, Bubble Sort and Extended Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing.

Text Books:

1. Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, SartajSahni and Computer Science Press.
2. "Introduction To Algorithms", 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	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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, PO2, PO3, PSO1, PSO3**
CO2	**Illustrate** advantages and disadvantages of specific algorithms and data structures.	**PO2, PO3, PSO1**
CO3	**Solve** bugs in program, recognize needed basic operations with data structures.	**PO1, PO2, PO4 PSO1, PSO2**
CO4	**Interpret** algorithms and data structures in terms of time and memory complexity of basic operations.	**PO3, PSO1, PSO3**
CO5	**Compare** the computational efficiency of the principal algorithms for sorting, searching, and hashing.	**PO3, PSO1, PO4 PSO2, PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE1305	DATA STRUCTURES	2	3	3	2	-	-	-	-	-	-	-	-	3	2	3	-

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

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

Name of the Program: BSc (Computer Science) Semester: II Stream: CSE
PAPER TITLE: Data Structures PAPER CODE: CSE11305
Maximum Marks: 40 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.	**What** are the characteristics of an Algorithm?	**R**	**CO1**
2.	**What** are elementary data representation? Also explain classification of data structure.	**R**	**CO1**
3.	**What** are the type of complexities?	**R**	**CO4**
4.	**What** will be the address of 5^{th} element in a floating-point array representation? The array is specified as Percentage [16]. The base address of the array is 1058.	**R**	**CO1**
5.	**Construct** an AVL tree with five arbitrary elements.	**Ap**	**CO2**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	a) **Explain** row major and column major representation of an array? b) **Develop** an algorithm to delete element from a QUEUE. **[2 + 3]**	**U**	**CO1**
7.	a) **What** is the difference between iteration and recursion? How dynamic runtime array can be created. b) **Develop** an algorithm to convert and infix expression to its prefix expression. **[2 + 3]**	**R, Ap**	**CO1, CO3**
8.	a) **Define** Ø with suitable graph and example. b) **Solve** the postfix expression 5 2 * 3 4 + 5 2 * * + using stack. **[2 + 3]**	**R, Ap**	**CO4, CO3**
9.	**Prove** that for any nonempty binary tree, if n_0 represent the number of leaf nodes and n_2 be the number of nodes of degree 2, then $n_0 = n_2 + 1$.	**Eva**	**CO3**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	i) **Build** a C function to implement pop operation in a stack by using an array. ii) **Build** a C function to insert an element into a linear queue by using a singly linked list. iii) **Find** an equivalent infix expression of the following postfix expression by using stack:	**Ap, Ap, R**	**CO3**

	A B + C * D E - - F G + ^ **[3 + 3 + 4]**		
11.	i) **Construct** the binary tree whose in-order and pre-order traversal sequence of nodes are given below: In-order: E A C K F H D B G Pre-order: F A E K C D H G B ii) **Build** a recursive C function to insert an element in a binary search tree. iii**) Prove** that the number of odd degree vertices in a graph is always even. **[4 + 3 + 3]**	**Ap, Ap, Eva**	**CO3,CO4**
12.	i) **Build** an AVL tree with the following keys in the order given below: I, J, K, C, B, F, D, G, E Clearly mention different rotations used and balance factor of each node. ii) **Construct** a B-Tree of order 3 from the following lists of data items: 42, 12, 30, 32, 10, 16, 20, 22, 34, 36, 38, 14, 24, 28 **[5 + 5]**	**Ap, Ap**	**CO2, CO3**

CSE11306	PROGRAMMING IN JAVA	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Basic concept of programming				
Co-requisites	--				

Course Objectives:

1. To motivate students to solve the problems in engineering using the concepts of object-oriented programming.

Course Outcomes:

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

CO1. **Define** Abstraction in all forms and in a holistic way
CO2. **Illustrate** object-oriented modelling techniques like classes and Instances modelling techniques
CO3. **Solve** programs using standard design patterns
CO4. **Interpret** fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
CO5. **Construct** programming solutions with exception handling and multi-threading concept
CO6. **Solve** GUI program with proper event handling techniques

Catalog Description:

This course investigates object-oriented methods including object-oriented programming methodologies and techniques. Current methodology is emphasized. The use of object-oriented features such as encapsulation, information hiding, inheritance and polymorphism is reinforced by class assignments and programming exercises. The importance of multi-threading and exception handling is introduced in this course.

Course Content:

Unit I: **12 lecture hours**

OOP Concepts - Data Abstraction, Encapsulation, Inheritance, Benefits of Inheritance, Polymorphism, Classes and Objects, Procedural and OOP Paradigms. Introduction To Java, Data Types, Variables & Constants, Scope & Life Time Of Variables, Precedence Of Operator, Expressions, Type Casting, Enumerated Types, Block Scope, Control Flow, Conditional Statements, Loops, Break & Continue Statements, Arrays, Console Input/Output, Formatting Output, Constructors Methods, Parameter Passing, Static Fields & Methods, Access Control, "This" Reference, Method Overloading, Recursion, Garbage Collection, Building Strings, String Class.

Unit II: **14 lecture hours**

Inheritance - Hierarchical Inheritance: Super And Sub Classes, Member Accessing Rules, Super Keyword, And Preventing Inheritance: Final Classes And Methods, Object Class And Its Methods.

Polymorphism - Dynamic Binding, Method Overriding, Abstract Classes and Methods

Interfaces - Interfaces and Abstract Classes, Definition, Implementation, Accessing Implementations by Interface References, Extending Interfaces.

Inner Classes - Usage, Local, Anonymous and Static Inner Classes, Examples.

Packages - Definition, Creation And Accessing A Package, Understanding CLASSPATH, Importing Packages.

Unit III: 12 lecture hours

Exception Handling - Dealing With Errors, Advantages Of Exception Handling, The Classification - Exception Hierarchy, Checked And Unchecked Exceptions, Try, Catch, Throw, Throws And Finally, Exceptions-Throwing, Exception Specification, Built In Exceptions, Creating Exception Sub Classes.

Multithreading - Difference Between Multiple Processes And Multiple Threads, Thread States, Creating And Interrupting Threads, Thread Priorities, Synchronizing Threads, Inter-Thread Communication, Procedure Consumer Pattern.

Unit IV: 10 lecture hours

Collection Framework - Introduction, Generics and Common Use Of Collection Classes, Array List, Vector, Hash Table, Stack, Enumeration, Iterator, String Tokenizer, Random, Scanner, Calendars And Properties.

Files - Streams - Byte Streams, Character Streams, Text Input/Output, Binary Input/Output, Random Access of File Operations, File Management.

Connecting To Database – JDBC / ODBC Type 1 To 4 Drivers, Connection And Handling Databases With JDBC.

Unit V: 12 lecture hours

GUI Programming - The AWT Class Hierarchy, Introduction To Swing, Swing Vs, AWT, Hierarchy Of Swing Components, Containers - Jframe, Japplet, Jdialog, Jpanel, Overview Of Swing Components: Jbutton, Jlabel, Jtextfield, Jtextarea, Swing Applications, Layout Management - Types - Border, Grid And Flow

Event Handling - Events, Sources, Classes, Listeners, Event Sources and Listeners, Delegation Event Model, Examples. Handling Mouse Events, Adapter Classes.

Applets - Inheritance Hierarchy For Applets, Differences Between Applets And Applications, Life Cycle, Passing Parameters To Applets, Applet Security Issues.

Text Books:

1. “Java Fundamentals - A Comprehensive Introduction”, Illustrated Edition By Daleskrien, Herbert Schildt, Mcgraw-Hill Education.

Reference Books:

1. “Java For Programmers”, 2nd Edition By Paul Deitel And Harvey Deitel, Pearson Education.
2. “Thinking In Java”, Low Price Edition By Bruce Eckel, Pearson Education

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

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	**30**	**20**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO-1	**Define** Abstraction in all forms and in a holistic way	**PO1, PO4, PSO1**
CO-2	**Illustrate** object oriented modelling techniques like classes and Instances modelling techniques	**PO1, PO2, PO3, PSO1, PS03**
CO-3	**Solve** programs using standard design patterns	**PO1, PO2, PO3, PSO1, PS04**
CO-4	**Interpret** fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.	**PO1, PO2, PO4, PSO1**
CO-5	**Construct** programming solutions with exception handling and multi-threading concept	**PO1, PO2, PO3, PSO1, PSO3, PSO4**
CO-6	**Solve** GUI program with proper event handling techniques	**PO1, PO2, PO3, PSO1, PSO3, PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11306	PROGRAMMING IN JAVA	3	3	3	2	-	-	-	-	-	-	-	-	3	-	3	3

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

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

Name of the Program: B. Sc (Computer Science) Semester: II Stream: CSE
PAPER TITLE: Programming in Java PAPER CODE: CSE11306
Maximum Marks: 40 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, and 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.	**What** is the difference between suspending and stopping a thread?	**R**	**CO5**
2.	**Compare** between init ( ) and start ( ) methods?	**U**	**CO4**
3.	**Name** some of the most common types of exceptions that might occur in java.	**R**	**CO5**
4.	**Tell** the name of various sections of a web page.	**R**	**CO6**
5.	**Explain** the arguments used in the method drawRoundRect ( ).	**U**	**CO6**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	a) **Define** constructor with a suitable example. b) **Develop** a java program to implement the concept of nesting of methods. **[2 + 3]**	**R, Ap**	**CO3, CO4**
7.	a) **What** is method overloading? b) **Develop** a java program to implement the concept of method overloading. **[2 + 3]**	**R, Ap**	**CO3, CO4**
8.	a) **What** is multiple inheritance? b) **Develop** a java program to implement the concept of multiple inheritance. **[2 + 3]**	**R, Ap**	**CO3, CO4**
9.	a) **What** do you mean by exception handling mechanism? b) **Develop** a java program to implement the concept of method overriding. **[2 + 3]**	**R, Ap**	**CO3, CO4**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	i) **Define** an exception called "NoMatchException" that is thrown when a string is not equal to "India". Write a java program that uses this exception. ii) **Why** do applet classes need to be declared as public. iii) **Illustrate** the different stages in the life cycle of a thread with a suitable block diagram. **[4 + 2 + 4]**	**R, U**	**CO1, CO5,CO6**

11.	i) **Illustrate** the three ways of drawing polygons. ii) **Build** an applet to draw a circle inside a square. iii) **Explain** the three different ways by which a running thread may relinquish its control to another thread. **[3 + 4 + 3]**	**U, Ap**	**CO5,CO6**
12.	i) **Develop** a java program to use the yield ( ), stop ( ) and sleep ( ) methods of a thread. ii) **Build** an applet that receives three numeric values as input from the user and then displays the sum and average of the three on the screen. Write a HTML page and test the applet. **[4 + 6]**	**Ap**	**CO5, CO6**

CSE12307	DATA STRUCTURES LAB	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Basic concept of programming language.				
Co-requisites	--				

Course Objectives:

1. To teach programming (with an emphasis on problem solving) and introduce elementary data structures.
2. The student should, at a rudimentary level, be able to prove correctness (loop invariants, conditioning, etc).

Course Outcomes

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

CO1. **Explain** asymptotic performance of the algorithms.
CO2. **Illustrate** Linear data structures and their applications such as Stacks, Queues and Linked Lists
CO3. **Solve** and understand Non-Linear Data Structures and their Applications such as Trees and Graphs
CO4. **Interpret** searching and sorting algorithms.

Course Description:

Data Structures (also called Data Structures and Algorithms in some places) is a core course in all computer science undergraduate curricula. The course is the basis for understanding several data structures and also algorithms that operate on them. The course forms the foundation for almost all computer science subjects: compilers, operating systems, databases, AI and software engineering.

Course Content:

List of Programs:

Experiments

1. Write a menu based C program to insert a node at the beginning, after a specified position, at the end of a singly linked list.
2. Write a menu based C program to delete a node from the beginning, from a specified position, from the end of a singly linked list.
3. Write a menu based C program to display the data part of the nodes in reverse order, reverse the list and sort the elements of a singly linked list.
4. Write a menu based C program to insert a node at the beginning, after a specified position, at the end of a doubly linked list.
5. Write a menu based python program to delete a node from the beginning, from a specified position, from the end of a doubly linked list.
6. Write a menu based C program to display the data part of the nodes in reverse order, reverse the list and sort the elements of a doubly linked list.
7. Write a menu based C program to insert, delete and display operation of a linear queue by using singly linked list.
8. Write a menu based C program to insert, delete and display operation of a linear queue by using an array.
9. Write a menu based C program to implement push, pop and display operation of a linear queue by using singly linked list.

10. Write a menu based C program to implement push, pop and display operation of a linear queue by using an array.
11. Write a menu based C program to implement insert, delete and display operation of a circular queue by using an array.
12. Write a menu based C program to implement insert, delete and traverse operation of a binary search tree using doubly linked list.
13. Write a menu based C program to implement linear search, binary search and interpolation search algorithm.
14. Write a menu based C program to implement bubble sort, selection sort, and quick sort, merge sort, insertion sort, heap sort and radix sort algorithm.
12. Implement Tree Traversals, BFS, Graph Traversal, Shortest path and some topics on Spanning Tree using C.

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	Continuous Evaluation	End Semester Examination
Weightage (%)	50	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO-1	**Explain** asymptotic performance of the algorithms.	**PO1, PO3, PO5, PSO2, PSO3**
CO-2	**Illustrate** Linear data structures and their applications such as Stacks, Queues and Lists	**PO1, PO2, PO3, PSO1, PSO2, PSO3**
CO-3	**Solve** and understand Non-Linear Data Structures and their Applications such as Trees and Graphs	**PO1, PO2, PO3, PSO1, PSO2, PSO3**
CO-4	**Interpret** searching and sorting algorithms.	**PO1, PO2, PO3, PO5,PSO1, PSO2, PSO3 PSO3PSO1, PSO2, PSO3**

Course Code	Course Title	PO1 Computational knowledge	PO2 Design/development of solutions	PO3 Problem analysis	PO4 The engineer and society	PO5 Conduct investigations of complex problems	PO6 Environment and sustainability	PO7 Modern tool usage	PO8 Individual and team work	PO9 Ethics	PO10 Communication	PO11 Project management and finance	PO12 Life-long learning	PSO1 Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	PSO2 Competence to use research, experiment, contemporary issues to solve industrial problems.	PSO3 Envisage and work on laboratory and multi- disciplinary tasks in computer science.	PSO4 Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
CSE12307	DATA STRUCTURES LAB	3	3	3	-	2	-	-	-	-	-	-	-	3	3	3	-

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

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

Name of the Program: B. Sc (Computer Science) Semester: II Stream: CSE
PAPER TITLE: Data Structures Lab PAPER CODE: CSE12307
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

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

Section A (Answer All the Questions) (5 x 8 = 40)			
1.	**Develop** a C program to reverse a singly linked list.	**Ap**	**CO1**
2.	**Develop** a C program to insert an element in a circular queue by using an array.	**Ap**	**CO1**
3.	**Develop** a C program to delete a node from a BST.	**Ap**	**CO3**
4.	**Develop** a C program to insert an element in a stack by using a singly linked list.	**Ap**	**CO1**
5.	**Develop** a C program to implement merge sort algorithm.	**Ap**	**CO4**

CSE12308	PROGRAMMING IN JAVA LAB	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Basic concept of programming language				
Co-requisites	--				

Course Objectives:

1. To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling, functions and object oriented approaches.

Course Outcomes:

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

CO1. **Define** classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.

CO2. **Illustrate** object oriented modelling techniques like classes and Instances modelling techniques

CO3. **Solve** programs using standard design patterns.

CO4. **Interpret** fundamentals of object-oriented programming in Java, including defining Classes, invoking methods, using class libraries, etc.

CO5. **Construct** programming solutions with exception handling and multi-threading concept

CO6. **Solve** GUI program with proper event handling techniques.

Catalog Description:

This course investigates object-oriented methods including object-oriented programming methodologies and techniques. Current methodology is emphasized. The use of object-oriented features such as encapsulation, information hiding, inheritance and polymorphism is reinforced by class assignments and programming exercises. The importance of multi-threading and exception handling is introduced in this course.

Course Content:

Experiments:

1. Assignments based on class, constructor.
2. Assignments based on overloading.
3. Assignments based on inheritance, overriding.
4. Assignments based on wrapper class, arrays.
5. Assignments based on developing interfaces- multiple inheritances, extending interfaces
6. Assignments based on creating and accessing packages

7. Assignments based on multithreaded programming
8. Assignments based on applet programming

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Illustrated Edition By Daleskrien, Herbert Schildt, Mcgraw-Hill Education.

Reference Books:

1. "Java For Programmers", 2nd Edition By Paul Deitel And Harvey Deitel, Pearson Education.
2. "Thinking In Java", Low Price Edition By Bruce Eckel, Pearson Education

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

Components	Continuous Evaluation	End Semester Examination
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO-1	**Define** classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem	**PO1, PSO1**
CO-2	**Illustrate** object oriented modelling techniques like classes and Instances modelling techniques	**PO1, PO2, PO3, PSO1, PS03**
CO-3	**Solve** programs using standard design patterns.	**PO1, PO2, PO3, PSO1, PS04**
CO-4	**Interpret** fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.	**PO1, PO2, PO5, PSO1**
CO-5	**Construct** programming solutions with exception handling and multi-threading concept	**PO1, PO2, PO3, PSO1, PSO3, PSO4**
CO-6	**Solve** GUI program with proper event handling techniques	**PO1, PO2, PO3, PSO1, PSO3, PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE12308	PROGRAMMING IN JAVA LAB	3	3	3	-	-	-	-	-	-	-	-	-	3	-	3	3

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

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

Name of the Program: B. Sc (Computer Science) Semester: II Stream: CSE
PAPER TITLE: Programming in Java Lab PAPER CODE: CSE12308
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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 8 = 40)			
1.	**Develop** a java program to implement the concept of method overloading.	**Ap**	**CO2, CO3**
2.	**Develop** a java program to implement the concept of method overriding.	**Ap**	**CO2, CO3**
3.	**Develop** a java program to implement the concept of nesting of methods.	**Ap**	**CO1, CO3**
4.	**Develop** a java program to implement multiple inheritance.	**Ap**	**CO2, CO3**
5.	**Develop** a java program to implement the concept of multithreaded programming.	**Ap**	**CO2, CO5**

CSE11309	Operating System	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Computer Organization, Basic Data structure(list, tree, graph)				
Co-requisites	High level programming Language				

Course Objectives

1. To introduce the main components of an OS & their function.
2. To develop the process management and scheduling.
3. To provide various issues in Inter Process Communication (IPC) and the role of OS in IPC.
4. To understand the concepts and implementation Memory management policies and virtual memory.
5. To develop the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS.
6. To provide the need for special purpose operating system with the advent of new emerging technologies.

Course Outcomes:

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

CO1. **Describe** and explain the fundamental components of a computer operating system.
CO2. **Define**, restate, discuss, and explain the policies for scheduling, deadlocks, memory Management, synchronization, system calls, and file systems.
CO3. **Evaluate** the requirement for process synchronization and coordination handled by operating system.
CO4. **Design** and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems.
CO5. **Identify** use and evaluate the storage management policies with respect to different storage management technologies. 6. Identify the need to create the special purpose operating system.
CO6. **Identify** the need to create the special purpose operating system.

Catalog Description:

This course will introduce the core concept of operating system such as system abstractions, mechanisms, and their implementations. The core of the course contains concurrent programming (threads and synchronization), inter process communication, and an introduction to distributed operating systems. The course is split into four sections: (1) Introduction, (2) Process and Thread Management, (3) Resource Management and Memory Management, and (4) I/O hardware and File Management. The course will consist of assigned reading, weekly lectures, a midterm and final term exam, and a sequence of programming assignments. The goal of the readings and lectures is to introduce the core concepts. The goal of the programming assignments is to give students some exposure to operating system code. Students are expected to read the assigned materials prior to each class, and to participate in in-class discussions.

Course Content:

Unit I: 08 lecture hours

Introduction: Concept of Operating Systems, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Monolithic, Microkernel Operating Systems, Concept of Virtual Machine. Case study on UNIX and WINDOWS Operating System

Unit II: 16 lecture hours

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads,

Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling: Types and performance evaluation..

Unit III: 07 lecture hours

Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Strict Alternation , Peterson's Solution, The Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's &Writer Problem, Dinning Philosopher Problem etc.

Unit IV: 07 lecture hours

Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, and Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery.

Unit V: 12 lecture hours

Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction; Paging: Principle of operation – Page allocation – Hardware support for paging, Protection and sharing, Disadvantages of paging.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU)and Least Recently used (LRU).

Unit VI: 10 lecture hours

I/O Hardware: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table),efficiency and performance.

Text Books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Reference Books:

1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing.
2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley.
3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India.
4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates.

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

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

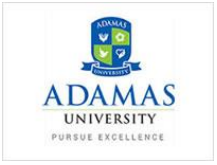
Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Describe** and explain the fundamental components of a computer operating system.	PO1,PSO1,PSO2,PSO3
CO2	**Define**, restate, discuss, and explain the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems.	PO1, PO2,PO3, PSO1,PSO3
CO3	**Evaluate** the requirement for process synchronization and coordination handled by operating system.	PO1, PO2,PO3,PSO2
CO4	**Design** and construct the following OS components: System calls, Schedulers, Memory management systems, Virtual Memory and Paging systems	PO1, PO2,PO3,PO4, PSO1,PSO3
CO5	**Identify** use and evaluate the storage management policies with respect to different storage management technologies.	PO4, PSO1,PSO2,PSO3
CO6	**Identify** the need to create the special purpose operating system.	PO3, PSO1,PSO3

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11309	Operating System	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3	-

1=weakly mapped
2= moderately mapped

3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: III**
Code- CSE11309 **Stream- CSE**
Time: 03 Hrs.
Paper title– Operating System **Total pages- 1**
Max. Marks: 40 **Total no. of questions- 12**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks). **Any Two Questions from Section C** (Each Carrying 10 Marks).
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively**

	SECTION A (Answer All questions)		
1.	**List** the different types of queue used in scheduling algorithm.	**U**	**CO1**
2.	**Explain hit ratio in paging technique.**	**U**	**CO2**
3.	**Define** zombie process.	**R**	**CO3**
4.	**What** is dispatcher?	**R**	**CO4**
5.	**Give** example of round robin scheduling.	**U**	**CO5**
	SECTION B (Attempt any **Three Questions)**		
1.	**Explain** various states of a process with the help of a state transition diagram.	**U**	**CO1**
2.	**When** internal fragmentation occurs explain with an example.	**R**	**CO2**
3.	**Demonstrate** critical section Problem. Explain all the requirements of critical-section problem.	**U**	**CO3**
4.	**Why** "Message passing is time consuming as compared to shared memory"?	**R**	**CO4 /CO5**
	SECTION C (Attempt any **Two Questions)**		
1.	**Build** Gantt chart for Non-preemptive Priority-based and FCFS scheduling of the following processes:	**Ap**	**CO4**

	Process Priority Arrival Time Burst Time P1 4 0 7 P2 3 1 4 P3 1 3 3 P4 2 4 2 Calculate Average waiting time and turnaround time.		
2.	**a) Define** critical section Problem. Explain all the requirements of critical-section problem. **b) What** is Semaphore? How can semaphore be used to achieve mutual exclusion?	**R**	**CO4**
3.	**a) Explain** the necessary and sufficient conditions for the occurrence of deadlock. b) **Plan** the following state of a system. **Process Allocation Max. Demand Available** P1 3 1 1 6 4 3 3 2 3 P2 1 0 4 3 0 6 P3 3 2 0 7 6 1 **What** is the content of Need Matrix? Is the System is in safe state or in unsafe state using Banker's algorithm.	**U**	**CO5**

CSE11310	Design and Analysis of Algorithms	L	T	P	C
Version 1.0	Contact Hours- 60	3	1	0	4
Pre-requisites/Exposure	Basic knowledge of data structure and programming				
Co-requisites	Knowledge of Basic Computer Organization				

Course Objectives:

1. To introduce problem solving approach through design.
2. To develop students to analyse the existing algorithms and approach for improvement.
3. To introduce the students a perspective to different design and analysis approach for algorithm(s) to solve a problem.
4. To develop students to select optimal solution to a problem by choosing the most appropriate algorithmic method.

Course Outcomes:

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

CO1. **Understand** the basics about algorithms and learn how to analyse and design algorithms

CO2. **Choose** brute force, divide and conquer, dynamic programming and greedy techniques methods to solve computing problems

CO3. **Understand** the approach for solving problems using iterative method.

CO4. **Describe** the solution of complex problems using backtracking, branch and bound techniques.

CO5. **Classify** the different Computability classes of P, NP, NP-complete and NP-hard.

Catalog Description:

Algorithmic study is a core part of Computer Science. This study caters to all possible applicable areas of Computer Science. This study includes observation, design, analysis and conclusion. Various types of algorithms have different notion of implementation according to their cost (in terms their time and space complexity). This study also includes refinement of one algorithm as per the applicability to real problems. Categorization of algorithms according to different method of design also includes in this course. It also compares the same algorithm using different algorithm design methods. For example, Knapsack problem can be solved in Greedy approach and Dynamic approach, both are optimization method. This course enables the students to think analytically while applying, designing an algorithm to solve a specific problem.

Course Content:

Unit I: 12 lecture hours

Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behavior; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters' theorem.

Unit II: 16 lecture hours

Fundamental Algorithmic Strategies: Brute-Force, Greedy, Dynamic Programming, Branch-and-Bound and Backtracking methodologies for the design of algorithms; Illustrations of these techniques for Problem-Solving. Heuristics – characteristics and their application domains, case studies on real-life problems.

Unit III: 12 lecture hours

Graph and Tree Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm, case studies on real-life problems.

Unit IV: 10 lecture hours

Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P, NP, NP-complete and NP-hard. Cook's theorem, Standard NP-complete problems and Reduction techniques.

Unit V: 10 lecture hours

Advanced Topics: Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE, Case studies on real-life problems for selecting appropriate algorithms, Case studies on real-life problems for selecting appropriate algorithms

Text Books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest And Clifford Stein, MIT Press/ Mcgraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz Et Al.

Reference Books;

1. Algorithm Design, 1ST Edition, Jon Kleinberg and Évatardos, Pearson.
2. Algorithm Design: Foundations, Analysis, And Internet Examples, Second Edition, Michael T Goodrich And Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, Udimanber, Addison-Wesley, Reading, MA.

Modes of Evaluation: Quiz/Assignment/ Written Examination

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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 basics about algorithms and learn how to analyse and design algorithms.	**PO1,PO2,PO3,PO5,**
CO2	**Choose** brute force, divide and conquer, dynamic programming and greedy techniques methods to solve computing problems.	**PO1,PO3,PO12,PSO1,PSO3**
CO3	**Understand** the approach for solving problems using iterative method.	**PO2,PO3,PO5,PO12,PSO3**
CO4	**Describe** the solution of complex problems using backtracking, branch and bound techniques.	**PO4,PO5,PO12,PSO2,PSO3**
CO5	**Classify** the different Computability classes of P, NP, NP-complete and NP-hard.	**PO5,PO12,PO4, PS01,PSO2,PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11310	Design and Analysis of Algorithms	2	2	3	2	3	-	-	-	-	-	-	3	2	3	3	-

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

Model Question Paper

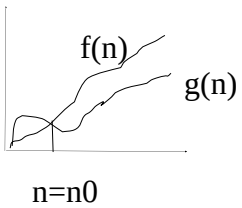
Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: III**
Code- CSE11310 **Stream- CSE**
Time: 03 Hrs.
Paper title– Design & Analysis of Algorithm **Total pages- 1**
Max. Marks: 40 **Total no. of questions- 12**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks). **Any Two Questions from Section C** (Each Carrying 10 Marks).
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively**

SECTION A (Answer All questions)

1.	**Identify** the number of minimum spanning tree of a complete graph having 5 vertices.	**Ap**	**CO4**
2.	**Enumerate** the number of sequences for Chain Multiplication of 5 matrices.	**U**	**CO4**
3.	**Define** tight asymptotic bound.	**R**	**CO1**
4.	**What** will be the appropriate representation for $T(n) = 3n^2 + n \log(n)$	**R**	**CO1**
5.	**Which** algorithmic approach is used by Prim's algorithm.	**U**	**CO2**
	SECTION B (Attempt any **Three Questions)**		
1.	**What** is the significance of 'n0' in defining any Asymptotic notation. Justify your answer.  	**U**	**CO1**
2.	**Solve** the following recurrence relations to find out the complexity: a) $T(n) = 2\,T(n/4) + \sqrt{n}\log_2(n)$ solve using Master's Theorem b) $T(n) = T(n/3) + T(2n/3) + \Theta(n)$ solve using Recursion Tree	**Ap**	**CO2**

3.	**Define** the basic concepts of backtracking with the help of neat flow diagram showing "Dead End" and "Success". Hence, solve 4-Queens and 8-Queens problem using the above Approach.	**U**	**CO3**
4.	**Explain** circuit satisfiability. Prove that circuit satisfiability is in NP	**U**	**CO5**
	SECTION C (Attempt any **Two Questions)**		
1.	**Compare** Dynamic Approach from Divide & Conquer? Find out Minimum number of scalar multiplication required to multiply the following chain of matrices: A1 (5X15) , A2 (15X10), A3 (10X5), A4 (5X25)	**Ap**	**CO2**
2.	**Discuss** the amortized analysis of an aggregate method. Also give the procedural steps for the computation of an optimal parenthesization of a matrix-chain product whose dimensions are: A(10X20); B(20X50); C(50X1); D(1X100)	**Create**	**CO4**
3.	**Build** the basic properties of Greedy Approach to solve any problem? Solve activity Selection problem for the following data using Greedy method: Start time 1 2 2 6 8 10 12 14 Finish time 6 5 4 9 15 14 16 18	**Ap**	**CO2**

CSE11311	Computer Architecture	L	T	P	C
Version 1.0	Contact hours -60	3	1	0	4
Prerequisites/Exposure	Digital Electronics, Microprocessor				
Co-requisites	Programming Concepts				

Course Objectives

1. To study the basic organization and architecture of digital computers (CPU, memory, I/O, software).
2. Discussions will include digital logic and microprogramming.
3. Such knowledge leads to better understanding and utilization of digital computers, and can be used in the design and application of computer systems or as foundation for more advanced computer-related studies.

Course Outcomes

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

CO1 Define functional block of a computer and relate data representation.
CO2 Explain and understand memory hierarchy design, memory access time formula, performance improvement techniques, and trade-offs.
CO3 Illustrate pipelined execution, parallel processing and principles of scalable performances.
CO4 Analyze the concepts of memory utilization in a computer system.

Catalog Description

The architecture of computer systems and associated software. Topics include addressing modes, interrupt systems, input/output systems, external memory systems, assemblers, loaders, multiprogramming, performance evaluation, and data security.

Course Content

Unit I: 15 lecture hours

Functional blocks of a computer: CPU, memory, input-output subsystems, control unit. Instruction set architecture of a CPU – registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – instruction sets of some common CPUs.

Data representation: signed number representation, fixed and floating-point representations, character representation. Computer arithmetic – integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic.

Unit II: 13 lecture hours

Introduction to x86 architecture.

CPU control unit design: hardwired and micro-programmed design approaches, Case study – design of a simple hypothetical CPU.

Memory system design: semiconductor memory technologies, memory organization.

Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB

Unit III: 11 lecture hours

Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards.

Unit IV: **11 lecture hours**

Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

Unit V: **10 lecture hours**

Parallel Processors: Introduction to parallel processors, parallel computer models, principles of scalable performances, multiprocessors and multicomputer, message passing mechanism, scalable & Multithreaded dataflow architecture, Concurrent access to memory and cache coherency and synchronization techniques, GPU Processors.

Text Books:

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.
2. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.

Reference Books:

1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry F. Jordan, Pearson Education

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Define** functional block of a computer and relate data representation.	**PO1,PO3,PO6,PO12,PSO1, PSO2,PSO3**
CO2	**Explain** and understand memory hierarchy design, memory access time formula, performance improvement techniques, and trade-offs.	**PO1,PO2,PO3,PO6,PO12, PSO1,PSO3, PSO4**
CO3	**Illustrate** pipelined execution, parallel processing and principles of scalable performances.	**PO1,PO3,PO6,PO12,PSO1,PSO3,PSO2**
CO4	**Analyze** the concepts of memory utilization in a computer system.Define the implementation of parallel processors and Analyze the synchronization techniques	**PO1,PO3,PO5,PO6,PO12, PSO1,PSO3,**

		PSO4

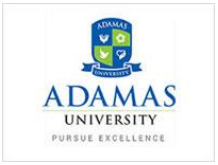
		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modem tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO1 2	PSO1	PSO2	PSO3	PSO4
CSE11311	Computer Architecture	3	2	3	-	-	3	-	-	-	-	-	3	3	2	3	2

1=weakly mapped

2= moderately mapped

3=strongly mapped

Model Question Paper

Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: III**
Code- CSE11311 **Stream- CSE**
Time: 03 Hrs.
Paper title– Computer Architecture **Total pages- 2**
Max. Marks: 40 **Total no. of questions- 12**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks)**.** Any **Two Questions from Section C** (Each Carrying 10 Marks)**.**
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively.**

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

1.	**What** is an Instruction?	**R**	**CO1**
2.	**What** is an Instruction?	**R**	**CO1**
3.	**What** do you understand by byte addressable memory?	**R**	**CO2**
4.	**What** is a processor clock?	**R**	**CO1**
5.	**What** do you understand by RTN?	**R**	**CO1**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	Let us assume that a complete execution of a program requires the execution of 100 machine language instruction. Some instructions may be executed more than once when they are inside loop, So we can assume that the average no of steps needed to execute one basic instruction is 7, such that each and every basic step completes in 1 clock cycle. If a 10 Hz – processor is used then **calculate** time required by the processor to execute the program. What is an Interrupt? What is branching?	**C**	**CO2**
7.	**Discuss** the properties of memory hierarchy with diagram? Discuss LRU & FIFO page replacement policies with example If the	**Ap, R**	**CO2**

	memory block requests are in the order then which algorithm will result less page faults 3, 5, 2, 8, 0, 6, 3, 9, 16, 20, 17, 25, 18, 30, 24, 2, 63, 5, 82, 17, 24		
8.	**Explain** clearly, the register-indirect, the indexed and the base register with indexed addressing modes. Next, point out the exact difference between the three..	**U**	**CO3**
9.	**Draw** the schematic diagram of hardware needed to implement "shift-subtract" restoring division technique (positive integers); next, give a step by step illustration of the above division technique with dividend D = $(1000)_2$ and divisor M = (0011).	**U**	**CO2**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		
10.	**State** the algorithm designed to overcome the disadvantage of Booths multiplication algorithm along with the flowchart. Represent each and every step of the proposed algorithm for multiplying 7 and (-2).	**C**	**CO3**
11	The main memory of a system has a word length of 32-bits & is both word and byte addressable. The system has a 16 bit address bus. The lowest numbered byte in a word occupies bits 0 through 7. The byte number of lowest numbered byte in a word is the byte address for that word. Both bytes and words are numbered starting from 0. Now, **Find** the following: Byte address of the 9^{th} memory word Word address of the 9^{th} byte Word address of the word containing byte with byte address = 34 Number of words in this byte addressable memory	**C**	**CO3**
12.	**Discuss** the properties of memory hierarchy with diagram? Write a short note on Indexed & Indirect memory addressing scheme.	**C**	**CO3**

CSE11312	Web Designing and Programming	L	T	P	C
Version 1.0	Contact hours -60	3	1	0	4
Pre-requisites/Exposure	Browser compatibility knowledge /HTML				
Co-requisites	--				

Course Objectives:

1. To help the pupils to develop an understanding of client /server model.
2. To enable students a precise understanding of web protocol.
3. To give the students a perspective of web design language for designing a web site.
4. To enable students design a structure of web page model for any organization .

Course Outcomes:

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

CO1. **Understanding** of E- Mail, Telnet, FTP, E-Commerce, Video Conferencing, E-Business.
CO2. **Formalize** HTML Tag Reference, Global Attributes, Event Handlers, Document Structure.
CO3. **Classify** a detailed analysis of form, frame and CSS in HTML.
CO4. **Demonstrate** effectively a web page with HTML/JavaScript/XML style.

Catalog Description:

The methods by which computers communicate with each other through the use of markup languages and multimedia packages is known as web technology. In the past few decades, web technology has undergone a dramatic transition, from a few marked-up web pages to the ability to do very specific work on a network without interruption. Let's look at some examples of web technology. Being a web developer gives you the power to create new cool things. If you can imagine it you can build it (or kind of). You don't need any kind of material - just your knowledge about web development.

Course Content:

Unit I: 12 lecture hours

Internet And WWW: Introduction, E- Mail, Telnet, FTP, E-Commerce, Video Conferencing, E-Business. Internet Service Providers, Domain Name Server, Internet Address, World Wide Web (WWW): World Wide Web And Its Evolution, Uniform Resource Locator (URL), Browsers - Internet Explorer, Netscape Navigator, Opera, Firefox, Chrome, Mozilla. Search Engine, Web Server - Apache, IIS, Proxy Server, HTTP Protocol. Case Study of E-Business website like (Myntra,Jabong,Amazon)

Unit II: 22 lecture hours

Module 2:

HTML And Graphics: HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level Formatting, Block Level Formatting, List Tags, Hyperlink Tags, Image And Image Maps, Table Tags, Form Tags, Frame Tags, Executable Content Tags.

Imagemaps: Introduction, Client-Side Imagemaps, Server-Side Imagemaps, Using Server-Side And Client-Side Imagempas Together, Alternative Text For Imagemaps, Tables : Introduction To HTML Tables And Their Structure, The Table Tags, Alignment, Aligning Entire Table, Alignment Within A Row, Alignment Within A Cell, Attributes, Content Summary, Background Colour, Adding A Caption, Setting The Width, Adding A Border, Spacing Within A Cell, Spacing Between The Cells, Spanning

Multiple Rows Or Columns, Elements That Can Be Placed In A Table, Table Sections And Column Properties, Tables As A Design Tool.

Frames: Introduction To Frames, Applications, Frames Document, The Tag, Nesting Tag, Placing Content In Frames With The Tag, Targeting Named Frames, Creating Floating Frames, Using Hidden Frames,Frame analysis in Online Job portal.

Forms: Creating Forms, The<FORM>Tag, Named Input Fields, The <INPUT> Tag, Multiple Lines Text Windows, Drop Down And List Boxes, Hidden Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms And Scripting, Action Buttons, Labelling Input Files, Grouping Related Fields, Disabled And Read-Only Fields, Form Field Event Handlers Passing **Form Data Style Sheets:**Introduction, Different Approaches To Style Sheets, Using Multiple Approaches, Linking To Style Information In Separate File, Setting Up Style Information, Using The <LINK>Tag, Embedded Style Information, Using <STYLE> Tag, Inline Style Information. Real life case study analysis of E-Ticket booking, with suitable linking of travel destination.

Unit III: 16 lecture hours

Java Script: Introduction, Client-Side Javascript, Server-Side Javascript, Javascript Objects, Javascript Security.

Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short

Module 3:

Java Script: Introduction, Client-Side Javascript, Server-Side Javascript, Javascript Objects, Javascript Security.

Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional Operator), ,(Comma Operator), Delete, New, This, Void

Statements: Break, Comment, Continue, Delete, Do … While, Export, For, For…In, Function, If…Else, Import, Labelled, Return, Switch, Var, While, With,

Core Javascript: Array, Boolean, Date, Function, Math, Number, Object, String, Regexp

Document And Its Associated Objects: Document, Link, Area, Anchor, Image, Applet, Layer

Events And Event Handlers: General Information About Events, Defining Event Handlers: Onabort, Onblur, Onchange, Onclick, Ondblclick, Ondragdrop, Onerror, Onfocus, Onkeydown, Onkeypress, Onkeyup, Onload, Onmousedown, Onmousemove, Onmouseout, Onmouseover, Onmouseup, Onmove, Onreset, Onresize, Onselect, Onsubmit, Onunload,Case study analysis of E-commerce website in transaction processing of client order .

Unit IV: 12 lecture hours

Java Script: Introduction, Client-Side Javascript, Server-Side Javascript, Javascript Objects, Javascript Security.

Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++ (Increment), -- (Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ? (Conditional Operator), ,(Comma Operator), Delete, New, This, Void

Statements: Break, Comment, Continue, Delete, Do … While, Export, For, For…In, Function, If…Else, Import, Labelled, Return, Switch, Var, While, With,

Core Javascript: Array, Boolean, Date, Function, Math, Number, Object, String, Regexp

Document And Its Associated Objects: Document, Link, Area, Anchor, Image, Applet, Layer

XML: Introduction, Anatomy, Document, Creating XML Documents, Creating XML Dtds, XML Schemas, XSL, Mapping of XML ontology for a web site.

PHP: Introduction, Server-Side Web Scripting, Installing PHP, Adding PHP To HTML, Syntax And Variables, Passing Information Between Pages, Strings, Arrays And Array Functions, Numbers, Basic PHP Errors / Problems

Text Books:

1. "Web Design The Complete Reference", Thomas Powell, Tata Mcgrawhill

Reference Books:

1. "HTML And XHTML The Complete Reference", Thomas Powell, Tata Mcgrawhill.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understanding** of E- Mail, Telnet, FTP, E-Commerce, Video Conferencing, E-Business.	**PO2,PO3,PO5,PO6,PO10,PSO1,PSO2**
CO2	**Formalize** HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags.	**PO2,PO3,PO5,PO10,PSO1,PSO2**
CO3	**Classify** a detailed analysis of form, frame and CSS in HTML	**PO2,PO3,PO5,PO12,PO5,PO6, PSO4**
CO4	**Demonstrate** effectively a web page with HTML/JavaScript/XML style	**PO12,PSO2,PSO1,PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
ECS 32197	Web Designing & Programming	-	3	3	-	3	2	-	-	-	2	-	2	3	3	-	2

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

Model Question Paper

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

Name of the Program: B. Sc (Computer Science) Semester: III Stream: CSE
PAPER TITLE: Web Designing and Programming PAPER CODE: CSE11312
Maximum Marks: 40 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.	**List** the steps involved in Architecture of of server with suitable example	**U**	**CO1**
2.	**Enumerate** the basic elements of application layer protocol and their use in message communication.	**U**	**CO2**
3.	**Define** brief history of internet)?	**R**	**CO3**
4.	**What** is multicast DNS (mDNS),?	**R**	**CO4**
5.	**Give** the the essential components of URL.	**U**	**CO3**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** the characteristics of Java script arithmetic operator)? .	**U**	**CO1**
7.	 **Examine** the frame with HTML tag	**U, Ap**	**CO1, CO2**
8.	**Elucidate** the factors influencing Javascript security.	**Ap**	**CO3**
9.	**Explain** with Example: i) FTP ii) DNS.	**U**	**CO4 /CO5**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		

10.	**Explain** in detail about Table in HTML.	**U**	**CO4**
11.	**Write** a list in HTML?with suitable example .	**R**	**CO4**
12.	**Distinguish** XML DTD by taking suitable example?	**An**	**CO5**

CSE11313	Operating System Lab	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Problem Solving using C				
Co-requisites	Linux operating System				

Course Objectives:

1. To introduce students with the architecture of Unix OS.
2. To provide necessary skills for developing and debugging programs in UNIX environment.
3. To develop the ability to identify and apply the suitable algorithm for the given real world problem

Course Outcomes:

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

CO1. **Identify** Unix commands and shell programming Implement various algorithms in a high level language
CO2. **Build** 'C' program for process and file system management using system calls
CO3. **Choose** the best CPU scheduling algorithm for a given problem instance
CO4. **Identify** the performance of various page replacement algorithms
CO5. **Develop** algorithm for deadlock avoidance, detection and file allocation strategies.

Catalog Description:

Operating systems are the core part of every computing device to run any type of software. The increasing use of computing devices in all areas of life, lead to a variety of operating systems. As all operating systems share common principles. These principles are important for computer science students in their understanding of programming languages and software built on top of operating systems. The Operating System Laboratory, OS Lab is a course that will teach students about principles of operating systems using a constructivist approach and problem-oriented learning.

Course Content:

Experiment 1:

Basics of UNIX Commands

Experiment 2:

Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close.

Experiment 3:

Write programs using the I/O System calls of UNIX operating system (open, read, write, etc).

Experiment 4:

Given the list of processes, their CPU burst times. Display/print the Gantt chart forFCFS scheduling algorithm. Compute and print the average waiting time and average turnaround time

Experiment 5:

Given the list of processes, their CPU burst times and arrival times. Display the Gantt chart for SJF scheduling algorithm. Compute and print the average waiting time and average turnaround time.

Experiment 6:

Given the list of processes, their CPU burst times and time quantum. Display the Gantt chart for Round robin scheduling algorithm. Compute and print the average waiting time and average turnaround time.

Experiment 7:

Given the list of processes, their CPU burst times and arrival times. Display the Gantt chart for Priority scheduling algorithm. Compute and print the average waiting time and average turnaround time.

Experiment 8:

Develop application using Inter-Process Communication (using shared memory, pipes or message queues).

Experiment 9:

Implement the Producer-Consumer problem using semaphores (using UNIX system calls)

Experiment 10:

Implement Memory management schemes like paging and segmentation.

Experiment 11:

Implement Memory allocation schemes like First fit, Best fit and Worst fit.

Experiment 12:

Implementation based on Graph Traversal Algorithm**:** Implement Breadth First Search (BFS) and Implement Depth First Search (DFS)

Text Books:

1. Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

Reference Books:

1. Universal Command Guide: For Operating Systems–April 15, 2002 ,byGuy Lotgering
2. The Easy Guide to Operating Systems, Larry Miller, 2012. Michael

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

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
Weightage (%)	50	50

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

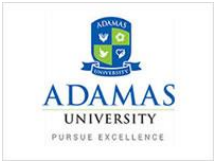
Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Identify** Unix commands and shell programming Implement various algorithms in a high level language	PO1,PO2,PO3, PS02,PS03
CO2	**Build** 'C' program for process and file system management using system calls	PO1,PO3,PO5,PO12,PS02

CO3	**Choose** the best CPU scheduling algorithm for a given problem instance	**PO2,PO3,PO12, PS02,PS03**
CO4	**Identify** the performance of various page replacement algorithms.	**PO2,PO3,PO5,PO12,PS02**
CO5	**Develop** algorithm for deadlock avoidance, detection and file allocation strategies	**PO3,PO5,PO12,PS02,PS03**

Course Code		
CSE1313	Course Title	Operating System Lab
PO1	Computational knowledge	2
PO2	Design/development of solutions	3
PO3	Problem analysis	3
PO4	The engineer and society	-
PO5	Conduct investigations of complex problems	3
PO6	Environment and sustainability	-
PO7	Modern tool usage	-
PO8	Individual and team work	-
PO9	Ethics	-
PO10	Communication	-
PO11	Project management and finance	-
PO12	Life-long learning	3
PSO1	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	-
PSO2	Competence to use research, experiment, contemporary issues to solve industrial problems.	3
PSO3	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	3
PSO4	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.	-

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

Model Qestion Paper

Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: III**
Code- CSE11313 **Stream- CSE**
Time: 03 Hrs.
Paper title– Operating System Lab **Total pages- 1**
Max. Marks: 40 **Total no. of questions- 5**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks). **Any Two Questions from Section C** (Each Carrying 10 Marks)
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively**

SECTION A (Answer All questions)(8 x 5=40)

1.	**Demonstrate** the priority-based non-pre-emptive CPU scheduling algorithms to find turnaround time and waiting time.	**U**	**CO3**
2.	**Develop** a shell script which will fork a child process. The child process will be another script instead of the same script of calling process. First one is the script, which will be parent process.	**Ap**	**CO1**
3.	**Define** deadlock. Show deadlock detection using Banker's algorithm.	**R**	**CO5**
4.	**Demonstrate** fork ( ), execlp ( ), wait ( ) and exit ( ) system call.	**U**	**CO2**
5.	**What** is paging. Demonstrate FIFO paging algorithm.	**R**	**CO4**

CSE12314	Design & Analysis of Algorithm Lab	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Programming and Data structures and High Level programming Language like C, Java and Python anyone.				
Co-requisites	--				

Course Objectives:

1. To develop a problem and design the solution for the problem.
2. To design and implement efficient algorithms for a specified application.
3. To provide the ability to identify and apply the suitable algorithm for the given real world problem

Course Outcomes:

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

CO1. **Analyze** the complexities of various problems in different domains.
CO2. **Identify** the problem given and design the algorithm using various algorithm design techniques.
CO3. **Implement** various algorithms in a high level language
CO4. **Analyze** the performance of various algorithms.
CO5. **Compare** the performance of different algorithms for same problem.

Catalog Description:

Algorithmic study is a core part of Computer Science. This study caters to all possible applicable areas of Computer Science. This study includes observation, design, analysis and conclusion. Various types of algorithms have different notion of implementation according to their cost (in terms their time and space complexity). This study also includes refinement of one algorithm as per the applicability to real problems. Categorization of algorithms according to different method of design also includes in this course. It also compares the same algorithm using different algorithm design methods. For example, Knapsack problem can be solved in Greedy approach and Dynamic approach, both are optimization method. This course enables the students to think analytically while applying, designing an algorithm to solve a specific problem.

Course Content:

Experiment 1:

Implementation based on Divide and Conquer: Binary Search using Divide and Conquer approach, Quick sort and Merge Sort

Experiment 2:

Implementation based on Dynamic Programming : Implement all pair of Shortest path for a graph (Floyed-Warshall Algorithm), Dijkstra's , Bellman Ford Algorithm and Implement Traveling Salesman Problem

Experiment 3:

Implementation based on Brunch and Bound :Implement 15 Puzzle Problem

Experiment 4:

Implementation based on Backtracking :Implement 8 Queen problem, Graph Coloring Problem, Hamiltonian Problem

Experiment 5:

Implementation based on Greedy method**:** Knapsack Problem and Job sequencing with deadlines, Minimum Cost Spanning Tree by Prim's Algorithm and Minimum Cost Spanning Tree by Kruskal's Algorithm

Experiment 6:

Implementation based on Graph Traversal Algorithm**:** Implement Breadth First Search (BFS) and Implement Depth First Search (DFS)

Text Books:

1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L RivestAnd Clifford Stein, MIT Press/Mcgraw-Hill.
2. Fundamentals of Algorithms – E. Horowitz Et Al.

Reference Books:

1. Algorithm Design, 1ST Edition, Jon Kleinberg and Évatardos, Pearson.
2. Algorithm Design: Foundations, Analysis, And Internet Examples, Second Edition, Michael T Goodrich And Roberto Tamassia, Wiley.
3. Algorithms -- A Creative Approach, 3RD Edition, Udimanber, Addison-Wesley, Reading, MA.

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

Components	Continuous Evaluation	End Semester Examination
Weightage (%)	50	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Analyze** the complexities of various problems in different domains.	PO1,PO2,PSO1,PSO 2
CO2	**Identify** the problem given and design the algorithm using various algorithm design techniques.	PO1,PO3, PSO1,PSO2
CO3	**Implement** various algorithms in a high level language	PO2,PO3, PO4, PSO2
CO4	**Analyze** the performance of various algorithms.	PO2,PO4,PO3
CO5	**Compare** the performance of different algorithms for same problem.	PO3,PSO1,PSO2

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CSE12314	Design & Analysis of Algorithm Lab	2	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-

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

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

Name: **Enrolment No:**	

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: III**
Code- CSE12314 **Stream- CSE**
Time: 03 Hrs.
Paper title– Design & Analysis of Algorithm Lab **Total pages- 1**
Max. Marks: 40 **Total no. of questions- 5**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks). **Any Two Questions from Section C** (Each Carrying 10 Marks)
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively**

SECTION A (Attempt any **Five Questions)**

1.	**Develop** C code for Bellman Ford Algorithm and Implement Traveling Salesman Problem	**Ap**	**CO4**
2.	**Explain** Quick sort with an example using C program.	**U**	**CO2**
3.	**Develop** 15 Puzzle Problem and implement by C program.	**Ap**	**CO4**
4.	**Demonstrate** the performance of Minimum Cost Spanning Tree by Prim's Algorithm and Minimum Cost Spanning Tree by Kruskal's Algorithm	**U**	**CO5**
5.	**Develop** Merge sort using divide and conquer strategy.	**R**	**CO5**

CSE12315	Web Programming Lab	L	T	P	C
Version 1.0	Contact hours -45	0	0	3	2
Pre-requisites/Exposure	Basic knowledge of Internet and HTML				
Co-requisites	--				

Course Objectives:

1. To help the behaviour study of web page element like, table, list, anchor and CSS.
2. To enable students, acquire knowledge in web page designing.
3. To give the students a perspective to user interface graphics and visualization techniques.
4. To enable students, acquire structure of web scripting and art of interface design.

Course Outcomes:

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

CO1. **Understand** the basic of web designing language.
CO2. **Analyse** ability of student in proper usage of HTML tag
CO3. **Construct** student understanding in JavaScript event and PHP.
CO4. **Classify** effectively feature of web attributes like Analyse ability of student in proper usage of HTML tag frame,form,and CSS.

Catalog Description:

Web Design Lab requires designers to create graphics, typography as well as images which are used only on the World Wide Web. While creating any design, web designers need to maintain balance between creating a good design as well as the speed and efficiency for the webpage/ website. Web Design is a specialisation of the web page creation.
The different areas in which a web designer can work include web graphic design, interface design, authoring, user experience design and the likes.
Most often individuals working in the web design field need to work closely with other members of their team. Web Design usually involves the design process that is related to the front-end of a website which includes writing mark up. A point to note here is that web design as a field is known to partially overlap with web engineering when the aspect of web development is considered.
Web designers use many tools in order to perform the tasks allotted to them. Web Designers are known to use both vector as well as raster graphics to create their design prototypes. They also use HTML, CSS, WYSIWYG editing software, mark up validators etc., to create design elements.

Course Content:

Suggested assignments to be framed based on the following Programming Language such as

HTML, CSS, Java script, XML and PHP.

List of Experiments:

1. Introduction to web page design, attributes and concept by taking an example of online job-portal.

2. Explain the logic of HTML and its feature, heading, color, background color, (h1 to h6).

3. Design a preliminary web page by using HTML table, create, row, header, data insertion.

4. Design a web page by using HTML form tag and explore its features by taking reference of some

E-commerce web site (Mantra , Zabong etc)

5. Design a web page by using HTML form attributes (Radio button, submit button, drop down menu, check box etc)in Online Ticket booking

6. Design a List in HTML (Ordered list and Un-ordered list).

7. Design a event page by using JavaScript in E-commerce website.

8-Design a web page by using JavaScript for arithmetic and logical operation.

9. Design a page enabling idea of Java string, Java switch, DOM model.By taking an online movie-ticket booking.

10. Design a web repository knowledge base by using XML-ontology.

11.Write a PHP class that sorts an ordered integer array with the help of sort() function.

12.Write a PHP Calculator class which will accept two values as arguments, then add them, subtract them, multiply them together, or divide them on request.

Text Books:

1. Mishra. B, Sharma. S (2011) Communication Skills for Engineers and Scientists. PHI Learning Pvt. Ltd. ISBN: 8120337190.
2. Chaturvedi P. D, Chaturvedi M. (2011) Business Communication: Concepts, Cases and Applications. Pearson Education India. ISBN: 8131718727.
3. Greenbaum. Sidney. College Grammar of English. Longman Publishers. ISBN: 9780582285972.

Reference Books:

1. Pal, Rajendra and Korlahalli, J.S. (2011) Essentials of Business Communication. Sultan Chand & Sons. ISBN: 9788180547294.

2. Kaul, Asha. (2014) Effective Business Communication.PHI Learning Pvt. Ltd. ISBN: 9788120338487.

3. Murphy, R. (2007) Essential English Grammar, CUP. ISBN: 8175960299.

4. C. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.

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

Components	Continuous Evaluation	End Semester Examination
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 of web designing language.	**PO1,PO2,PO3,PO10,PSO1,PSO2,PSO3**
CO2	**Analyse** ability of student in proper usage of HTML tag	**PO1,PO2,PO3,PO8,PO10,PSO2**
CO3	**Construct** student understanding in JavaScript event and PHP.	**PO1,PO2,PO3, PO6, PO12,PSO1,PSO2, PSO3**
CO4	**Classify** effectively feature of web attributes like frame,form,and CSS.	**PO1,PO2,PO3, PO7, PO12,PO6,PO7,PO8**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
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	PSO 4
ECS 32297	Web Programming Lab	3	3	3	-	-	-	-	2	-	2		2	2	3	2	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: III Stream: CSE
PAPER TITLE: Web Programming Lab PAPER CODE: CSE12315
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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 2 = 10)		
1.	**List** the html tag to design the ordered and un-ordered list with suitable example given below, An unordered HTML list: 1. Item1 2. Item2 3. Item3 4. Item4 An ordered HTML list: 4. First item 5. Second item 6. Third item 7. Fourth item	**U**	**CO1**
2.	**Enumerate** the basic elements of application layer protocol and their use in message communication.	**U**	**CO2**
3.	**Define** brief history of internet)?	**R**	**CO3**
4.	**What** is multicast DNS (mDNS),?	**R**	**CO4**
5.	**Give** the the essential components of URL.	**U**	**CO3**
	SECTION B (Attempt any **Six Questions) (6 x 5 = 30)**		
6.	**Describe** the characteristics of Java script arithmetic operator)? .	**U**	**CO1**

7.	**Examine** the frame with HTML tag 	**U, Ap**	**CO1, CO2**
8.	**Elucidate** the HTML tag for the table given below. 	**Ap**	**CO3**
9.	**Explain** with Example: i) JavaScript arithmetic operator (/,%,*)with example ii) DNS.	**U**	**CO4 /CO5**
10.	**Explain** in web repository knowledge base by using XML-ontology.	**U**	**CO4**
11.	**Write** a list in HTML?with suitable example .	**R**	**CO4**
12.	**Distinguish** the logic of HTML and its feature, heading, color, background color, (h1 to h6)by taking suitable example?	**U**	**CO5**

CSE11316	Database Management Systems	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Set Theory, Knowledge of programming language.				
Co-requisites	--				

Course Objectives:

1. To impart the basic understanding of the theory and applications of database management systems.
2. To implement the relational database design and data modelling using entity-relationship (ER) model.
3. To give basic level understanding of internals of database systems.
4. To be able to use SQL in querying the database.
5. To demonstrate Normalization process.
6. To expose to some of the recent trends in databases.

Course Outcomes:

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

CO1. **Describe** the fundamental concepts of databases.
CO2. **Construct** an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures.
CO3. **Summarize** relational model concept and illustrate the relational constraints.
CO4. **Develop** Structured Query Language (SQL) and apply to query a database.
CO5. **Define** normalization for relational databases.
CO6. **Define** and illustrate fundamental principles of data organization, query optimization and concurrent transaction processing.

Catalog Description:

A database management system (DBMS) is designed to manage a large body of information. Data management involves both defining structures for storing information and providing mechanisms for manipulating the information. In addition, the database system must provide for the safety of the stored information, despite system crashes or attempts at unauthorized access. If data are to be shared among several users, the system must avoid possible anomalous results due to multiple users concurrently accessing the same data.
Examples of the use of database systems include airline reservation systems, company payroll and employee information systems, banking systems, credit card processing systems, and sales and order tracking systems.
A major purpose of a database system is to provide users with an abstract view of the data. That is, the system hides certain details of how the data are stored and maintained. Thereby, data can be stored in complex data structures that permit efficient retrieval, yet users see a simplified and easy-to-use view of the data. The lowest level of abstraction, the physical level, describes how the data are actually stored and details the data structures. The next-higher level of abstraction, the logical level, describes what data are stored, and what relationships exist among those data. The highest level of abstraction, the view level, describes parts of the database that are relevant to each user; application programs used to access a database form part of the view level.

Course Content:

Unit I: 11 lecture hours

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).
Data models: Entity-relationship model, network model, relational and object-oriented data models, integrity constraints, data manipulation operations.

ER models: Entity Set, Relation Ship Set, Cardinality Properties, Type of Entities, Type of Keys, Aggregation, Specialization and Generalization.

Unit II: 12 lecture hours

Relational query languages: Relational algebra, Fundamental Operations, Additional Operations. Select, Project, Cartesian Product, UNION, Set difference, Rename. Types of joining operations, Division, Intersection, Aggregate. Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Unit III: 13 lecture hours

Relational database design: Integrity Constraint, Domain Constrain, Referential Integrity, Functional Dependencies, Closure of Set, Cover and Canonical Cover, Types of Anomalies, Armstrong's axioms, Extended Armstrong's axioms, Assertions and Demons.
Data Base Decomposition: Domain and data dependency, Normal forms: 1NF, 2 NF, 3 NF, BCNF, Dependency preservation, Lossless design.

Unit IV: 12 lecture hours

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.
Storage strategies: Indices, B-trees, B+-trees, hashing, File System, Disk Organization, Physical Storage, Buffer management.

Unit V: 12 lecture hours

Transaction processing: Failure, Recovery from Failure, Different States of Transaction, Transaction Isolation, ACID property, Serializability of scheduling, Multi-version and optimistic Concurrency Control schemes.
Concurrency control: Locking and timestamp-based schedulers, 2-Phase Locking Protocol, Dead Lock,
Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.
Advanced topics: Distributed databases, Data warehousing and data mining.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

Reference Books:

1. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
2. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination

Weightage (%)	**30**	**20**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Describe** the fundamental concepts of databases.	**PO1, PO2, PO4, PSO2,PSO4**
CO2	**Construct** an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures.	**PO2, PO3, PSO1,PSO3,PSO4**
CO3	**Summarize** relational model concept and illustrate the relational constraints.	**PO1,PO3, PO4,PSO1 ,PSO2,PSO4**
CO4	**Develop** Structured Query Language (SQL) and apply to query a database.	**PO2,PO4,PSO1,PSO3,PSO4**
CO5	**Define** normalization for relational databases.	**PO1, PO2, PO3, PSO2,PSO3,PSO4**
CO6	**Define** and illustrate fundamental principles of data organization, query optimization and concurrent transaction processing.	**PO2,PO4,PSO1,PSO2,PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE11316	Database Management System	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3

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

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

Name of the Program: B. Sc. (Computer Science) Semester: IV Stream: CSE
PAPER TITLE: Database Management System PAPER CODE: CSE11316
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 13 Total No of Pages: 02

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

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	**Explain** the insertion anomalies with proper example?	**U**	**CO1**
2.	**Define** is FD with example?	**R**	**CO5**
3.	**Explain** Growing phase and Shrinking phase with proper diagram?	**U**	**CO4**
4.	**Explain** serializability with proper example?	**U**	**CO3**
5.	**Explain** DCL with proper example?	**U**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Define** the symbols fundamental with proper example?	**R**	**CO1**
7.	**What are the** different type of JOINS with proper example?	**R**	**CO1**
8.	**Describe** Armstrong's Axioms with example?	**U**	**CO1**
9.	**Develop** an E-R diagram Hospital Management system with proper cardinality?	**AP**	**CO2**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	a) **What is** the highest NF of each of the following relations? i) R1 (E, F, G,H,J) with FDs are E → FGJ, J → H ii) R2 (A, B, C, D, E,F) with FDs are A → B,C,D,E,F, D → E b) **Explain** ACID Properties with proper example. 5+5	**R** **U**	**CO5, CO4**
11.	i). Consider the following schema: EmployeeInfo Table(EmpID,EmpFname,EmpLname,Department,Project,Address,DOB, Gender) EmployeePosition Table (EmpID,EmpDesignation,DateOfJoining,Salary) **Build** the following queries on the table. (In SQL) (a) Write a query to retrieve the EmpFname and EmpLname in a single column as "FullName". The first name and the last name must be separated with space.	**AP**	**CO4, C06**

	(b) Write a query to fetch the number of employees working in the department 'HR'. (c) Find the Employee name who lives in same city as "Vijoy" (d) Write a query to find the names of employees that begin with 'S' (e) Write a query find number of employees whose DOB is between 02/05/1980 to 31/12/1985 and are grouped according to gender.		
12.	**Identify** the BCNF with example? Draw a state diagram and **discuss** the typical states during transaction execution? 3+7	**Ap**	**CO5**
13.	**Explain** Deadlock recovery techniques? **Explain** Deadlock Prevention techniques? 5+5	**U**	**CO2**

CSE11317	Software Engineering	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Software/Hardware evolution at basic level				
Co-requisites	--				

Course Objectives:

1. To help the student to acquire knowledge of software evolution process.
2. To enable students modelling software project with appropriate metric and precision at workplace.
3. To give the students a perspective to software design process variables by exposing them to software specification document; and also, to enrich their software testing ability.
4. To enable students, acquire testing and quality assessment of model required for their profession.

Course Outcomes:

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

CO1. **Understand** the impact of software engineering.
CO2. **Communicate** with proper software model paradigm to pupils.
CO3. **Enhancement** of software metric engineering application in industry.
CO4. **Analyse** effectively testing and maintenance of software project.
CO5. **Illustrate** software modelling Structure and software metric Procedures to the Project.

Catalog Description:

There is a growing need for talented software developers across every industry. As technology advances, the ability to build quality software while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.
Software Engineering applies the knowledge and theoretical understanding gained through computer science to building high-quality software products. As a maturing discipline, software is becoming more and more important in our everyday lives. Our software development and engineering professional program is Pace University's response to the tremendous growth of the software development industry.

Course Content

Unit I: **11 lecture hours**

Software - Evolving role of it, a crisis on the Horizon and its Myths, Software process models: linear sequential model, prototyping model, RAD model, Evolutionary model, Formal methods model, Component based development, fourth generation techniques, Software development and requirement analysis using Agile, Scrum framework.

Unit II: **13 lecture hours**

Management spectrum, people, problem, process, project and few Critical approach,

Software Process and project metrics: Measure, Metrics and Indicators, Process and Project Domain related metrics, Software Measurement, Reconciling of Different, Metrics Approaches, Software quality metrics, Validation management, **Software project planning:** Observations on estimation, Objectives of Project planning.

Unit III: **11 lecture hours**

Resources: Software project estimation, Empirical models for estimation, Automated estimation tools, Risk management and Software risks: Identification, Risk projection, safety risks and hazards; RMMM plans, Risk management

Unit IV: **13 lecture hours**

Project scheduling and tracking: Definition of task set and task network, Scheduling, earned value analysis, Tracking of Errors, Project planning, **Software quality assurance:** Concepts of Software Quality, Quality movement, Review of software quality assurance, Software reliability, Software quality metrics (MTTF, MTTR, MTBF ETC.)

Unit V: **12 lecture hours**

S**oftware configuration management:** Object identification in software configuration, Configuring audit-SCM standards, **Analysis concepts and principles:** Requirement analysis, Software prototyping, Specification Review Analysis modeling, Data modeling, Functional modeling, Behavioral modeling, **Software design, Software testing techniques:** White box and black box testing, Software testing strategies - Unit testing, Integrating testing, System testing.

Text Books:

1. Software Engineering: A practitioner's approach, 8th Edition, Roger S. Pressman, McGraw Hill
2. An integrated approach to Software Engineering, Springer/Narosa Edition, PankajJalote.

Reference Books:

1. Fundamentals of Software Engineering, 4th Edition, Rajib Mall, Prentice Hall, India.

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

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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 impact of software engineering.	**PO1, PO9, PO11, PSO1, PSO4**
CO2	**Communicate** with proper software model paradigm to pupils.	**PO1, PO2, PO3, PO5, PO11, PSO1, PSO2**
CO3	**Classify** software metric engineering application in industry.	**PO1, PO5, PO12, PSO1, PSO2**
CO4	**Analyse** effectively testing and maintenance of software project.	**PO1, PO9, PSO3,PSO4**
CO5	**Illustrate** software modelling Structure and software metric Procedures to the Project.	**PO1, PO9, PSO2,PO12, PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE11317	Software Engineering	3	2	2	-	2	-	-	-	2	-	2	-	2	3	2	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: IV Stream: CSE
PAPER TITLE: Software Engineering PAPER CODE: CSE11317
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**List** the steps involved in Software development life cycle? Write a note on it.	**U**	**CO1**
2.	**Enumerate** the basic elements of Software requirement specification.	**U**	**CO2**
3.	**Define** Data coupling.	**R**	**CO3**
4.	**What** is Software configuration management?	**R**	**CO4**
5.	**Give** the principles of functional cohesion.	**U**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Classify** the stages of evolutionary model?	**An**	**CO1**
7.	**Explain** the essential phases of iterative water fall model then what is the expected performance over traditional water fall model?	**U**	**CO2**
8.	**Explain** the Black box testing and White box testing with suitable example.	**U**	**CO3**
9.	**Explain** Scrum and agile application briefly explain it with proper example?	**R**	**CO4 /CO2**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Explain** in detail about V-model from end user point of view how it is useful in project design.	**U**	**CO4**
11.	**Write** a Project estimation technique and estimation issues in project progress line.? Explain with a Case Study	**U**	**CO4**
12.	**Distinguish** features of the factors i) Product metric, ii) Function point metric?	**An**	**CO5**

CSE11318	Computer Networks	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Computer Fundamentals				
Co-requisites	--				

Course Objectives:

1. Become familiar with fundamentals of computer network.
2. Become familiar with transmission media and data communication.
3. Become familiar with addressing techniques and protocols.
4. Become familiar with file transfer protocols, and concepts of secured data communication technique.

Course Outcomes:

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

CO1. **Explain** key networking concepts, principles, design issues and techniques at all protocol layers.
CO2. **Contrast** between different types of networks (e.g., wide area networks vs. local area networks, wired vs. wireless) in terms of their characteristics and protocols used.
CO3. **Describe** different types of networked applications and what underlying network protocols are needed to meet their diverse requirements.
CO4. **Distinguish** between control and data planes in computer networks, and their corresponding architectures in real-world networks (including the Internet).
CO5. **Illustrate** reliable transport protocols and networked system architectures via implementation using Socket APIs, measurement and analysis.

Catalog Description:

In this course, students will study architectures, protocols, and layers in computer networks and develop client-server applications. Topics include the OSI and TCP/IP models, transmission fundamentals, flow and error control, switching and routing, network and transport layer protocols, local and wide-area networks, wireless networks, client-server models, and network security. Students will extend course topics via programming assignments, library assignments and other requirements.

Course Content:

Unit I: **7 lecture hours**

What Is the Internet?, Network Edge, Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models, Networks Under Attack.

Unit II: **10 lecture hours**

Application layer: Principles of Network Applications, Web and HTTP, Electronic mail in Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications.

Unit III: **11 lecture hours**

Transport layer: Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Unit IV: **12 lecture hours**

Network layer: Introduction, Virtual Circuit and Datagram Networks, Internet Protocol (IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Routing in the Internet, Broadcast and Multicast Routing

Unit V: 12 lecture hours

Link layer: Introduction to the Link Layer, Error-Detection and -Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization.

Unit VI: 5 lecture hours

Security in Computer Networks: What Is Network Security? Principles of Cryptography

Unit VII: 3 lecture hours

What Is Network Management? Internet-Standard Management Framework

Text Books:

1. Computer Networking -Top Down Approach- James F. Kurose and Keith W. Ross-- Pearson 2013, sixth Edition
2. Data Communications and Networking- Behrouz A. Forouzan-McGraw-Hill 2007, fourth Edition.

Reference Books:

1. Data Networks- DimitriBertsekas and Robert Gallager- Prentice Hall, 1992
2. Computer Networks (5th Edition) – Andrew S. Tanenbaum, Pearson 2011

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Explain** key networking concepts, principles, design issues and techniques at all protocol layers.	PO1, PO2, PSO1, PSO2
CO2	**Contrast** between different types of networks (e.g., wide area networks vs. local area networks, wired vs. wireless) in terms of their characteristics and protocols used.	PO1, PO3, PO4. PO6, PSO2, PSO3
CO3	**Describe** different types of networked applications and what underlying network protocols are needed to meet their diverse requirements.	PO2, PO3, PO4, PO6, PSO3, PSO4
CO4	**Distinguish** between control and data planes in computer networks, and their corresponding architectures in real-world networks (including the Internet).	PO2, PO4, PO12, PSO1, PSO4
CO5	**Illustrate** reliable transport protocols and networked system architectures via implementation using Socket	PO12, PSO2, PSO3

	APIs, measurement and analysis.	

Course Code	Course Title	PO 1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO 8	PO9	PO 10	P O 11	P O 12	PSO1	PSO2	PS O3	PSO 4
		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer	Expertise to face the challenges of changing trends and career opportunities
CSE11318	Computer Network	2	3	2	3	-	2	-	-	-	-	-	2	2	3	3	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) Semester: IV Stream: CSE
PAPER TITLE: Computer Networks PAPER CODE: CSE11318
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

	SECTION A (Attempt all questions)		
1.	**List** the role of sender, receiver and transmission media during data communication.	**R**	**CO1**
2.	**Explain** the basic elements of Quality System	**U**	**CO2**
3.	**Define** the name of all the layers of TCP/IP protocol.	**U&R**	**CO4**
4.	**What** is Network Topology?	**R**	**CO3**
5.	**List** the role of transmission media during data communication.	**U**	**CO5**
	SECTION B (Attempt any **Three Questions)**		
6.	**Describe** in details all the LAN Topologies with respective diagrams.	**Ap**	**CO3**
7.	**Explain** Leaky Bucket Algorithm in details.	**U**	**CO2**
8.	**Explain** in details the general concept of Stop and Wait Flow Control mechanism with suitable diagram.	**An**	**CO5**
9.	**What** Briefly state the difference between Pure ALOHA and Slotted ALOHA.	**U**	**CO2**
	SECTION C (Answer any Two Questions)		
10.	**Explain** with suitable diagram the layer to layer message communication between sender and receiver using OSI model.	**E & R**	**CO4, CO1, CO2**
11.	**Define** Error. Explain Single bit Error and Burst Error with suitable diagrams.	**R & U**	**CO5**
12.	**Explain** Two Dimensional Parity Check for Error Detection with appropriate diagram.	**E & R**	**CO2**

CSE11319	Theory of Computation	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	H. Sc Mathematics and Physics				
Co-requisites	--				

Course Objectives:

1. To introduce mathematical foundations of computations including automata theory.
2. To help students to realize formal connection between algorithmic problem solving and the theory of languages and automata.
3. To enable students to clarify the practical view towards the applications of these ideas in the engineering.
4. To identify the decidable, undecidable, salvable, and unsolvable problems

Course Outcomes:

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

CO1: **Recall** basics of discrete mathematics and graph theory.
CO2: **Explain** Regular Language and Grammar, CFL and Grammar, and Language Classification
CO3: **Build** FSA, PDA and Turing machines for formal languages
CO3: **Compare** decidability and undecidability of a problem
CO4: **Identify** computational complexity of various problems

Catalog Description:

The concept of modern computation has begun its journey long back. That time it was a practice to solve problems with the help of theoretical machines. This course is about those concepts which helped building modern computing system. This course will help to inculcate the algorithmic approach to solve problems or their solvability. The content of this course in short as this – First a review of discrete mathematics will be given. Moving onwards, the concepts of Finite Automata and Regular Languages, Regular Grammar, Context Free Languages, Classification of Grammars will be discussed. Next, the concept of computability will be discussed which includes Church-Turing Thesis, Decidability and Undecidability, Turing Machine and It's Halting problems etc. Lastly, the computational complexity will also be discussed in sequential and parallel paradigm.

Course Content:

Module 1: [10 Lecture Hours]

Regular Languages and finite Automata: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages, Regular language, Regular expressions, Deterministic finite automata (DFA), Deterministic finite automata (DFA) and equivalence with regular expressions, NFA and equivalence with DFA, Regular grammars and equivalence with finite automata

Module 2: [11 Lecture Hours]

Properties of regular languages, Pumping lemma for regular languages, Problem solving using pumping lemma, Minimization of finite automata, Context-free grammars (CFG), Context-free language (CFL), Chomsky normal forms, Greibach normal forms

Module 3: **[13 Lecture Hours]**

Pushdown Automata

Nondeterministic pushdown automata (NPDA), NPDA and equivalence with CFG, Parse trees, Ambiguity in CFG, Pumping lemma for context-free languages, Deterministic pushdown automata, Deterministic CFLs, Closure properties of CFLs.

Module 4: **[13 Lecture Hours]**

Context Sensitive Grammar

Context-sensitive grammars (CSG), Context-sensitive Languages, Linear bounded automata, Linear bounded automata and equivalence with CSG, The basic model for Turing machines (TM), Turing-recognizable (recursively enumerable) languages, Turing-decidable (recursive) languages, Closure properties of recursively enumerable and recursive languages, Context-sensitive grammars (CSG) and Languages, Linear bounded automata

Module 5: **[13 Lecture Hours]**

Turing Machine

Linear bounded automata and equivalence with CSG, The basic model for Turing machines (TM), Turing-recognizable (recursively enumerable) languages and Turing-decidable (recursive) languages, Closure properties of recursively enumerable and recursive languages, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, Unrestricted grammars and equivalence with Turing machines, Church-Turing thesis, universal Turing machine, Rice's theorem, undecidable problems about languages.

Text Books:

1. "Introduction to the Theory of Computation", 3rd Edition, Michael Sipser, Cengage Learning.
2. "Introduction to Automata Theory, Languages, and Computation", 3rd Edition, John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Pearson Education.

Reference Books:

1. "Introduction to Computability", Illustrated Edition by Frederick C. Hennie, Addison-Wesley.
2. "The Theory of Computation", EE Edition by Bernard M. Moret, Pearson Education Asia.
3. "Introduction to Languages and the Theory of Computation", Illustrated Edition by John C.Martin, Tata McGraw Hill.
4. "Automata and Computability, Undergraduate Texts in Computer Science", 2002 Reprint Edition by Dexter C. Kozen, Springer.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Recall** basics of discrete mathematics and graph theory.	**PO1, PO3, PO12 PSO1**
CO2	**Explain** Regular Language and Grammar, CFL and Grammar, and Language Classification	**PO1, PO2, PO3, PO4, PSO4**
CO3	**Build** FSA, PDA and Turing machines for formal languages	**PO1, PO2, PO3, PO4, PO12, PSO2**
CO4	**Compare** decidability and undecidability of a problem	**PO1, PO2, PO3, PSO2**
CO5	**Identify** computational complexity of various problems	**PO1, PSO1, PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer	Expertise to face the challenges of changing trends and career opportunities
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11319	Theory of Computation	3	3	3	2	-	-	-	-	-	-	-	2	2	2	-	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

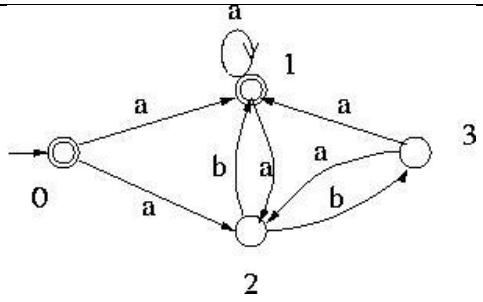
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) Semester: IV Stream: CSE
PAPER TITLE: THEORY OF COMPUTATION PAPER CODE: CSE11319
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	**What** kind of language is accepted by a Turing Machine? A) Regular, B) Context-Free, C) Recursive, D) All of These	**R**	**CO2, CO3**
2.	**Which** of these is the most restrictive grammar? A) Type-0, B) Type-1, C) Type-2, D) Type-3	**R**	**CO2**
3.	**Which** of these are more powerful than a powerful than a single-tape infinite Turing machine? A) Multi-tape Turing Machine, B) Multi-track Turing Machine, C) Both A&B, D) None of these	**R**	**CO3**
4.	**Relate** the following: i. Finite State Automata I) Context Free Language ii. Push Down Automata II) Recursive Language iii. Linear Bounded Automata III) Regular Language iv. Turing Machines IV) Context Sensitive Language	**U**	**CO2, CO3**
5.	**Relate** the following: i. Finite State Automata I) Stack ii. Push Down Automata II) Finite Tape iii. Linear Bounded Automata III) Infinite Tape iv. Turing Machines IV) No Memory	**U**	**CO3**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Define** finite state automata? **Build** the FSA for the language L = a*(a|b)ba*| a*	**R&Ap**	**CO1, CO2**
7.	**Build** the DFA for the following NFA	**Ap**	**CO1, CO3**

			
8.	**What** are the differences between Mealy Machine and Moore Machine. **Explain** with example	**R&U**	**CO3**
9.	**Explain** the Chomsky hierarch of formal grammars. **Demonstrate** the type of language, the corresponding grammar, memory constraints and accepting machines	**U**	**CO2**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Build** Turing machines for the following the grammars: $iL = 1^n iiL = 1^n 2^n iiiL = 1^n 2^n 3^n$	**Ap**	**CO3**
11.	**Build** the Pushdown Automata for the language $a^n b^{2n}$.**Show** the I.D. for the input "aaabbbbbb"	**U, Ap**	**CO3**
12.	**Define** P, NP, NP-Complete and NP-hard classes of problems. **Explain** in details whether P=NP. **Define** Chomsky Normal Form and Greibach Normal Form with examples	**U**	**CO4, CO5**

CSE12320	Database Management Systems Lab	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Set Theory, Knowledge of programming language.				
Co-requisites	--				

Course Objectives

1. To provide a sound introduction to the discipline of database management as a subject in its own right, rather than as a compendium of techniques and product-specific tools.
2. To familiarise the participant with the nuances of database environments towards an information-oriented data-processing oriented framework
3. To give a good formal foundation on the relational model of data
4. To present SQL and procedural interfaces to SQL comprehensively
5. To give an introduction to systematic database design approaches covering conceptual design, logical design and an overview of physical design
6. To motivate the participants to relate all these to one or more commercial product environments as they relate to the developer tasks

Course Outcomes

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

CO1. **Understand**, appreciate and effectively define the underlying concepts of database technologies.
CO2. **Design** and implement a database schema for a given problem-domain Normalize a database.
CO3. **Populate** and query a database using SQL DML/DDL commands.
CO4. **Declare** and enforce integrity constraints on a database using a state-of-the-art RDBMS.

Catalog Description

A database management system (DBMS) is computer application software that provides a way to manage data. The requirement of modern days is to have an automated system that manages, modifies and updates data accurately. This is achieved by a DBMS in robust, correct and non-redundant way. DBMS lab aims at practicing and achieving this aim by using various software's such as SQL, ORACLE, and MS – Access etc. All these require a thorough practice of various DDl, DCL and DML queries.

Course Content

Experiment 1:

Familiarization of structured query language.

Experiment 2:

Table Creation.

Experiment 3:

Insertion, Updation, Deletion of tuples.

Experiment 4:

Executing different queries based on different functions.

Experiment 5:

Performing joining operations.

Experiment 6:

Nested Queries.

Experiment 7:

Use of aggregate functions.

Experiment 8:

Use of group functions.

Experiment 9:

Use of order by functions.

Experiment 10:

Arithmetic operations.

Experiment 11:

Trigger using SQL.

Experiment 12:

Introduction to PL/SQL.

Experiment 13:

Report generation of various queries.

Experiment 14:

Merging Data Bases with front end using ODBC connection.

Experiment 15:

SQL Injection on a non-harmful test page.

Text Books:

1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

Reference Books:

1. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
2. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

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

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
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**, appreciate and effectively define the underlying concepts of database technologies.	PO1, PO3, PO4, PSO4
CO2	**Design** and implement a database schema for a given problem-domain Normalize a database.	PO1, PO4, PO5, PSO1, PSO4
CO3	**Populate** and query a database using SQL DML/DDL commands.	PO2, PO4, PSO2, PSO3
CO4	**Declare** and enforce integrity constraints on a database using a state-of-the-art RDBMS.	PO2, PO3, PSO2, PSO3, PSO4

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE12320	Database Management Systems Lab	2	2	2	2	2	-	-	-	-	-	-	-	2	2	2	3

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

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

Name of the Program: B. Sc (Computer Science) Semester: IV Stream: CSE
PAPER TITLE: Database Management Systems Lab
PAPER CODE: CSE12320
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 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.

Part A (1X 20=20)

Q1.

1. **Table: *Cust***

Column Name	Format	Remarks
Cust_ID	Varchar(3)	Primary Key
Last_Name	Char(20)	
First_Name	Char(20)	Not Null
Add	Varchar(30)	
Phone_No	Number(10)	

2. **Table: *Car***

Column Name	Format	Remarks
Car_No	Varchar(3)	Primary Key
Car_City	Char(20)	Not Null
Car_Type	Char(10)	Not Null
Car_Rating	Number(05)	
Rent	Number(05)	

3. **Table: *Invoice_Details***

Column Name	Format	Remarks
Invoice_No	Varchar(3)	Primary Key
Car_No	Char(20)	Foreign Key(Table 2)
Cust_ID	Varchar(3)	Foreign Key(Table 1)
Issue_Date	Date	

R **CO1, CO2**

	Return_Date Date **Please enter at least 15 values for each table. Please follow your query before entering your values.**		
Part-B (4X5=20)			
Q2.	**Create** a SQL query to find out the names of all the customers and Customer address.	**U**	**CO2**
Q3.	**Change** the return date of invoice number 'I08' to 25/05/2019.	**R**	**CO3**
Q4.	**Write** a SQL query to influence the Car rent Price by 25% where the price is more than 150/- per hours and show the query as "New_Rent".	**AP**	**CO4**
Q5.	**Select** the First name of the customers where customers last name does not exist in your table.	**R**	**CO2**

CSE12321	Software Engineering Lab	L	T	P	C
Version 1.0	Contact hours -45	0	0	3	2
Pre-requisites/Exposure	Software/Hardware evolution at basic level				
Co-requisites	--				

Course Objectives:

1. To help the student to acquire practical knowledge of software evolution process.
2. To enable students modelling software project with appropriate metric and precision at workplace.
3. To give the students a perspective to software design process variables by exposing them to software specification document; and also, to enrich their software testing ability.
4. To enable students, acquire testing and quality assessment of model required for their profession.

Course Outcomes:

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

CO1. **Understand** the practical impact of software engineering.
CO2. **Communicate** with proper software model paradigm to pupils.
CO3. **Classification** of software metric engineering application in industry.
CO4. A**nalyse** effectively analyse testing and maintenance of software project.
CO5. **Classify** and Illustrate software metric analysis for an effective model.

Catalog Description:

There is a growing need for talented software developers across every industry. As technology advances, the ability to build quality software while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.
Software Engineering applies the knowledge and theoretical understanding gained through computer science to building high-quality software products. As a maturing discipline, software is becoming more and more important in our everyday lives. Our software development and engineering professional program is Pace University's response to the tremendous growth of the software development industry.

Course Content:

List of Experiments:

1. Development of requirements specification.

2. Function oriented design using SA/SD.

3. Object-oriented design using UML.

4. Test case design, implementation using Java and testing.

5. Use of appropriate CASE tools and other tools such as configuration management tools.

6. Program analysis tools in the software life cycle.

7. State machine diagram in MS-Visio.

8. UML diagram in MS-Visio.

9. Use case diagram in MS-Visio.

Text Books:

1. Software Engineering: A practitioner's approach, 8th Edition, Roger S. Pressman, McGraw Hill
2. An integrated approach to Software Engineering, Springer/Narosa Edition, PankajJalote.

Reference Books:

1. Fundamentals of Software Engineering, 4th Edition, Rajib Mall, Prentice Hall, India.

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

Components	Continuous Evaluation	End Semester Examination
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 impact of software engineering.	**PO1, PO9, PO11, PSO1**
CO2	**Communicate** with proper software model paradigm to pupils.	**PO1, PO2, PO3, PO5, PO11, PSO1, PSO2**
CO3	**Classification** of software metric engineering application in industry.	**PO1, PO5, PO12, PSO2, PSO4**
CO4	**Analyse** effectively analyse testing and maintenance of software project	**PO1, PO9, PSO3,PSO4**
CO5	**Classify** and Illustrate software metric analysis for an effective model.	**PO1, PO9, PSO2,PO12**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE12321	Software Engineering Lab	3	2	2	-	2	-	-	-	2	-	2	-	2	3	2	2

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

Model Question Paper

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

Name of the Program: B. Sc (Computer Science) Semester: IV Stream: CSE
PAPER TITLE: Software Engineering Lab PAPER CODE: CSE12321
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

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

	Section A (Answer All the Questions) (5 x 2 = 10)		
1.	**List** the Function oriented design using SA/SD? Write a note on it.	**U**	**CO1**
2.	**Enumerate** the basic elements of UML diagram for hospital management system.	**U**	**CO2**
3.	**Define** Data coupling.	**R**	**CO3**
4.	**What** is Program analysis tools in the software life cycle?	**R**	**CO4**
5.	**Give** the principles of SRS document for ATM.	**U**	**CO4**
	SECTION B (Attempt any **Six Questions) (6 x 5 = 30)**		
6.	**Describe** the stages of sequence diagram to withdraw money from ATM?	**U**	**CO1**
7.	**Examine** the essential phases of UML modelling?	**Ap**	**CO2**
8.	**Elucidate** the state machine diagram for chocolate vending m/c in MS Visio.	**Ap**	**CO3**
9.	**Explain** Scrum and agile application briefly explain it with proper example?	**Ap**	**CO4 /CO2**
10.	**Explain** in detail about validation test case design in project.	**U**	**CO4**
11.	**Write** a Project estimation technique and estimation issues in project progress line.? Explain with a Case Study	**U**	**CO4**
12.	**Distinguish** features of the Student, teacher UML class in a university by suitable diagram in MS Visio?	**An**	**CO5**

CSE12322	Computer Networks Lab	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Basic Computer knowledge, C				
Co-requisites	--				

Course Objectives:

1. To become familiar with fundamentals of computer network.
2. To become familiar with transmission media and data communication.
3. To become familiar with addressing techniques and protocols.
4. To become familiar with file transfer protocols, and concepts of secured data communication technique.

Course Outcomes:

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

CO1. **Analye** the different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
CO2. **Analyse** Network device in details and connect the computers in local area network.
CO3. **Explain** the basic network command and network configuration commands.
CO4. **Construct** a network topology using packet tracer software.
CO5. **Construct** a network using distance and link state vector routing protocol.

Catalog Description:

This course provides students with hand-on training regarding the design, troubleshooting, modeling and evaluation of computer networks. In this course students are going to experiment in a real test-bed networking environment, and learn about network design and troubleshooting topics and tools such as: network addressing, address resolution protocol (ARP), basic troubleshooting tools (eg. Ping, ICMP), IP routing (eg. RIP), route discovery (eg. Traceroute), TCP and UDP, IP fragmentation and many other. Student will also be introduced to the network modeling and simulation, and they will have the opportunity to build some simple networking models using the tool and perform simulations that will help them evaluate their design approaches and expected network performances.

Course Content:

Experiment No. 1. Configuring, testing and measuring Network devices and parameters/policies; Network management experiments. Exercises in Network programming.

Experiment No.2. Implementation of Topologies: Star, Bus, Ring.

Experiment No.3. NIC Installation & Configuration: Familiarization with Networking cables (CAT5, UTP) Connectors (RJ45, T-connector), Hubs and Switches.

Experiment No.4. Implementation based on TCP/UDP Socket: Multicast & Broadcast Sockets

Experiment No.5. Implementation based on Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check) and Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window).

Text Books:

1. Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGraw-Hill.
2. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India.
3. Computer Networks, 8th Edition, Andrew S. Tanenbaum, Pearson New International Edition.

Reference Books:

1. Internetworking with TCP/IP, Volume 1, 6th Edition Douglas Comer, Prentice Hall of India.
2. TCP/IP Illustrated, Volume 1, W. Richard Stevens, Addison-Wesley, United States of America

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

Components	Continuous Evaluation	End Semester Examination
Weightage (%)	50	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Analyze** the different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.	**PO1, PO2, PO4, PSO4**
CO2	**Analyze** Network device in details and connect the computers in local area network.	**PO1, PO2, PO3, PO5, PSO1**
CO3	**Explain** the basic network command and network configuration commands.	**PO2, PO4, PSO2, PSO3**
CO4	**Construct** a network topology using packet tracer software.	**PO4, PO5, PSO1, PSO4**
CO5	**Construct** a network using distance and link state vector routing protocol.	**PO3, PSO2, PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs
Course Code	Course Title	PO1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO 8	PO9	PO 10	P O 11	P O 12	PSO1	PSO2	PS O3	PSO 4
CSE1232 2	Comp uter Netwo rks Lab	2	3	2	2	2	-	-	-	-	-	-	-	2	2	2	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: IV Stream: CSE
PAPER TITLE: Computer Networks Lab PAPER CODE: CSE12322
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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 8 = 40)			
1.	Write a program to **determine** the class of IP address. Please note that user will provide input of the entire IP address as a single string.	**AP**	**CO2**
2.	Write a program to **develop** Stop And Wait ARQ to manage the following situations - a. Frame Lost. b. ACK Lost. c. Frame and ACK both Lost. d. Frame and ACK both send successfully.	**AP**	**CO3**
3.	Write a menu driven program to **develop** Pure ALOHA and Slotted ALOHA mechanism as per the user choice.	**U**	**CO4**
4.	Write a menu driven program to **develop** CSMA protocol (i.e. Non persistent CSMA, 1 persistent CSMA and p persistent CSMA) mechanism as per the user choice.	**AP**	**CO5**
5.	**Develop** based on Data Link Layer Error Detection Mechanism (Cyclic Redundancy Check) and Data Link Layer Flow Control Mechanism (Stop & Wait, Sliding Window).	**An**	**CO4**

CSE11323	Artificial Intelligence	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Basic Computer knowledge				
Co-requisites	--				

Course Objectives:

1. To provide the most fundamental knowledge of AI.
2. To make a computer that can learn, plan, and solve problems autonomously.
3. To give the students a perspective on the main research topics in AI i.e. problem solving, reasoning, planning, etc.
4. To enable students to acquire knowledge on some basic search algorithms for problem solving; knowledge representation and reasoning; pattern recognition; fuzzy logic; and neural networks.

Course Outcomes:

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

CO1. **Define** Artificial Intelligence and its approach.
CO2. **Describe** propositional logic and inference engine.
CO3. **Show** Planning with state-space search.
CO4. **Apply** Bayesian networks and other temporal models.
CO5. **Explain** the types of Learning.

Catalog Description:

Artificial intelligence (AI) is a research field that studies how to realize the intelligent human behaviours on a computer. The ultimate goal of AI is to make a computer that can learn, plan, and solve problems autonomously. The main research topics in AI include: problem solving, reasoning, planning, natural language understanding, computer vision, automatic programming, machine learning, and so on. Of course, these topics are closely related with each other. For example, the knowledge acquired through learning can be used both for problem solving and for reasoning. In fact, the skill for problem solving itself should be acquired through learning. Also, methods for problem solving are useful both for reasoning and planning. Further, both natural language understanding and computer vision can be solved using methods developed in the field of pattern recognition. In this course, we will study the most fundamental knowledge for understanding AI. We will introduce some basic search algorithms for problem solving; knowledge representation and reasoning; pattern recognition; fuzzy logic; and neural networks.

Course Content:

Unit I: 12 lecture hours

Introduction – Agents – Problem Formulation – Uninformed Search Strategies – Heuristics – Informed Search Strategies – Constraint Satisfaction

Unit II: 14 lecture hours

Logical Agents – Propositional Logic – Inferences – First-Order Logic – Forward Chaining – Backward Chaining – Unification – Resolution

Unit III: 12 lecture hours

Planning With State-Space Search – Partial-Order Planning – Planning Graphs – Planning And Acting In The Real World

Unit IV: **11 lecture hours**

Uncertainty Revision Of Probability - Probabilistic Reasoning – Bayesian Networks – Inferences In Bayesian Networks – Temporal Models – Hidden Markov Models

Unit V: **11 lecture hours**

Learning From Observation - Inductive Learning – Decision Trees – Explanation Based Learning – Statistical Learning Methods - Reinforcement Learning

Text Books:

1. Artificial Intelligence – A Modern Approach, Second Edition, S. Russel and P. Norvig Pearson Education, 2003.

Reference Books:

1. Computational Intelligence: A Logical Approach", David Poole, Alan Mackworth, Randy Goebel, First edition; Oxford university press, 2004.
2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving", Fourth Edition, G. Luger, Pearson Education, 2002.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	**30**	**20**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Define** Artificial Intelligence and its approach.	**PO1, PO2, PO6**
CO2	**Describe** propositional logic and inference engine.	**PO1, PO2, PO3, PO4, PO7**
CO3	**Show** Planning with state-space search.	**PO3, PO4, PO12**
CO4	**Apply** Bayesian networks and other temporal models.	**PO6, PO12, PSO2, PSO3**
CO5	**Explain** the types of Learning.	**PO1, PSO2, PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO 3	PO4	PO 5	PO6	PO7	PO 8	PO9	PO 10	P O 11	P O 12	PSO1	PSO2	PS O3	PSO 4
CSE1132 3	Artificial Intelligence	3	2	2	2	-	2	-	-	-	-	-	2	-	2	2	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: Artificial Intelligence
PAPER CODE: CSE11323
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	**What** is Turing test?	**R**	**CO1**
2.	**Where** are Rewards and Penalty applied?	**U**	**CO2**
3.	**What** is ID3 Algorithm?	**U&R**	**CO4**
4.	_____ starts from Known Facts to find New Facts.	**R**	**CO3**
5.	**What** are AI neural networks?	**R**	**CO5**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Discuss** Problem Solving Technique of Artificial Intelligence in step wise manner	**Ap**	**CO3**
7.	**State** the comparison Supervised Learning, Unsupervised Learning and Reinforcement Learning.	**U**	**CO2**
8.	**Explain** A* Searching Algorithm with suitable example.	**An**	**CO5**
9.	**What** is TensorFlow?	**U**	**CO4**
	SECTION C(Answer Any Two Questions) (2 x 10 = 20)		
10.	**Define** Inference Engine. Explain Forward Chaining and Backward Chaining with separate examples.	**E & R**	**CO4, CO1, CO2**
11.	**Explain** First Order Markov Chain and Second Order Markov Chain with suitable examples	**R & U**	**CO5**
12.	**List** some disadvantages related to linear models.	**U**	**CO2**

CSE11324	WEB TECHNOLOGY	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Basic Programming				
Co-requisites	--				

Course Objectives:

1. To introduce students familiar with client server architecture.
2. To develop a web application using java technologies
3. To develop skills and project-based experience needed for entry into web application and development careers.

Course Outcomes:

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

CO1. Develop a dynamic webpage by the use of java script and DHTML

CO2. Write a well formed / valid XML document.

CO3. Write a server side java application called Servlet to catch form data sent from client, process it and store it on database.

CO4. Connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.

Course Description:

On completion of this course, a student will be familiar with client server architecture and able to develop a web application using java technologies. Students will gain the skills and project-based experience needed for entry into web application and development careers.

Course Content:

Unit I **12 Lectures hours**

Introduction to HTML : HTML Common tags- Block Level and Inline Elements, Lists, Tables, Images, Forms, Frames; Cascading Style sheets, CSS Properties; Java Script: Introduction to Java Script, Objects in Java Script, Dynamic HTML with Java Script Unit II JDBC: Data Base, Database Schema, A Brief Overview Of The JDBC Process, JDBC Driver Types, JDBC Packages, Database Connection, Associating The JDBC-ODBC Bridge With Database, Creating, Inserting, Updating And Deleting Data In Database Tables, Result Set, Metadata.

Unit III **12 Lectures hours**

Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Servlets, the Advantage of Servlets over "Traditional" CGI, Basic Servlet Structure, Simple Servlet Generating Plain Text, Compiling and Installing the Servlet, Invoking the Servlet, Lifecycle of a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Context Parameters, Handling Http Request & Responses, Using Cookies-Session Tracking, Servlet with JDBC.

Unit IV **12 Lectures hours**

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing, JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP

Objects, Declaring Variables and Methods , Sharing Data Between JSP pages, Users Passing Control and Data between Pages, JSP application design with JDBC, JSP Application Design with MVC.

Unit V **12 Lectures hours**

Introduction to PHP: Basics of PHP, Functions, Error Handling, Interaction between PHP and MySQL, Database using Forms,Using PHP to manipulate and Retrieve Data in MySQL.

TEXT BOOKS:

1. Jon Duckett "Beginning Web Programming" WROX.
2. Marty Hall and Larry Brown "Core Servlets and Java Server pages Vol. 1: Core Technologies", Pearson.

REFERENCE BOOKS:

1. DanWoods and Gautam Guliani,"Open Source for the Enterprise: Managing Risks, Reaping Rewards", O'Reilly, Shroff Publishers and Distributors, 2005.
2. Sebesta,"Programming world wide web" Pearson.
3. Dietel and Nieto,"Internet and World Wide Web – How to program",PHI/Pearson Education Asia.
4. Murach,"Murach's beginning JAVA JDK 5", SPD
5. Wang,"An Introduction to web Design and Programming",Thomson

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Develop** a dynamic webpage by the use of java script and DHTML	PO1, PO2, PO4
CO2	**Write** a well formed / valid XML document.	PO1, PO3, PO2, PO5
CO3	**Write** a server side java application called Servlet to catch form data sent from client, process it and store it on database.	PO2, PO4, PO5, PSO1
CO4	**Connect** a java program to a DBMS and perform insert, update and delete operations on DBMS table.	PSO1, PO2, PO3

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE11324	WEB TECHNOLOGY	2	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: III Stream: CSE
PAPER TITLE: Web Technology
PAPER CODE: CSE11324
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	**Describe** Computer Vision in one sentence.	**U**	**CO1**
2.	**Explain** about JPEG Format.	**Evaluate**	**CO1**
3.	**Describe** the difference between Perspective and orthographic projection	**U**	**CO1**
4.	**Explain** the representation of image.	**Evaluate**	**CO2**
5.	**Describe** difference between Computer vision and computer graphics.	**U**	**CO2**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Write** the algorithm of Sobel Edge Detection.	**Ap**	**CO1**
7.	**Examine** Gaussian Filtering in details.	**Ap**	**CO2**
8.	**Describe** Edge detection methods.	**U**	**CO6**
9.	**Describe** with Example: i) Tiff ii) PNG	**U**	**CO3, CO5**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Write** the steps of Canny Edge Detection	**Ap**	**CO2**
11.	**Write** the steps of Haris Corner Detector.	**Ap**	**CO4**
12.	**Describe** about Different type of Noise.	**U**	**CO3**

CSE11325	Elective-I (Image and Video Processing)	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Basic knowledge of image and pixels				
Co-requisites	--				

Course Objectives:

1. To describe and explain basic principles of digital image processing.
2. To design and implement algorithms that perform basic image processing (e.g. noise removal and image enhancement).
3. To design and implement algorithms for advanced image analysis (e.g. image compression, image segmentation).
4. To assess the performance of image processing algorithms and video processing and estimation algorithms.

Course Outcomes:

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

CO1: **Understand** the need for image transforms different types of image transforms and their properties.
CO2: **Develop** any image processing application and explain different techniques employed for the enhancement of images.
CO3: **Explain** different causes for image degradation and overview of image restoration techniques.
CO4:
Understand the need for image compression and to learn the spatial and frequency dom ain techniques of image compression, along with steps of video processing.

Catalog Description:

This course provides an introduction to basic concepts, methodologies and algorithms of digital image processing focusing on the following two major problems concerned with digital images: (1) image enhancement and restoration for easier interpretation of images, and (2) image analysis and object recognition. Some of the image processing techniques (e.g., spatial domain and frequency domain methods) will also be studied in this course. The primary goal of this course is to lay a solid foundation for students to study advanced image analysis topics such as computer vision systems, biomedical image analysis, and multimedia processing & retrieval, along with video analysis systems.

Course Content:

Unit I: 9 lecture hours

Fundamentals of Image processing and Image Transforms:

Basic steps of Image processing system sampling and quantization of an Image: Basic relationship between pixels Image Transforms: 2D Discrete Fourier Transform, Discrete Cosine Transform (DCT), Discrete Wavelet transforms.

Unit II: 16 lecture hours

Image Processing Techniques: Image Enhancement, Spatial Domain methods: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing Spatial filters, Sharpening Spatial filters,

Frequency Domain methods - Basics of filtering in frequency domain, image smoothing, image sharpening, selective filtering Image Segmentation: Segmentation concepts, point, line and Edge detection, Thresholding, region based segmentation.

Unit III: 8 lecture hours

Image Compression: Image compression fundamentals: coding Redundancy, spatial and temporal redundancy. Compression models: Lossy and Lossless, Huffman coding, Arithmetic coding, LZW coding, run length coding, Bit Plane coding, transform coding, predictive coding , wavelet coding, JPEG standards.

Unit IV: 12 lecture hours

Basic Steps of Video Processing: Analog video, Digital Video, Time varying Image Formation models, 3D motion models, Geometric Image formation, Photometric Image formation, sampling of video signals, filtering operations.

2-D Motion Estimation: Optical flow, general methodologies, pixel based motion estimation, Block matching algorithm, Mesh based motion Estimation, global Motion Estimation, Region based motion estimation, multi resolution motion estimation. Waveform based coding, Block based transform coding, predictive coding, Application of motion estimation in video coding.

Text Books:

1. "Digital Image Processing", Gonzaleze and Woods, 3 rdedition , Pearson.
2. "Handbook of image and video processing", Bovik, Alan C. Academic press, 2010.

Reference Books:

1. "Digital video Processing", M. Tekalp, Prentice Hall International.
2. "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", Chris Solomon, Toby Breckon, John Wiley & Sons.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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 need for image transforms different types of image transforms and their properties.	PO1,PO2, PO3, PO6
CO2	**Develop** any image processing application and explain different techniques employed for the enhancement of images.	PO2,PO1,PO4 ,PSO1, PSO2
CO3	**Explain** different causes for image degradation and overview of image restoration techniques.	PO1,PO2,PO3 , PSO1, PSO2
CO4	**Understand** the need for image compression and to learn the spatial and frequency domain techniques of image compression, along with steps of video processing.	PO4,PO6 PSO1, PSO2

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career,	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11325	Elective-I(Image and Video Processing)	3	3	2	2	-	2	-	-	-	-	-	-	3	3	-	-

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

Model Question Paper

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

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: Elective-I (Image and Video Processing) PAPER CODE: CSE11325
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**Define** an image.	**R**	**CO1**
2.	**What** is simultaneous contrast?	**R**	**CO2**
3.	**Define** maximum filter and minimum filter.	**R**	**CO3**
4.	**Define** sampling.	**R**	**CO4**
5.	**What** is 3D motion model?	**R**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Explain** Discrete wavelet transform.	**U**	**CO1**
7.	**Examine** the objective of image enhancement technique.	**An**	**CO2**
8.	**Explain** Image restoration. Mention two areas where image restoration process can be applied.	**U**	**CO3**
9.	**Distinguish** between analog video and digital video.	**An**	**CO4**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Explain** the various components of a general purpose image processing system.	**U**	**CO4**
11.	**Explain** application of motion estimation in video coding.	**U**	**CO4**
12.	**Explain** some of the basic relationships that exist between pixels in a digital image.	**U**	**CO1**

CSE11326	Cryptography & Cyber Security (ELECTIVE – I)	L	T	P	C
Version 1.0	Contact hours -45	3	0	0	3
Pre-requisites/Exposure	Computer Network, Engineering Mathematics				
Co-requisites	--				

Course Objectives:

1. To understand basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To understand various protocols for cyber security to protect against the threats in the cyber space.

Course Outcomes:

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

CO1. **Define** the basics of OSI security model and Classical Encryption Technique.
CO2. **Understand** and identify the application of Public Key Encryption Techniques and practices.
CO3. **Demonstrate** the application of Data Authentication and Authorization.
CO4. **Examine** the basics concept of Network Security and Web Security.
CO5. **Appraise** the recent threats and attacks against the technical world and design some effective prevention scheme.

Catalog Description:

Effective network communication is an integral part of technical life. Cyber Security and Cryptography is a process of securing the data communication, all the algorithms, messages etc. In this course you will learn the inner workings of cryptographic systems and how to correctly use them in real-world applications. The course begins with a detailed discussion of how two parties who have a shared secret key can communicate securely when a powerful adversary eavesdrops and tampers with traffic. We will examine many deployed protocols and analyze mistakes in existing systems. The second half of the course discusses public-key techniques that let two parties generate a shared secret key. Throughout the course participants will be exposed to many exciting open problems in the field and work on fun (optional) programming projects. In the course cybersecurity we will cover more advanced security tasks such as zero-day vulnerability, privacy mechanisms, and other forms of encryption.

Course Content:

Unit I: 10 lecture hours

Classical Encryption Techniques: Symmetric Cipher - Substitution Techniques, Transposition Techniques; Rotor Machines, Steganography, Block Cipher and Data Encryption Standard (DES), Strength of DES, Cryptanalysis - Differential and Linear model. Symmetric Ciphers -Triple DES, Blowfish; Confidentiality using Conventional Encryption - Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.

Unit II: 9 lecture hours

Public Key Encryption, Digital Signatures, Prime Number Format's and Euler's Theorems, Primality testing. Public Key Cryptography and RSA - Principles of Public Key Cryptosystems, RSA Algorithm, Key Management, Diffie-Hellman Key Exchange.

Unit III: 10 lecture hours

Authentication Protocol, Message Authentication, Authentication Requirements,

Authentication Functions, Message Authentication Codes, Message Digest - MD5, Digital Signatures and Authentication Protocols.

Unit IV: 10 lecture hours

Network Security: Authentication Applications - Kerberos, X.509 Directory Authentication Service; Electronic Mail Security: Pretty Good Privacy, IP Security-Overview, Architecture, Authentication Header, And Encapsulation Security Payload

Web Security: Basic requirements, Secure Sockets Layer and Transport Layer security, Secure Electronic Transaction.

Unit V: 6 lecture hours

System Security: Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and their Design Principles.
Cross Site Scripting Attack, SQL Injection Spoofing and Sniffing

Text Books:

1. "Cryptography and Network Security", William Stallings, 4th Edition, Pearson Education/PHI, 2006.
2. "Network Security: Private Communication in Public World", Charlie Kaufman, RadiaPerman, Mike Speciner, 2nd Edition, Pearson Education, 2011.

Reference Books:

1. "Cryptography and Network Security", Atulkahate, TMH, 2003.
2. "Cyber Security", Nina Godbole, WILEY, 2003.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Define** the basics of OSI security model and Classical Encryption Technique.	PO2
CO2	**Understand** and identify the application of Public Key Encryption Techniques and practices.	PO2, PO3,PSO1
CO3	**Demonstrate** the application of Data Authentication and Authorization.	PO3, PO5, PO8 ,PSO1
CO4	**Examine** the basics concept of Network Security and Web Security.	PO2, PO6,PSO3
CO5	**Appraise** the recent threats and attacks against the technical world and design some effective prevention scheme.	PO5, PO6, PO8, PSO3

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career,	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	
CSE1 1326	ELECTIVE – I (Cryptography & Cyber Security)	-	3	2	-	2	2	-	2	-	-	-	-	2	-	2	-

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

Model Question Paper

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

Name of the Program: B. Sc (Computer Science) Semester: III Stream: CSE
PAPER TITLE: ELECTIVE – I (Cryptography & Cyber Security) PAPER CODE: CSE11326
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**Describe** the Threat and Vulnerability with examples.	**U**	**CO1**
2.	**Explain** the about Private key and Public Key with examples.	**Evaluate**	**CO1**
3.	**Describe** the difference Sniffing and Spoofing	**U**	**CO1**
4.	**Explain** the nature of Virus.	**Evaluate**	**CO2**
5.	**Describe** why Ceaser Cipher is mono alphabetic.	**U**	**CO2**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Write** the algorithm of RSA.	**Ap**	**CO1**
7.	**Examine** whether the AES is better than DES or not.	**Ap**	**CO2**
8	**Describe** the various malware in details.	**U**	**CO6**
9.	**Describe** with Example: i) XSS attack ii) Sql injection	**U**	**CO3, CO5**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Write** the steps to solve the following equation: i. x= 1 mod 5 ii. x= 2 mod 7 iii. x= 3 mod 9 iv. x= 4 mod 11	**Ap**	**CO2**
11.	**Write** the steps of Diffie Hellman Key Exchange Algorithm with Example	**Ap**	**CO4**
12.	**Describe** the advantage of Public Key Encryption over Symmetric Key Encryption. **Describe** Firewalls and their Design Principles.	**U**	**CO3**

CSE11327	Cloud Computing	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	DBMS, Java, Python				
Co-requisites	--				

Course Objectives:

1. To provide students with the fundamentals and essentials of Cloud Computing.
2. To understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
3. To understand the importance of protocols and standards in computing

Course Outcomes:

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

CO1. **Describe** the fundamental concepts of databases.
CO2. **Construct** an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures.
CO3. **Summarize** relational model concept and illustrate the relational constraints.
CO4. **Develop** Structured Query Language (SQL) and apply to query a database.
CO5. **Define** normalization for relational databases.
CO6. **Define** and illustrate fundamental principles of data organization, query optimization and concurrent transaction processing.

Catalog Description:

Cloud Computing is a large scale distributed computing paradigm which has become a driving force for information technology over the past several years. The exponential growth data size in scientific instrumentation/simulation and social media has triggered the wider use of cloud computing services. We will explore solutions and learn design principles for building large network based systems to support both compute and data intensive computing across geographically distributed infrastructure.

Course Content:

Unit I: **10 lecture hours**

Definition and evolution of Cloud Computing; Enabling Technologies, Service and Deployment Models Popular Cloud Stacks and Use Cases; Benefits, Risks, and Challenges of Cloud Computing Economic Models and SLAs. Topics in Cloud Security; Common cloud providers and their associated cloud stacks and popular cloud use case scenarios.

Unit II: **12 lecture hours**

Cloud Infrastructure

Historical Perspective of Data Centers; Datacenter Components: IT Equipment and Facilities; Design Considerations: Requirements, Power, Efficiency, & Redundancy, Power calculations, PUE (Power usage effectiveness) and Challenges in Cloud Data Centers; Cloud Management and Cloud Software Deployment Considerations.

Unit III: **9 lecture hours**

Virtualization (CPU, Memory, I/O); Case Study: Amazon EC2; Software Defined Networks (SDN); Software Defined Storage (SDS).

Unit IV: **8 lecture hours**

Cloud Storage

Introduction to Storage Systems; Cloud Storage Concepts, Distributed File Systems (HDFS, Ceph FS); Cloud Databases (HBase, MongoDB, Cassandra, DynamoDB) ; Cloud Object Storage (Amazon S3, OpenStack Swift, Ceph).

Unit V: 6 lecture hours

Programming Models: Distributed Programming for the Cloud; Data-Parallel Analytics with Hadoop; MapReduce (YARN); Iterative Data-Parallel Analytics with Apache Spark ; Graph-Parallel Analytics with GraphLab 2.0 (PowerGraph).

Text Books:

1. Enterprise Cloud Computing - Technology, Architecture, Applications, GautamShroff, Cambridge University Press, 2010
2. Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wiley,2011

Reference Books:

1. Cloud Computing: Concepts and Practices, Naresh Kumar Sehgal, Pramod Chandra P. Bhatt, Springer 2018.
2. AWS System Administration: Best Practices for Sysadmins in the Amazon Cloud, Federico Lucifredi and Mike Ryan, "O'Reilly Media, Inc, 2018.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** need of cloud computing, cloud essentials, benefits, challenges, limitations, usage and applications, business models	**PO1, PO2,PSO3**
CO2	**Discuss** the meaning of cloud computing, understand cloud models, cloud application architecture, cloud computing architecture and various infrastructure models.	**PO1, PO4,PO5,PSO1,PSO2,PSO3**
CO3	**Understand** the various cloud services.	**PO2,PSO1,PSO3,PSO4**
CO4	**Determine** the various software plus services possible for the users to place the very sensitive data housed on-site.	**PO2,PO3, PO4,PSO2,PSO4**
CO5	**Summarize** knowledge of virtualization to know about virtual machines, virtual cluster, types of virtualization	**PO4,PO5,PSO1,PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE11327	Cloud Computing	2	3	3	3	2	-	-	-	-	-	-	-	3	2	3	3

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

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

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: Cloud Computing
PAPER CODE: CSE11327
Maximum Marks: 40 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, and 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.	**Define** Community cloud with proper example?	**R**	**CO1**
2.	**Define** security governance.	**R**	**CO5**
3.	**Define** VM security?	**R**	**CO4**
4.	**Explain** data privacy**.**	**U**	**CO3**
5.	**Explain** Cloud Computing	**U**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Illustrate** any five web services of Amazon in detail	**U**	**CO1**
7.	**Compare** Google App Engine and Amazon AWS	**U**	**CO1**
8.	**List** the examples of SaaS, PaaS and IaaS**.**	**R**	**CO1**
9.	**Identify** the services provided by Aneka?	**AP**	**CO2**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Summarize** the different forms of testing related to cloud	**U**	**CO4**
11.	**Explain** about the security aspects of cloud computing	**U**	**CO5**
12.	**Explain** briefly the cloud infrastructure self service	**U**	**CO2**

CSE11328	ELECTIVE – II (Computer Vision)	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Computer Graphics, Engineering Mathematics				
Co-requisites	--				

Course Objectives:

1. To introduce students the fundamentals of image formation.
2. To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition.
3. To develop an appreciation for various issues in the design of computer vision and object recognition systems.
4. To provide the student with programming experience from implementing computer vision and object recognition applications.

Course Outcomes:

On completion of this course students will be able to:

CO1. Identify basic concepts, terminology, theories, models and methods in the field of computer vision.
CO2. Describe known principles of human visual system
CO3. Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition.

Course Description:

This **course** provides an introduction to **computer vision**, including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification, scene understanding, image analysis using edge detection, corner detection, and segmentation.

Course Content:

Unit I: **[9 lecture hours]**
Overview of Computer Vision, Computer imaging systems, lenses, Image formation and sensing, Image Noise, Filtering

Unit II: **[9 lecture hours]**
Edge detection, Hough transform, corner detection, Segmentation, Morphological filtering, Fourier and Wavelet transform.

Unit III: **[9 lecture hours]**
Feature extraction through shape, histogram, color, spectral information, texture and using CVIP tools; Feature analysis through feature vectors, distance /similarity measures, data pre-processing; Pattern classification.

Unit IV: **[9 lecture hours]**
Image Structure - Linear filters, Finding Lines - from detection to model fitting, clustering and segmentation, pixel grouping methods; Camera Models – Epi polar Geometry, Stereo and multi-view Reconstruction

Unit V: **[9 lecture hours]**

Recognition Building blocks - Detectors and Descriptors, SIFT and Single Object Recognition, Optical flow and Tracking. Recognition - Object Scenes, Activities - Object classification and detection, Object in scenes, Human Motion Detection.

Text Books

T1. "Computer Vision - A modern approach", D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.

T2. "Computer Vision: Algorithms and Applications", Richard Szeliksy, (http://szeliski.org/Book/)

Reference Books

R1. "Fundamentals of Computer Vision", Mubarak Shah

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Identify** basic concepts, terminology, theories, models and methods in the field of computer vision.	PO1, PO2, PSO1
CO2	**Describe** known principles of human visual system	PO3, PO2, PO5
CO3	**Describe** basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition.	PO4, PO5, PSO1

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems	Envisage and work on laboratory and multi- disciplinary tasks in computer	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11328	ELECTIVE – II (Computer Vision)	2	2	2	2	2	-	-	-	-	-	-	-	2	-	-	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: ELECTIVE – II (Computer Vision)
PAPER CODE: CSE11328
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**Describe** Computer Vision in one sentence.	**U**	**CO1**
2.	**Explain** about JPEG Format.	**Evaluate**	**CO1**
3.	**Describe** the difference between Perspective and orthographic projection	**U**	**CO1**
4.	**Explain** the representation of image.	**Evaluate**	**CO2**
5.	**Describe** difference between Computer vision and computer graphics.	**U**	**CO2**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Write** the algorithm of Sobel Edge Detection.	**Ap**	**CO1**
7.	**Examine** Gaussian Filtering in details.	**Ap**	**CO2**
8.	**Describe** Edge detection methods.	**U**	**CO6**
9.	**Describe** with Example: i) Tiff ii) PNG	**U**	**CO3, CO5**
	SECTION C (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Write** the steps of Canny Edge Detection	**Ap**	**CO2**
11.	**Write** the steps of Haris Corner Detector.	**Ap**	**CO4**
12.	**Describe** about Different type of Noise.	**U**	**CO3**

CSE11329	Internet of Things	L	T	P	C
Version 1.0	Contact hours -45	3	0	0	3
Pre-requisites/Exposure	Basics of Microprocessor / Microcontroller				
Co-requisites	--				

Course Objectives:

1. To give a brief overview of IoT.
2. To enable Basic, 1G and 2G, 3G, 3.5G, 4G (LTE) and 5G precision at workplace.
3. To give the students a perspective to smart objects, Network Convergence, IoT-Standard and Characteristic.
4. To enable students, study the structure of Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP for their profession.

Course Outcomes:

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

CO1: **Understand** the Architecture of IoT, Security issues, Opportunities for IoT.
CO2: **Construct** the Concept of wireless sensor network.
CO3: **Develop** Network Convergence, IoT-Standard and Characteristic
CO4: **Compare** a Precise analysis of Sensor network architecture,
CO5: **Classify** IoT Taxonomy, System Model.

Catalog Description:

The Internet of Things (IoT), as a new growth engine of the information and communications technology industry, has sparked global enthusiasm. However, academic deliberation has concentrated on technological aspects, discounting the multifaceted nature of IoT. Therefore, we reviewed non-technical and technical domain to examine the current status of IoT discourse and applied analytic hierarchy process models to assess the priorities for future IoT research.

Course Content

Unit I: 2 lecture hours

Introduction: What is IoT and the connected world?

Architecture of IoT, Security issues, Opportunities for IoT

Unit II: 4 lecture hours

Wireless Communication

Wireless Communication –Basic, 1G and 2G, 3G, 3.5G, 4G (LTE) and 5G

Unit III: 2 lecture hours

Wireless Sensor Networks

Concept of wireless sensor network, Chronology of sensor node, Senor network architecture,

Taxonomy, System Model.

Unit IV: 6 lecture hours

Architecture

IoT built from smart objects, Network Convergence, IoT-Standard and Characteristic,

Outline of Architecture, Opportunities in IoT, Architectural Components and its mapping into protocols.

Unit V: 8 lecture hours

Wireless Standards

What are Wireless Standards? Network and Device Layer Protocol, Routing Protocol for Low Power and Lossy Networks (RPL), 6LowPAN, IEEE 802.15.4, Bluetooth Low Energy (BLE), LTE.

Unit VI: 10 lecture hours

Middleware layer Protocol

multicast DNS (mDNS), DNS Service Discovery (DNS-SD)

Application Layer Protocol

Constrained Application Protocol (CoAP), Message Queuing Telemetry Transport (MQTT), Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP).

Unit VII: 13 lecture hours

Localization, Data Storage (Big Data), Web of Things (WoT) and Security

Localization:

Localization algorithms, Indoor localization, Localization for mobile systems, Applications, Data Storage (Big Data): Managing high rate sensor data, Processing data streams, Data consistency in an intermittently connected or disconnected environment, Identifying outliers and anomalies.

Security: Why is security for IoT so hard? Threat models; Defensive strategies and examples

Applications

Smart health; Home automation; Location tracking

Text Books:

1. Internet of Things (IoT): Technologies, Applications, Challenges and Solutions- BK Tripathy (Editor), J Anuradha (Editor), CRC press, 2018
2. The Internet of Things, S. Greengard, MIT Press, 2015, 1st Edition

Reference Books:

1. Ala Al-Fuqaha et al., "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications", IEEE Communication Surveys & Tutorials, Vol. 17, No. 4, Fourth Quarter 2015, pp 2347-76
2. S. M. RIAZUL ISLAM et al., "The Internet of Things for Health Care: A Comprehensive Survey", IEEE Access, Jun 2015, pp678-08

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** is the Architecture of IoT, Security issues, Opportunities for IoT.	**PO1, PO6, PO8, PSO1, PSO2**
CO2	**Construct** the Concept of wireless sensor network.	**PO1, PO2, PO3, PSO1, PSO3**
CO3	**Develop** Network Convergence, IoT-Standard and Characteristic.	**PO1, PO2, PO3, PO5, PSO1, PSO2,PO12**
CO4	**Compare** a Precise analysis of Sensor network architecture.	**PO1, PO6, PO8, PSO2, PSO4, PO12**
CO5	**Classify** IoT Taxonomy, System Model.	**PO1, PO6, PO8, PSO3, PSO4, PSO2**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
ECS11 329	Internet of Things	3	2	2		2	2		2					2	3	2	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: Internet of Things PAPER CODE: CSE11329
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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 2 = 10)		
1.	**List** the steps involved in Architecture of IoT	**U**	**CO1**
2.	**Enumerate** the basic elements of wireless sensor network	**U**	**CO2**
3.	**Define** Extensible Messaging and Presence Protocol (XMPP),	**R**	**CO3**
4.	**What** is multicast DNS (mDNS)?	**R**	**CO4**
5.	**Give** the principles of Localization for mobile systems.	**U**	**CO3**
	SECTION B (Attempt any **Three Questions) (3x 5 = 15)**		
6.	**Describe** the characteristics of Constrained Application Protocol (CoAP), Message Queuing Telemetry Transport (MQTT), .	**U**	**CO1**
7.	**Examine** Why is security for IoT so hard? And **it's Inference** with your own example.	**U**	**CO1, CO2**
8.	**Elucidate** the factors influencing IoT security.	**R**	**CO3**
9.	**Explain** with Example: i) Smart healthcare ii) Reliability Coefficient of smart city.	**An**	**CO4 /CO5**
	SECTION C (Attempt any **Two Questions) (2x 10 = 20)**		
10.	**Explain** in detail about Home automation.	**U**	**CO4**
11.	**Write** a Quality Control **Plan** for the Managing high rate sensor data, Processing data streams.	**R**	**CO4**
12.	**Distinguish** Data consistency in an intermittently connected or disconnected environment.	**An**	**CO5**

CSE11330	ELECTIVE – II (Machine Learning)	L	T	P	C
Version 1.0	Contact Hours –45	3	0	0	3
Pre-requisites/Exposure	Data Structure, Discrete Structure				
Co-requisites	--				

Course Objectives:

1. To help the student to acquire knowledge of basics of artificial intelligent computing.
2. To enable students to gain basic knowledge of machine learning.
3. To incorporate the evolutionary computational knowledge.
4. To enable students to acquire various problem solving, learning, and planning ability.
5. To enable students to apply machine learning models to solve real-life problems.

Course Outcomes:

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

CO1: **Identify** the Mathematical Preliminaries for Machine Learning.
CO2: **Discuss** about Supervised Learning and identify or recognize the different algorithms falling under this category.
CO3: **Discuss** about Unsupervised Learning and solve different algorithms falling under this category.
CO4: **Identify** the Learning Theory by sketching the various Ensemble Methods of Machine Learning.
CO5: **Understan**d the basic ideas of Bayesian Learning and try to implement some model which is based on it.

Catalog Description:

There is a growing need for talented machine learning/data scientist developers across every industry. As technology advances, the ability to build quality machine learning driven software while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.
Machine Learning applies the knowledge and theoretical understanding gained through computer science to building high-quality intelligent software products. As a maturing discipline, Artificial Intelligence is becoming more and more important in our everyday lives. Our software development and engineering professional program is University's response to the tremendous growth of the software development industry.

Course Content:

Unit I: 9 lecture hours

Mathematical Preliminaries for Machine Learning: Basic over view of Linear Algebra, Intercepts and Slope, Probability, Random Variable, Matrix Theory, Vectors, Optimization, Multivariate Normal Distribution, Multivariate Calculus, Brief Introduction on MATLAB/Python.

Unit II: 9 lecture hours

Supervised Learning: Learning by Computing Distances: Distance from Means and Nearest Neighbours; Learning by Asking Questions: Decision Tree based Classification and Regression, Linear Regression: optimization and gradient descent; Logistic Regression: K-Nearest Neighbour Classifier;

Naïve Bayes Classifier; Support Vector Machines: Linear case and Non-linear case; Random Forest Classifier.

Unit III: 9 lecture hours

Unsupervised Learning: Uses of Unsupervised Learning; Data Clustering: K-means and Kernel K-means; Linear Dimensionality Reduction: Principal Component Analysis, Multiple Discriminant Analysis; Nonlinear Dimensionality Reduction via Kernel PCA; Matrix Factorization and Matrix Completion; Introduction to Generative Models; Generative Models for Clustering: GMM and Intro to EM; Expectation Maximization and Generative Models for Dimensionality Reduction.

Unit IV: 9 lecture hours

Learning Theory: Introduction to Learning Theory, VC Dimension; Ensemble Methods: Boosting: Basic, Illustrations and Equations; Boosting versus Bagging; Semi-supervised Learning.

Unit V: 9 lecture hours

Bayesian Classifier, Belief Network, Probabilistic Graphical Model: Bayesian Network Representations and Semantics; Decision Making under uncertainty; Knowledge Engineering;

Text Books:

1. "Machine Learning", T.M. McGraw-Hill, Tom M. Mitchell, McGraw-Hill, 1997
2. "Pattern Recognition and Machine Learning", C. Bishop, Springer, 2006.
3. "Pattern Classification", R. Duda, E. Hart, and D. Stork, Willey-Interscience, 2000.
4. "Machine learning: a probabilistic perspective", Kevin R. Murphy, MIT Press, 2012.

Reference Books:

1. "Machine Learning", E. Alpaydin, MIT Press, 2010.
2. "Introduction to statistical pattern recognition", K. Fukunaga, Academic press, 2013.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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 Mathematical Preliminaries for Machine Learning.	PO2, PO3, PO5, PSO1
CO2	**Discuss** about Supervised Learning and identify.	PO1, PO2, PO3
CO3	**Discuss** about Unsupervised Learning and solve different algorithms falling under this category.	PO1, PO4, PSO1
CO4	**Identify** the Learning Theory by sketching the various Ensemble Methods of Machine Learning.	PO1, PO5, PSO1

	C	Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO 1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
ECS 11330	ELECTIVE –II (Machine Learning)	3	2	2	2	2	-	-	-	-	-	-	-	3	-	-	-

1=weakly mapped
2= moderately mapped

3=strongly mapped

Model Question Paper

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

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: ELECTIVE – II (Machine Learning)
PAPER CODE: CSE11330
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**What** is Supervised Learning?	**R**	**CO1**
2.	**What** is maximum margin in SVM?	**R**	**CO2**
3.	Is Bayesian Learning s parametric model or not? **State** reason.	**U**	**CO5**
4.	In **which** category of clustering K-Means clustering belong to?	**R**	**CO4**
5.	In PCA **which** concept of mathematics is used?	**R**	**CO3**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Implement** XOR logic using MLP.	**AP**	**CO2**
7.	**What** are the differences between bagging and boosting?	**R**	**CO4**
8.	**What** is maximum margin classifier? Explain what are Support vectors in SVM	**R**	**CO3**
9.	**Describe** the process of PCA. How PCA helps reducing the size of the dataset?	**U**	**CO4**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	**Derive** the weight update rule for a single hidden layer in backpropagation	**AP**	**CO2**
11.	**Write** short notes on: - i) Bias ii) Variance. Explain using Simple Linear Regression	**U**	**CO1**
12.	Cluster the dataset using K-Means clustering into 4 clusters. **Find** out the inter-cluster dissimilarity and intra-cluster similarity.	**AP**	**CO4**

CSE12331	Elective-I Lab(Image and Video Processing Lab)	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Basic knowledge of image and computer graphics				
Co-requisites	--				

Course Objectives:

1. To help the student to understand the Fundamentals of Digital image and its processing.
2. To perform the image enhancement technique for the improvement of pictorial information for human perception i.e. enhancing the quality of the image so that the image will have a better look
3. To apply the concepts of image segmentation and compression using which a graduate will be able to remove the redundancy pixels and transmit the image using less bandwidth.
4. To describe object detection and recognition technique learning which a graduate will be able to understand the fundamentals of digital signal processing with particular emphasis on problems in biomedical research and clinical medicine.

Course Outcomes:

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

CO1. **Understand** the fundamentals of Digital image and its processing.
CO2. **Apply** the image enhancement for improving quality of picture.
CO3. **Apply** image segmentation and compression to remove redundant pixels.
CO4. **Describe** the object detection and recognition.

Catalog Description:

This course provides an introduction to basic concepts, methodologies and algorithms of digital image processing focusing on the following two major problems concerned with digital images: (1) image enhancement and restoration for easier interpretation of images, and (2) image analysis and object recognition. Some of the image processing techniques (e.g., spatial domain and frequency domain methods) will also be studied in this course. The primary goal of this course is to lay a solid foundation for students to study advanced image analysis topics such as computer vision systems, biomedical image analysis, and multimedia processing & retrieval.

Course Content:

Experiments:

1. i.Write a program to read a color image and convert it into grey scale image.
   ii. Write a program to add the salt & pepper noise into the image
   iii. Write a program to add the speckle noise into the image
2. Write a program to apply medial filter and averaging on the image
3. Write a program to detect the edge using Sobel and Prewitt operator
4. Write a program to detect the edge using Laplecian and Canny operator
5. Write a program to find the corner of an image using Harris Corner Detector
6. Experiment on line fiiting and circle fitting using Hough Transform
7. Experiment on Image Segmentation
8. Experiment on **Camera Calibration**
9. Implementation of **Tomasi–Kanade Factorisation Algorithm**
10. **Scale Invariant Feature Transform** (**SIFT**) to establish point correspondence

Text Books:

1. "Digital Image Processing", Gonzaleze and Woods, 3 rdedition , Pearson.
2. "Handbook of image and video processing", Bovik, Alan C. Academic press, 2010.

Reference Books:

1. "Digital video Processing", M. Tekalp, Prentice Hall International.

2. "Fundamentals of Digital Image Processing A Practical Approach with Examples in Matlab", Chris Solomon, Toby Breckon, John Wiley & Sons.

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

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
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 fundamentals of Digital image and its processing.	PO1,PO2,PO3, PSO1
CO2	**Apply** the image enhancement for improving quality of picture.	PO1,PO2,PO4,PO5 , PSO2
CO3	**Apply** image segmentation and compression to remove redundant pixels.	PO2,PO3,PO4,PO5 , PSO2
CO4	**Describe** the object detection and recognition.	PO1,PO2,PO4,PO5

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	P O 9	P O 10	P O 11	P O 12	PSO1	PSO2	PSO3	PSO4
CSE12 331	Elective-I Lab(Image and Video Processing Lab)	3	3	1	3	3	-	-	-	-	-	-	--	1	2	-	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: Elective-I (Image and Video Processing Lab) PAPER CODE: CSE12331
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:

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

Section A (Answer All the Questions) (5 x 8 = 40)			
1.	**Develop** a program to read a color image and convert it into grey scale image. ii. Develop a program to add the salt & pepper noise into the image ii. Develop a program to add the speckle noise into the image	**AP**	**CO1**
2.	**Develop** a program to apply medial filter and averaging on the image	**AP**	**CO2**
3.	**Develop** a program to detect the edge using Sobel and Prewitt operator	**AP**	**CO4**
4.	**Develop** a program to detect the edge using Laplecian and Canny operator	**AP**	**CO4**
5.	**Develop** a program to find the corner of an image using Harris Corner Detector	**AP**	**CO3**

CSE12332	Cryptography & Cyber Security Lab	L	T	P	C
Version 3.1	Contact hours -45	0	0	3	2
Pre-requisites/Exposure	Computer Network, Engineering Mathematics				
Co-requisites	--				

Course Objectives:

1. To understand basics of Cryptography and Network Security.
2. To be able to secure a message over insecure channel by various means.
3. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
4. To understand various protocols for cyber security to protect against the threats in the cyber space.

Course Outcomes:

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

CO1. **Define** the basics of OSI security model and Classical Encryption Technique.
CO2. **Understand** and identify the application of Public Key Encryption Techniques and practices.
CO3. **Demonstrate** the application of Data Authentication and Authorization.
CO4. **Examine** the basics concept of Network Security and Web Security.
CO5. **Appraise** the recent threats and attacks against the technical world and design some effective prevention scheme.

Catalog Description:

Effective network communication is an integral part of technical life. Cyber Security and Cryptography is a process of securing the data communication, all the algorithms, messages etc. In this course you will learn the inner workings of cryptographic systems and how to correctly use them in real-world applications. The course begins with a detailed discussion of how two parties who have a shared secret key can communicate securely when a powerful adversary eavesdrops and tampers with traffic. We will examine many deployed protocols and analyze mistakes in existing systems. The second half of the course discusses public-key techniques that let two parties generate a shared secret key. Throughout the course participants will be exposed to many exciting open problems in the field and work on fun (optional) programming projects. In the course cybersecurity we will cover more advanced security tasks such as zero-day vulnerability, privacy mechanisms, and other forms of encryption.

Course Content:

Unit I: 10 lecture hours

Classical Encryption Techniques: Symmetric Cipher - Substitution Techniques, Transposition Techniques; Rotor Machines, Steganography, Block Cipher and Data Encryption Standard (DES), Strength of DES, Cryptanalysis - Differential and Linear model. Symmetric Ciphers -Triple DES, Blowfish; Confidentiality using Conventional Encryption - Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.

Unit II: 9 lecture hours

Public Key Encryption, Digital Signatures, Prime Number Format's and Euler's Theorems, Primality testing. Public Key Cryptography and RSA - Principles of Public Key Cryptosystems, RSA Algorithm, Key Management, Diffie-Hellman Key Exchange.

Unit III: **10 lecture hours**

Authentication Protocol, Message Authentication, Authentication Requirements,

Authentication Functions, Message Authentication Codes, Message Digest - MD5, Digital Signatures and Authentication Protocols.

Unit IV: **10 lecture hours**

Network Security: Authentication Applications - Kerberos, X.509 Directory Authentication Service; Electronic Mail Security: Pretty Good Privacy, IP Security-Overview, Architecture, Authentication Header, Encapsulation Security Payload

Web Security: Basic requirements, Secure Sockets Layer and Transport Layer security, Secure Electronic Transaction

Unit V: **6 lecture hours**

System Security: Intruders, Malicious Software, Viruses and Related Threats, Counter Measures, Firewalls and their Design Principles.

Cross Site Scripting Attack, SQL Injection Spoofing and Sniffing

Text Books

1. "Cryptography and Network Security", William Stallings, 4th Edition, Pearson Education/PHI, 2006.
2. "Network Security: Private Communication in Public World", Charlie Kaufman, RadiaPerman, Mike Speciner, 2nd Edition, Pearson Education, 2011.

Reference Books

1. "Cryptography and Network Security", Atulkahate, TMH, 2003.
2. "Cyber Security", Nina Godbole, WILEY, 2003.

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

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
Weightage (%)	50	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Define** the basics of OSI security model and Classical Encryption Technique.	**PO2**
CO2	**Understand** and identify the application of Public Key Encryption Techniques and practices.	**PO2**
CO3	**Demonstrate** the application of Data Authentication and Authorization.	**PO5**
CO4	**Examine** the basics concept of Network Security and Web Security.	**PO2**
CO5	**Appraise** the recent threats and attacks against the technical world and design some effective prevention scheme.	**PO5**

Course Code	Course Title	Computational knowledge PO 1	Design/development of solutions PO 2	Problem analysis PO 3	The engineer and society PO 4	Conduct investigations of complex problems PO 5	Environment and sustainability PO 6	Modern tool usage PO7	Individual and team work PO 8	Ethics PO 9	Communication PO 10	Project management and finance PO 11	Life-long learning PO 12	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, PSO1	Competence to use research, experiment, contemporary issues to solve industrial problems. PSO2	Envisage and work on laboratory and multi- disciplinary tasks in computer science. PSO3	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs. PSO4
CSE12332	Cryptography & Cyber Security Lab	-	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: ELECTIVE – I LAB (Cryptography & Cyber Security Lab)
PAPER CODE: CSE12332
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

Section A (Answer All the Questions) (5 x 8 = 40)			
1.	**Write** the steps of Diffie Hellman Key Exchange Algorithm with Example	**Ap**	**CO4**
2.	**Describe** the advantage of Public Key Encryption over Symmetric Key Encryption. **Describe** Firewalls and their Design Principles.	**U**	**CO3**
3.	**Describe** the various malware in details.	**U**	**CO6**
4.	**Describe** with Example: i) XSS attack ii) Sql injection	**U**	**CO3, CO5**
5.	**Write** the steps to solve the following equation: i. x= 1 mod 5 ii. x= 2 mod 7 iii. x= 3 mod 9 iv. x= 4 mod 11	**Ap**	**CO2**

CSE12333	Cloud Computing Lab	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	DBMS, Java, Python				
Co-requisites	--				

Course Objectives:

1. To explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.

2. To understand various management and other distinguish services of AWS.
3. To analyze the billing of resources and other paradigm: how to deal with disasters.
4. To understand security and compliances for AWS.
5. To deploy applications over commercial cloud computing infrastructures such as Amazon.

Course Outcomes:

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

CO1. **Define** Cloud Computing and memorize the different Cloud service and deployment models.
CO2. **Describe** importance of virtualization along with their technologies.
CO3. **Use and Examine** different cloud computing services.
CO4. **Analyze** the components of open stack & Google Cloud platform and understand Mobile Cloud Computing.
CO5. **Design** & develop backup strategies for cloud data based on features.

Catalog Description:

Cloud Computing is a large scale distributed computing paradigm which has become a driving force for information technology over the past several years. The exponential growth data size in scientific instrumentation/simulation and social media has triggered the wider use of cloud computing services. We will explore solutions and learn design principles for building large network based systems to support both compute and data intensive computing across geographically distributed infrastructure.

Course Content:

Experiment 1
Logging on to Tivoli Service Automation Manager
UIs Logging in to VMware
Experiment 2
Sphere client Opening the email application
Submitting a new VMware deployment request using the quick path
Experiment 3
Monitoring the deployment status Logging in to the virtual server (optional)
Modifying the virtual server by adding additional memory
Experiment 4
Adding a VMware server with a monitoring agent to an existing project
Customizing the service catalog Creating a future reservation request
Experiment 5
Displaying projects and servers in the self-service
UI Monitoring a virtual server in the IBM Tivoli Monitoring Tivoli Enterprise Portal (optional)
Experiment 6

Creating a backup image of the virtual machine
Deleting a virtual server Canceling a project

Experiment 7

Creating a project with a virtual server restored from a saved backup image

Experiment 8

Requesting a new project with additional software as a different customer
Monitoring the deployment status (optional)

Experiment 9

Disabling automatic approval Submitting a service request to restart a virtual machine
Viewing Tivoli Service Automation Manager reports

Experiment 10

Logging into the standalone VMware ESX server Exploring general hypervisor information

Experiment 11

Monitoring hypervisor's performance Managing data stores
Exploring Virtual Machine files

Text Books:

1. Enterprise Cloud Computing - Technology, Architecture, Applications, GautamShroff, Cambridge University Press, 2010
2. Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wiley,2011

Reference Books:

1. Cloud Computing: Concepts and Practices, Naresh Kumar Sehgal, Pramod Chandra P. Bhatt, Springer 2018.
2. AWS System Administration: Best Practices for Sysadmins in the Amazon Cloud, Federico Lucifredi and Mike Ryan, "O'Reilly Media, Inc, 2018.

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

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
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** Cloud Computing and memorize the different Cloud service and deployment models.	PO1, PO4, PSO1,PSO3
CO2	**Define** Cloud Computing and memorize the different Cloud service and deployment models.	PO1, PO3, PO5, PSO1, PSO2
CO3	**Use and Examine** different cloud computing services.	PO2, PO3, PO5 PSO4
CO4	**Analyze** the components of open stack & Google Cloud platform and understand Mobile Cloud Computing.	PO2,PO3,PSO2, PSO3, PSO4
CO5	**Design** & develop backup strategies for cloud data based on features.	PO4,PSO1, PSO3

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE12333	Cloud Computing Lab	2	2	3	2	2	-	-	-	-	-	-	-	3	2	3	2

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

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

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: Cloud Computing Lab
PAPER CODE: CSE12333
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 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 8 = 40)			
1	**Monitoring** hypervisor's performance Managing data stores **Exploring** Virtual Machine files	**R**	**CO1**
2	**Monitoring** the deployment status Logging in to the virtual server (optional) **Modifying** the virtual server by adding additional memory	**R**	**CO5**
3	**Creating** a backup image of the virtual machine Deleting a virtual server Canceling a project	**R**	**CO4**
4	**Requesting** a new project with additional software as a different customer Monitoring the deployment status (optional)	**U**	**CO3**
5	**Disabling** automatic approval Submitting a service request to restart a virtual machine Viewing Tivoli Service Automation Manager reports	**U**	**CO2**

CSE12334	ELECTIVE – II (Computer Vision Lab)	L	T	P	C
Version 1.0	Contact Hours - 45	0	0	3	2
Pre-requisites/Exposure	Computer Graphics, Engineering Mathematics				
Co-requisites	--				

Course Objectives:

1. To introduce students the fundamentals of image formation.
2. To introduce students the major ideas, methods, and techniques of computer vision and pattern recognition.
3. To develop an appreciation for various issues in the design of computer vision and object recognition systems.
4. To provide the student with programming experience from implementing computer vision and object recognition applications.

Course Outcomes:

At the end of the course, the student will be able to:
CO1. Understand the basics overview of Computer Vision.

CO2. Demonstrate and practice the application of feature extraction through shape, histogram, color, spectral information, texture

CO3. Appraise the application of image Structure - Linear filters, Finding Lines - from detection to model fitting, clustering and segmentation.

CO4. Apply Recognition Building blocks - Detectors and Descriptors, SIFT and Single Object Recognition.

Course Description:

This **course** provides an introduction to **computer vision**, including fundamentals of image formation, camera imaging geometry, feature detection and matching, stereo, motion estimation and tracking, image classification, scene understanding, image analysis using edge detection, corner detection, and segmentation.

Course Content:

Module 1: 10 lecture hours 1. Apply different type of noise in an image 2. Implement different type of filtering on an image.	
Module 2: 10 lecture hours Perform different type of edge detection algorithm	
Module 3: 10 lecture hours Perform different type of Corner Detection Algorithm	

Module 4: **11 lecture hours**
1. Perform Morphological filtering 2. Perform Hough Transform

Text Books:
Computer Vision: A Modern Approach *Second Edition*, David Forsyth and Jean Ponce ,Pearson, 2003**.**
Computer Vision, First edition, D.H. Ballard, C.M. Brown; Prentice-Hall Inc New Jersey, 1982,
Reference Books:
Machine Vision, First edition , R. Jain, R. Kasturi, B.G. Schunck; McGraw-Hill, 1995,
Computer Vision and Action Recognition, Second Edition, M. A. R Ahad; Springer, 2011,
Digital Image Processing, Second edition, B. Jahne; Springer Verlag, 2005

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

Components	**Continuous Evaluation**	**End Semester Examination**
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 basics overview of Computer Vision.	**PO1, PO3, PSO1**
CO2	**Demonstrate** and practice the application of feature extraction through shape, histogram, color, spectral information, texture	**PO2, PO4, PSO3**
CO3	**Appraise** the application of image Structure - Linear filters, Finding Lines - from detection to model fitting, clustering and segmentation.	**PO1, PO3, PSO1**
CO4	**Apply** Recognition Building blocks - Detectors and Descriptors, SIFT and Single Object Recognition.	**PO2, PO4, PSO3**

Course Code	Course Title	Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE12334	ELECTIVE – II (Computer Vision Lab)	2	2	2	2	-	-	-	-	-	-	-	-	2	-	2	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: ELECTIVE – II (Computer Vision) Lab
PAPER CODE: CSE12334
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

Section A (Answer All the Questions) (5 x 8 = 40)			
1.	**Describe** Edge detection methods.	**U**	**CO6**
2.	**Describe** with Example: i) Tiff ii) PNG	**U**	**CO3, CO5**
3.	**Write** the steps of Canny Edge Detection	**Ap**	**CO2**
4.	**Write** the steps of Haris Corner Detector.	**Ap**	**CO4**
5.	**Describe** about Different type of Noise.	**U**	**CO3**

CSE12335	Internet of Things Lab	L	T	P	C
Version 1.0	Contact hours -45	0	0	3	2
Pre-requisites/Exposure	Basics of Microprocessor/Microcontroller				
Co-requisites	--				

Course Objectives:

1. To give a brief overview of IoT.
2. To enable Basic, 1G and 2G, 3G, 3.5G, 4G (LTE) and 5G precision at workplace.
3. To give the students a perspective to smart objects, Network Convergence, IoT-Standard and Characteristic.
4. To enable students, study the structure of Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP for their profession.

Course Outcomes:

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

CO1. **Understand** the Architecture of IoT, Security issues, Opportunities for IoT
CO2. **Compare** and analyse Concept of wireless sensor network
CO3. **Explore** Network Convergence, IoT-Standard and Characteristic.
CO4. **Construct** analysis of Arduino network architecture,
CO5. **Classify** IoT Taxonomy, System Model.

Catalog Description:

The Internet of Things (IoT), as a new growth engine of the information and communications technology industry, has sparked global enthusiasm. However, academic deliberation has concentrated on technological aspects, discounting the multifaceted nature of IoT. Therefore, we reviewed non-technical and technical domain to examine the current status of IoT discourse and applied analytic hierarchy process models to assess the priorities for future IoT research.

Course Content:

List of Experiments:

1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.

8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to things peak cloud.
10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from things peak cloud.

Text Books:

1. Internet of Things (IoT): Technologies, Applications, Challenges and Solutions- BK Tripathy (Editor), J Anuradha (Editor), CRC press, 2018
2. The Internet of Things, S. Greengard, MIT Press, 2015, 1st Edition

Reference Books:

1. Ala Al-Fuqaha et al., "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications", IEEE Communication Surveys & Tutorials, Vol. 17, No. 4, Fourth Quarter 2015, pp 2347-76

2. S. M. RIAZUL ISLAM et al., "The Internet of Things for Health Care: A Comprehensive Survey", IEEE Access, Jun 2015, pp678-08

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

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
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 Architecture of IoT, Security issues, Opportunities for IoT.	**PO1, PO6, PO8, PSO1, PSO2, PSO3, PSO4**
CO2	**Compare** and analyse Concept of wireless sensor network	**PO1, PO2, PO3, PSO1**
CO3	**Explore** Network Convergence, IoT-Standard and Characteristic.	**PO1, PO2, PO3, PO5, PSO1, PSO2, PO12**
CO4	**Construct** analysis of Arduino network architecture.	**PO1, PO6, PO8, PSO2,PO12**
CO5	**Classify** IoT Taxonomy, System Model.	**PO1, PO6, PO8, PSO3, PSO4, PSO2**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
ECS12 335	Interne t of Things Lab	3	2	2	-	2	2	-	2	-	-	-	-	2	3	2	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: Internet of Things Lab
PAPER CODE: CSE12335
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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 8 = 40)			
1.	**Elucidate** the factors influencing IoT security.	**An**	**CO3**
2.	**Explain** on Arduino/Raspberry Pi to upload temperature and humidity data to things peak cloud.	**An**	**CO4 /CO5**
3.	**Explain** in detail about Home automation.	**U**	**CO4**
4.	**What is** Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection	**U**	**CO4**
5.	**Distinguish** a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from things peak cloud	**An**	**CO5**

CSE12336	ELECTIVE – II LAB (Machine Learning Lab)	L	T	P	C
Version 1.0	Contact Hours -45	0	0	3	2
Pre-requisites/Exposure	Data Structure and Python Basics				
Co-requisites	--				

Course Objectives:

1. To help students gain practical insights of AI Algorithm through functional programming.
2. To enable students, communicate with clarity and precision of ML Algorithm.
3. To give the students a perspective enhancement of present system.
4. To enable students to make a comparative study and further improvement.

Course Outcomes:

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

CO1. Implement and Evaluate different search strategies using Prolog.

CO2. Execute and Memorize and different various libraries and the most frequently used func tions, methods, constants required for the implementation of any machine learning.

CO3. Implement and Appraise Linear and Logistic Regression and Classify using K-NN for smaller dataset.

CO4. Implement clustering algorithm and judge the appropriate clustering method for a particular dataset. Also, to design Artificial Neural Network for different dataset and to classify for multiclass datasets.

CO5. Implement Decision Tree and Naïve Bayes classifier, Design Linear SVM and appraise.

Catalog Description:

Every laboratory course brings an open world to a student. It helps the most in exploring and innovating. In Artificial Intelligence and Machine Learning Lab all experiments are given based on real-life problems. Through this kind of practice students become more analytic more inclined to practical thinking. Also, this course brings inquisitiveness to the students. This course is a rationale to the advance courses such as Artificial Neural Network and Deep Learning", "Soft Computing", etc. First Part of this course is the implementation of some important Artificial intelligence aspects such as Agents, Knowledge Representation and Planning. The later part implements all major Machine Learning algorithms with the online datasets.

Course Content:

List of Experiments:

1. Implementation of search strategies (Informed/Heuristics) in PROLOG/C/PYTHON
2. Introduction to various libraries and the most frequently used functions, methods, constants required for the implementation of any machine learning algorithm.
3. Loading of Dataset. Splitting into Test and Train set using Pandas. Visualizing DataSet using MatplotLib.
4. Implementation of Regression:
    a. Linear
    b. Logistic
5. Implementation of K-Nearest Neighbour (KNN).
6. Implementation of K-Means Clustering.
7. Implementation of various weight update methods of Artificial Neural Network using CIFAR10/MNIST Dataset.
8. Implementation of Decision Tree algorithm
9. Implementation of Linear Separator (Linear SVM).

Text Books:

1. "Python Data Science Handbook Essential Tools for Working with Data", 1st Edition, Jake Vander Plas, O'Reilly
2. Prolog Programming for Artificial Intelligence (4th Edition) (International Computer Science Series): Bratko, Ivan

Reference Books:

1. "Foundations of Machine Learning", 2012 Edition, Mehryar Mohri, Afshin Rostamezadeh, Ameet Talwalkar, The MIT Press

Modes of Evaluation: Quiz/Assignment/Written Examination

Examination Scheme:

Components	Continuous Evaluation	End Semester Examination
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** and Evaluate different search strategies using Prolog	PO1, PO2, PO4, PSO1
CO2	**Execute** and Memorize and different various libraries and the most frequently used functions, methods, constants required for the implementation of any machine learning	PO2, PO4, PSO1
CO3	**Implement** and Appraise Linear and Logistic Regression and Classify using K-NN for smaller dataset.	PO1, PO3, PSO1
CO4	**Implement** clustering algorithm and judge the appropriate clustering method for a particular dataset. Also, to design	PO3, PO5, PSO2

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE12336	ELECTIVE – II LAB (Machine Learning Lab)	2	2	3	2	2	-	-	-	-	-	-	-	3	2	-	-

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

Model Question Paper

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

Name of the Program: B. Sc (Computer Science) Semester: V Stream: CSE
PAPER TITLE: ELECTIVE – II LAB (Machine Learning Lab)
PAPER CODE: CSE12336
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Instruction for the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**Implement** Back propagation Algorithm using Python (only basic libraries are to be used) on IRIS dataset. Dataset will be given.	**Ap**	**CO4**
2.	**Implement** Ridge Regression using Python (only basic libraries are to be used).	**Ap**	**CO3**
3.	**Write** a program to detect cancerous cell in FNAC images using Python. Use SVM as a classifier.	**Ap**	**CO5**
4.	**Write** a prolog program to determine if a string is a palindrome or not.	**Ap**	**CO1**
5.	**Implement** A* search strategy using Python. Don't use any Python library for implementing A* search. Only basic libraries are to be used. Display the heuristic value at each step.	**Ap**	**CO1**

CSE11337	Computer Graphics	L	T	P	C
Version 1.0	Contact Hours -60	3	1	0	4
Pre-requisites/Exposure	Basic knowledge of Computer system				
Co-requisites	--				

Course Objectives:

1. To introduce the use of the components of a graphics system and become familiar with building approach of graphics system components and algorithms related with them.
2. To learn the basic principles of 3-dimensional computer graphics.
3. To provide an understanding of how to scan convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
4. To provide an understanding of mapping from a world coordinates to device coordinates, clipping, and projections.
5. To provide an understanding of curve representation and hidden surfaces along with the different color models.

Course Outcomes:

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

CO1. **Explain** software & hardware properties of graphics systems in general and detailed rasterization algorithms for line, circle, ellipse & polygons in particular.
CO2. **Illustrate** how to do 'cut-paste' operation on pictures using 2D clipping and generate modified/edited pictures using 2D/3D geometric transformation & parallel and perspective projection as needed.
CO3. **Explain** the general extension for 3D surfaces and also with basic colour models, such as RGB, CMY, YIQ, HSV.
CO4. **Classify** the hidden surfaces algorithms.
CO5. **Define** fractals and other self-similar features of objects and ray tracing models.

Catalog Description:

Computer Graphics refers to the representation and manipulation of image data by a computer. It is the sub-field of computer science which studies methods for digitally synthesizing and manipulating visual content. Students get an overview of two-dimensional transformation and viewing. Students get an exposure to three-dimensional geometry and representation of 3D objects. Students learn about the curve concept which is essential as not all objects in real life have flat surface. Students learn the different algorithms for hidden surface removal and about different color models.

Course Content:

Unit I 16 lecture hours

Computer graphics & graphics systems: Overview of computer graphics, representing pictures, preparing, presenting & interacting with pictures for presentations. Visualization & image processing. RGB color model, direct coding, and lookup table. Storage tube graphics display, Raster scan display, 3D viewing devices, Plotters, printers, digitizers, Light pens etc. Active & Passive graphics devices.

Scan conversion: Points & lines, Line drawing algorithms; DDA algorithm, Bresenham's line algorithm, Circle generation algorithm, Ellipse generating algorithm, scan line polygon, fill algorithm, boundary fill algorithm, flood fill algorithm.

Unit II **20 lecture hours**

2D transformation & viewing: Basic transformations: translation, rotation, scaling; Matrix representations & homogeneous coordinates, transformations between coordinate systems; reflection shear; Transformation of points, lines, parallel lines, intersecting lines. Viewing pipeline, Window to view port co-ordinate transformation, clipping operations, point clipping, line clipping, clipping circles, polygons & ellipse. Cohen and Sutherland line clipping, Sutherland-Hodgeman Polygon clipping, Cyrus-beck clipping method

Three Dimension Geometry: Introduction, 3D Geometry, Primitives and Transformation, Rotation about an Arbitrary Axis, Parallel Projection, Perspective Projection, Viewing Parameters, and Conversation to View Plan Coordinate, 3D Viewing Transformation, Special Projection

Unit III **14 lecture hours**

Curves: Curve representation, surfaces, designs, Bezier curves, B-spline curves, end conditions for periodic B-spline curves, rational B-spline curves.

Hidden surfaces : Depth comparison, Z-buffer algorithm, Back face detection, BSP tree method, the Painter's algorithm, scan-line algorithm; Hidden line elimination, wire frame methods , fractal - geometry.

Unit IV: **10 lecture hours**

Color& shading models: Light &color model, interpolative shading model, Texture.

Introduction to Ray-tracing: Human vision and color, Lighting, Reflection and transmission models.

Text Books:

1. Computer Graphics with Open GL, 4th Edition, Donald D. Hearn, M. Pauline Baker, Warren Carithers, Pearson Education
2. Computer Graphics using OPENGL, Third Edition,F.S. Hill, Pearson Education.

Reference Books:

1. Computer Graphics- Principles and Practice, Third Edition,John F. Hughes, Andries Van Dam, James D. Foley, Steven K. Feiner, Addison-Wesley

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Explain** software & hardware properties of graphics systems in general and detailed rasterization algorithms for line, circle, ellipse & polygons in particular.	**PO1,PO2,PO3**
CO2	**Illustrate** how to do 'cut-paste' operation on pictures using 2D clipping and generate modified/edited pictures using 2D/3D geometric transformation & parallel and perspective projection as needed	**PO2,PO1,PO4**
CO3	**Explain** the general extension for 3D surfaces and also with basic colour models, such as RGB, CMY, YIQ, HSV.	**PO2,PO3**
CO4	**Classify** the hidden surfaces algorithms	**PO1,PO2,PO4**
CO5	**Define** fractals and other self-similar features of objects and ray tracing models.	**PO1,PO2,PO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11337	Computer Graphics	3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: VI Stream: CSE
PAPER TITLE: Computer Graphics PAPER CODE: CSE11337
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate

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

	Section A (Answer All the Questions) (5 x 1 = 5)		
1.	**What** is pixel?	**R**	**CO1**
2.	**Define** ray tracing	**R**	**CO5**
3.	**What** is 2D scaling?	**R**	**CO2**
4.	**What** is Back face detection?	**R**	**CO4**
5.	**What** is color model?	**R**	**CO3**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** the DDA line drawing algorithm.	**U**	**CO1**
7.	**Explain** the different types of clipping techniques.	**U**	**CO2**
8.	**Explain** the significance of fractals.	**U**	**CO5**
9.	**Explain** the difference between RGB and CMY color model.	**U**	**CO3**
	SECTION C(Answer Any Two Questions) (2 x 10 = 20)		
10.	**Explain** in detail about 3D object representation.	**U**	**CO4**
11.	**Explain** about Hidden surface problem.	**U**	**CO4**
12.	**Distinguish** between parallel and perspective projection.	**An**	**CO5**

CSE11338	Big Data Analytics	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Knowledge on Programming Language (Java preferably), Practice of SQL (queries and sub queries), Exposure to Linux Environment.				
Co-requisites	--				

Course Objectives:

1. To understand the features of R and the process of importing and exporting data from various databases in R.
2. To understand the features and modes of Hadoop along with HDFS and MapReduce architectures.
3. To understand all the steps of data analytics project life cycle and application to various data analytics projects.
4. To perform various supervised and unsupervised machine learning algorithms for big data analysis.

Course Outcomes:

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

CO1. **Describe** the features of R and the process of importing and exporting data from various databases in R.
CO2. **Identify** the features and modes of Hadoop along with HDFS and MapReduce architectures.
CO3. **Describe** and use RHIPE, RHadoop and Hadoop Streaming with R.
CO4. **Identify** and perform all the steps of data analytics project life cycle on various data analytics projects.
CO5. **Develop** various supervised and unsupervised machine learning algorithms for big data analysis.

Catalog Description:

This course provides a basic introduction to big data and corresponding quantitative research methods. The objective of the course is to familiarize students with big data analysis as a tool for addressing substantive research questions. The course begins with a basic introduction to big data and discusses what the analysis of these data entails, as well as associated technical, conceptual and ethical challenges. Strength and limitations of big data research are discussed in depth using real-world examples. Students then engage in case study exercises in which small groups of students develop and present a big data concept for a specific real-world case. This includes practical exercises to familiarize students with the format of big data. It also provides a first hands-on experience in handling and analyzing large, complex data structures. The block course is designed as a primer for anyone interested in attaining a basic understanding of what big data analysis entails. There are no prerequisite requirements for this course.

Course Content:

Unit I: 9 lecture hours

INTRODUCTION TO BIG DATA: Big Data Definition, Characteristic Features, Structure, Applications - Big Data vs Traditional Data - Risks of Big Data - Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Evolution of Analytic Processes, Tools and methods - Analysis vs Reporting - Modern Data Analytic Tools.

Unit II: 9 lecture hours

HADOOP FRAMEWORK: Distributed File Systems - Transparencies - Large-Scale File System Organization – **Master**-Slave/**Master**-Worker Architecture– HDFS concepts – MapReduce Execution, Algorithms using MapReduce, Matrix-Vector Multiplication – Hadoop YARN.

Unit III: 9 lecture hours

DATA ANALYSIS: Statistical Methods: Regression modelling, Classification: SVM & Kernel Methods - Rule Mining - Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods, Grid Based Methods, Model Based Clustering Methods, Predictive Analytics – Data analysis using R.

Unit IV: 9 lecture hours

MINING DATA STREAMS: Stream Data Model and Architecture - Sampling data in a stream - Mining Data Streams and Mining Time-Series data - Real Time Analytics Platform (RTAP) Applications - Real Time Sentiment Analysis, OLAP, Data warehousing concepts.

Unit V: 9 lecture hours

Introduction to NoSQL – Aggregate Data Models – Hbase: Data Model and Implementations – .Cassandra: Data Model – Hadoop Integration. Pig Models developing and testing Pig Latin scripts. Hive Data Types and File Formats – HiveQL Data Definition – HiveQL Data Manipulation – HiveQL Queries.

Text Books:

1. Michael Berthold, David J. Hand, ―Intelligent Data Analysis, Springer, Second Edition, 2007.
2. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.

Reference Books:

1. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
2. Bill Franks, ―Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics‖, Wiley and SAS Business Series, 2012.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Describe** the features of R and the process of importing and exporting data from various databases in R.	PO1, PO2, PO4, PO5, PSO1, PSO2
CO2	**Identify** the features and modes of Hadoop along with HDFS and MapReduce architectures.	PO3, PO5, PO8, PSO1, PSO2, PSO4

CO3	**Describe** and use RHIPE, RHadoop and Hadoop Streaming with R.	**PO1, PO2, PSO1,PSO3,PSO4**
CO4	**Identify** and perform all the steps of data analytics project life cycle on various data analytics projects.	**PO3, PO4, PSO3**
CO5	**Develop** various supervised and unsupervised machine learning algorithms for big data analysis.	**PO1,PO4,PO8, PSO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO4
CSE11338	Big Data Analytics	3	2	2	3	2	-	-	2	-	-	-	-	3	2	3	2

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

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

Name of the Program: B. Sc (Computer Science) Semester: VI Stream: CSE
PAPER TITLE: Big Data Analytics
PAPER CODE: CSE11338
Maximum Marks: 40 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, and 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.	**What** is Big Data? **Explain** characteristics of Big Data	**R & U**	**CO1**
2.	**Define** Semi structured data with example?	**R**	**CO5**
3.	**Illustrate** the functions of Job Tracker and Task Tracker.	**U**	**CO4**
4.	**Explain** Term Frequency and Inverse Document Frequency.	**U**	**CO3**
5.	**Explain** Metastore in Hive.	**U**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Identify** how HBase uses Zookeeper to Build Applications with Zookeeper.	**Ap**	**CO5**
7.	**Explain** the concept of Blocks and Heartbeat Message in HDFS Architecture. **List** the benefits of block transfer? 3+2	**U & R**	**CO1**
8.	**Illustrate** HDFS Architecture. **Explain** the function of NameNode and DataNode.	**Ap & R**	**CO2**
9.	**Explain** the components of SPARK.	**U**	**CO3**
	SECTION (Answer Any Two Questions) (2 x 10 = 20)		
10.	**What** are the advantages of Hadoop? **Explain** Hadoop Architecture and its Components with proper diagram. 7+3	**R & U**	**CO4**
11.	**Explain** Apache Pig architecture and its components with diagram. **Explain** Four V's of Big Data. 7+3	**U**	**CO5**
12.	**Explain** following for MongoDB. (i) Indexing (ii) Aggregation **Explain** the 5 P's of Data science in brief. 2.5+2.5+5	**U**	**CO2**

CSE11339	Artificial Neural Network and Deep Learning	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Introduction to probability theory, linear algebra or statistics				
Co-requisites	Python, prior knowledge of some machine learning algorithms and data structures is very useful.				

Course Objectives:

1. To understand the motivation for different neural network architectures and select the appropriate architecture for a given problem
2. To understand what are the major categories of models (such as CNNs and RNNs), and when they should be applied
3. To apply back propagation algorithm for calculating weight gradients in a feed forward neural network

Course Outcomes:

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

CO1. **Recall** basics on Artificial Intelligence and Neural Network
CO2. **Illustrate** ANN learning, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning and Boltzmann learning
CO3. **Apply** deep learning algorithms and solve real world problems.
CO4. **Choose** deep learning algorithms which are more appropriate for various types of learning tasks in various domains.
CO5. **Identify** the results and performance of the algorithms.

Catalog Description:

Artificial Neural Networks are programs that write themselves when given an objective, some training data, and abundant computing power. Recently, these programs have brought about a wide array of future-like innovations, such as self-driving cars, face recognition, and human-like speech generators. This course offers you an introduction to Deep Artificial Neural Networks (i.e. "Deep Learning"). With focus on both theory and practice, we cover models for various applications, how they are trained and tested, and how they can be deployed in real world applications.

Course Content:

Unit I: 10 lecture hours

Introduction: what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks

Learning Process: Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process

Unit II: 5 lecture hours

Single Layer Perceptron's: Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing

techniques, perception –convergence theorem, Relation between perception and Bayes classifier for a Gaussian Environment.

Multilayer Perceptron: Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection.

Unit III: 10 lecture hours

Back Propagation: Back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning.

Self- Organization Maps: Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive patter classification, Hierarchal Vector quantilizer, contexmel Maps.

Neuro Dynamics: Dynamical systems, stability of equilibrium states, attractors, neuro-dynamical models, manipulation of attractors' as a recurrent network paradigm

Unit IV: 15 lecture hours

Deep Learning: Recent developments in deep neural networks, Limiting the size of the weights, Using noise as a regularize, The ups and down of back propagation, Introduction to full Bayesian approach, The Bayesian interpretation of weight decay, Mackay's quick and dirty method of setting weight costs.

Convolutional Neural Networks: Invariance, stability. Variability models (deformation model, stochastic model), Scattering networks Group Formalism, Supervised Learning: classification, Properties of CNN representations: inevitability, stability, invariance, covariance/invariance: capsules and related models, Connections with other models: dictionary learning, LISTA, other tasks: localization, regression, Embedding (DrLim), inverse problems, Extensions to non-euclidean domains, Dynamical systems: RNNs, LSTM.

Deep Unsupervised Learning: Autoencoders (standard, Denoising, contractive, etc), Variational Autoencoders, Adversarial Generative Networks, Maximum Entropy Distributions.

Unit V: 5 lecture hours

Advance Topics: Non-convex optimization for deep network, Stochastic optimization, Attention and Memory Models, Open Problems.

Text Books:

1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd Edition 2004.
2. Deep Learning, Ian Goodfellow, Yoshua Bengio, and Aaron Courville, MIT press, 2016.

Reference Books:

1. Artificial neural networks, B. Vegnanarayana Prentice Hall of India P Ltd, 2005.
2. Neural networks in Computer intelligence, Li Min Fu, TMH, 2003.

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Recall** basics on Artificial Intelligence and Neural Network	**PO1, PO2, PO3, PO12 PSO1, PSO2, PSO3, PSO4**
CO2	**Illustrate** ANN learning, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning and Boltzmann learning	**PO1, PO2, PO3, PO4, PO5, PSO1, PSO2, PSO3, PSO4**
CO3	**Apply** deep learning algorithms and solve real world problems.	**PO1, PO2, PO3, PO4, PO5, PSO1, PSO2, PSO3, PSO4**
CO4	**Choose** deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	**PO1, PO2, PO3, PO4, PO5, PSO1, PSO2, PSO3, PSO4, PO12**
CO5	**Evaluate** and interpret the results and performance of the algorithms.	**PO1, PO2, PO3, PO4, PSO1, PSO2, PSO3, PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11339	Artificial Neural Network and Deep Learning	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3	3

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

Model Question Paper

Name: **Enrolment No:**	

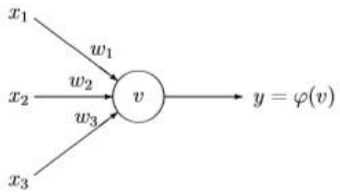
ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) **Semester: VI**
Code- CSE11339 **Stream- CSE**
Time: 03 Hrs.
Paper title– Artificial Neural Network and Deep Learning **Total pages- 1**
Max. Marks: 40 **Total no. of questions- 12**

Instructions:
Attempt All Questions from **Section A** (Each Carrying 1 Marks); any **Three Questions** from **Section B** (Each Carrying 5 Marks). **Any Two Questions from Section C** (Each Carrying 10 Marks).
1. **At top of sheet, clearly mention Name, Roll No., Enrolment No., Paper Name & Code, and Date of Exam.**
2. **Assumptions made if any, should be stated clearly at the beginning of your answer.**
3. **All parts of a Question should be answered consecutively**

SECTION A (Answer All questions)

1.	**What** is neural network? Explain about multilayer perceptron model.	**R**	**CO1**
2.	**What** is the role of activation functions in neural network? Name the concept and briefly explain" Function is a measure to evaluate how good your model's performance is"	**R**	**CO2**
3.	**What** do you understand by back propagation?	**R**	**CO3**
4.	**What** is the difference between a feed forward neural network and recurrent neural network?	**R**	**CO4**
5.	**What** is an auto-encoder?	**R**	**CO5**
	SECTION B (Attempt any **Three Questions)**		
6.	a) **What** are Hyperparameters? b) **What** will happen if the learning rate is too slow or too high?	**R**	**CO1**
7.	a) What are Softmax and ReLU functions? b) **Explain** gradient descent.	**R**	**CO2**
8.	a) **Explain** Bayesian Classifier. Identify working of Bayesian Classifier for a Gaussian Environment?	**R**	**CO3**

	b) **Briefly describe** learning process in form of error correction, memory based, Hebbian?		
9.	**Explain** the concept of overfitting in case of neural networks.	**R**	**CO4/CO5**
	SECTION C (Attempt any **Two Questions)**		
10.	Consider the unit shown on Figure 1.  Suppose that the weights corresponding to the three inputs have the following values: w1 = 2 w2 = −4 w3 = 1 and the activation of the unit is given by the step-function: $\phi(v) =$ 1 if $v \geq 0$ 0 otherwise **Solve** and Find the output value y of the unit for each of the following input patterns: Pattern P1 P2 P3 P4 x1 1 0 1 1 x2 0 1 0 1 x3 0 1 1 1	**Ap**	**CO1** **CO2**
11.	**Explain** various type of learning. Why deep learning has more advantage over traditional machine learning?	**R**	**CO3**
12.	**Explain** principle of forward propagation and back propagation algorithm in case of deep learning.	**R**	**CO4**

CSE11340	ELECTIVE -III (Computer Communication Theory)	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Introduction to computer networks				
Co-requisites	--				

Course Objectives:

1. Explicate the nature of theory in general and of communication theory in particular.
2. Trace the development of theoretical inquiry in the field of communication.
3. Evaluate the utility of theory by applying specific criteria and standards.
4. Distinguish among metatheoretical assumptions and various approaches to communication theory. Examine communication processes in a variety of contexts.
5. Apply communication theory in the development of an original research project.

Course Outcomes:

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

CO1. **Explain** the nature of theory in general and of communication theory in particular.

CO2. **Evaluate** the utility of theory by applying specific criteria and standards.

CO3. **Distinguish** among metatheoretical assumptions and various approaches to communication theory. Examine communication processes in a variety of contexts.

CO4. **Apply** communication theory in the development of an original research project.

Catalog Description:

Introduction to Communication Theory considers various theoretical perspectives on communication processes. In this course, we will examine the foundation of theoretical inquiry (including the nature and development of theory), selected approaches to theorizing, applications of theory, and ethical implications of theory in a number of communication contexts.

Course Content:

Unit I: **5 lecture hours**

What Is the Internet?, Network Edge, Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models, Networks Under Attack.

Unit II: **8 lecture hours**

Principles of Network Applications, Web and HTTP, Electronic mail in Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications.

Unit III: **9 lecture hours**

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Unit IV: **9 lecture hours**

Introduction, Virtual Circuit and Datagram Networks, Internet Protocol (IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Routing in the Internet, Broadcast and Multicast Routing

Unit V: **9 lecture hours**

Introduction to the Link Layer, Error-Detection and -Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization.

Unit VI: 3 lecture hours

What Is Network Security? Principles of Cryptography

Unit VII: 2 lecture hours

What Is Network Management? Internet-Standard Management Framework

Text Books:

1. Computer Networking -Top Down Approach- James F. Kurose and Keith W. Ross--Pearson 2013, sixth Edition
2. Data Communications and Networking- Behrouz A. Forouzan-McGraw-Hill 2007, fourth Edition.

Reference Books:

1. Data Networks- DimitriBertsekas and Robert Gallager- Prentice Hall, 1992
2. Computer Networks (5th Edition) – Andrew S. Tanenbaum, Pearson 2011

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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 nature of theory in general and of communication theory in particular.	PO1, PO2, PO6
CO2	**Evaluate** the utility of theory by applying specific criteria and standards.	PO1, PO3, PO4, PO6, PSO4
CO3	**Distinguish** among meta theoretical assumptions and various approaches to communication theory. Examine communication processes in a variety of contexts.	PO2, PO3, PO4, PSO1
CO4	**Apply** communication theory in the development of an original research project.	PO2, PO4, PSO1, PSO4

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	PSO 4
		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs
CSE11340	ELECTIVE - III (Computer Communication Theory)	2	3	2	3	-	2	-	-	-	-	-	-	2	-	-	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: B. Sc (Computer Science) Semester: VI Stream: CSE
PAPER TITLE: ELECTIVE -III (Computer Communication Theory) PAPER CODE: CSE11340
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

	SECTION A (Attempt all questions) (5 X 1 =5)		
1.	**List** the role of sender, receiver and transmission media during data communication.	**R**	**CO1**
2.	**Explain** the basic elements of Quality System	**U**	**CO2**
3.	**Define** the name of all the layers of TCP/IP protocol.	**U&R**	**CO4**
4.	**What** is Network Topology?	**R**	**CO3**
5.	**List** the role of transmission media during data communication.	**U**	**CO5**
	SECTION B (Attempt any **Three Questions) (3x5=15)**		
6.	**Describe** in details all the LAN Topologies with respective diagrams.	**Ap**	**CO3**
7.	**Explain** Leaky Bucket Algorithm in details.	**U**	**CO2**
8.	**Explain** in details the general concept of Stop and Wait Flow Control mechanism with suitable diagram.	**An**	**CO5**
9.	**What** Briefly state the difference between Pure ALOHA and Slotted ALOHA?	**U**	**CO2**
	SECTION C (Answer any Two Questions) (2x10=20)		
10.	**Explain** with suitable diagram the layer to layer message communication between sender and receiver using OSI model.	**E & R**	**CO4, CO1, CO2**
11.	**Define** Error. Explain Single bit Error and Burst Error with suitable diagrams.	**R & U**	**CO5**
12.	**Explain** Two Dimensional Parity Check for Error Detection with appropriate diagram.	**E & R**	**CO2**

CSE11341	Internet of Things(IoT) Using Augmented Reality	L	T	P	C
Version 1.0		0	0	0	3
Pre-requisites/Exposure	Basics of Microprocessor/Microcontroller				
Co-requisites	--				

Course Objectives:

1. To give a brief overview of IoT.
2. To enable Basic, 1G and 2G, 3G, 3.5G, 4G (LTE) and 5G precision at workplace.
3. To give the students a perspective to smart objects, Network Convergence, IoT-Standard and Characteristic.
4. To enable students, study the structure of Extensible Messaging and Presence Protocol (XMPP), Advanced Message Queuing Protocol (AMQP for their profession.

Course Outcomes:

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

CO1. **Understand** the Architecture of IoT, Security issues, Opportunities for IoT
CO2. **Compare** the Concept of wireless sensor network
CO3. **Explore** Network Convergence, IoT-Standard and Characteristic.
CO4. **Classify** the analysis of Sensor network architecture,
CO5. **Analyze** augmented reality Taxonomy, System Model.

Catalog Description:

The Internet of Things (IoT), as a new growth engine of the information and communications technology industry, has sparked global enthusiasm. However, academic deliberation has concentrated on technological aspects, discounting the multifaceted nature of IoT. Therefore, we reviewed fusion of iot and augmented reality non-technical and technical domain to examine the current status of IoT discourse and applied analytic hierarchy process models to assess the priorities for future IoT research.

Course Content:

Unit I: **3 lecture hours**

Introduction: What is IoT and the connected world?

Architecture of IoT, Security issues, Opportunities for IoT

Unit II: **6 lecture hours**

Wireless Communication

Wireless Communication –Basic, 1G and 2G, 3G, 3.5G, 4G (LTE) and 5G

Unit III: **3 lecture hours**

Wireless Sensor Networks

Concept of wireless sensor network, Chronology of sensor node, Senor network architecture,

Taxonomy, System Model.

Unit IV: **8 lecture hours**

Architecture

IoT built from smart objects, Network Convergence, IoT-Standard and Characteristic,

Outline of Architecture, Opportunities in IoT, Architectural Components and its mapping into protocols.

Unit V: **10 lecture hours**

Database - World Space, World Coordinate, World Environment, Objects - Geometry, Position / Orientation, Hierarchy, Bounding Volume, Scripts and other attributes, VR Environment - VR Database, Tessellated Data, LODs, Cullers and Occluders, Lights and Cameras, Scripts, Interaction - Simple, Feedback, Graphical User InterfaceMiddleware layer Protocol

multicast DNS (mDNS), DNS Service Discovery (DNS-SD)

Application Layer Protocol

Constrained Application Protocol (CoAP), Message Queuing Telemetry Transport (MQTT),

VIRTUAL REALITY APPLICATIONS: Engineering, Architecture, Education, Medicine, Entertainment, Science, Training.

Unit VII: **13 lecture hours**

3D INTERACTION TECHNIQUES:

3D Manipulation tasks, Manipulation Techniques and Input Devices, Interaction Techniques for 3D Manipulation, Deign Guidelines - 3D Travel Tasks, Travel Techniques, Design Guidelines - Theoretical Foundations of Wayfinding, User Centered Wayfinding Support, Environment Centered Wayfinding Support, Evaluating Wayfinding Aids, Design Guidelines - System Control Security: Why is security for IoT so hard? Threat models; Defensive strategies and examples

Applications

Smart health; Home automation; Location tracking

Text Books:

1. Internet of Things (IoT): Technologies, Applications, Challenges and Solutions- BK Tripathy (Editor), J Anuradha (Editor), CRC press, 2018
2. The Internet of Things, S. Greengard, MIT Press, 2015, 1st Edition
3. Alan B Craig, William R Sherman and Jeffrey D Will, "Developing Virtual Reality Applications: Foundations of Effective Design", Morgan Kaufmann, 2009.

Reference Books:

1. Ala Al-Fuqaha et al., "Internet of Things: A Survey on Enabling Technologies, Protocols, and Applications", IEEE Communication Surveys & Tutorials, Vol. 17, No. 4, Fourth Quarter 2015, pp 2347-76

2. S. M. RIAZUL ISLAM et al., "The Internet of Things for Health Care: A Comprehensive Survey", IEEE Access, Jun 2015, pp678-08

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

Examination Scheme:

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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 Architecture of IoT, Security issues, Opportunities for IoT.	**PO1, PO6, PO8, PSO1, PSO2**
CO2	**Compare** the Concept of wireless sensor network.	**PO1, PO2, PO3, PSO1, PSO3**
CO3	**Explore** Network Convergence, IoT-Standard and Characteristic	**PO1, PO2, PO3, PO5, PSO1, PSO2, PSO4, PO12**
CO4	**Classify** the analysis of Sensor network architecture.	**PO1, PO6, PO8, PSO2,PO12**
CO5	**Analyze** augmented reality Taxonomy, System Model.	**PO1, PO6, PO8, PSO3, PSO4, PSO2**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
ECS11341	Internet of Things using augmented reality	3	2	2	-	2	2	-	2	-	-	-	-	2	3	2	2

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

Model Question Paper

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Sc (Computer Science) Semester: VI Stream: CSE
PAPER TITLE: IoT using Augmented Reality PAPER CODE: CSE11341
Maximum Marks: 40 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and 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.	**List** the steps involved in Architecture of IoT	**U**	**CO1**
2.	**Enumerate** the basic elements of wireless sensor network	**U**	**CO2**
3.	**Define** 3-d travel task.	**R**	**CO3**
4.	**What** is script in virtual reality?	**R**	**CO4**
5.	**Give** the principles of Localization for mobile systems.	**U**	**CO3**
	SECTION B (Attempt any **Three Questions) (3 X 5 = 15)**		
6.	**Describe** the characteristics of celluer and occluder in virtual reality. .	**U**	**CO1**
7.	**Examine** Why is security for IoT so hard? And **its Inference** with your own example.	**U**	**CO1, CO2**
8.	**Elucidate** the factors influencing IoT security.	**An**	**CO3**
9.	**Explain** with Example: i) Smart healthcare ii) Reliability Coefficient of smart city.	**U**	**CO4 /CO5**
	SECTION C(Attempt any **Two Questions) (2 X 10 = 20)**		
10.	**Explain** in detail about Home automation.	**U**	**CO4**
11.	**Write** a Quality Control **Plan** for the Managing high rate sensor data, Processing data streams.	**R**	**CO4**
12.	**Distinguish** VR features in gaming environment.	**An**	**CO5**

CSE11342	ELECTIVE – IV (INDUSTRY ORIENTED CERTIFICATION COURSE)) (AWS / Azure Cloud Computing Course)	L	T	P	C
Version 1.0	Contact Hours -45	0	0	0	3
Pre-requisites/Exposure	Basic understanding of computer concepts Computer with internet connection to create accounts on AWS, Azure & GCP and experiment with their service offerings				
Co-requisites	--				

Course Objectives:

1. Basic cloud concepts and compare cloud with the alternative self-hosted IT infrastructure. We will understand the difference between Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).
2. Introduce each of the three public cloud providers in detail: Amazon Web Service (AWS), Microsoft Azure and Google Cloud Platform (GCP).
3. Brief history of the cloud provider and its reach with its global infrastructure. As this is a beginner level course, we will go through step-by-step instructions on creating a new account on the cloud providers' web portal. After that we will take a quick tour of the portal.
4. Go through all the categories of services provided by the cloud provider and core services in each category. We will design a simple architecture using the core services we learned to understand how cloud can be used in real world scenarios.

Course Outcomes:

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

CO1.**Compare** between Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).

CO2. **Discuss** about each of the public cloud providers in detail: Amazon Web Service (AWS), Microsoft Azure and Google Cloud Platform (GCP).

CO3. **Experiment with** the cloud provider services and their infrastructure like API, CLI and SDK.

Catalog Description:

Getting started with cloud technologies can be daunting with the number of cloud providers in the market and also hundreds of services, in the form of building blocks, offered by each cloud provider. But it is important to understand these services or building blocks which are used to create and deploy any type of application in the cloud. Also, cloud providers offer on-demand computing resources and services in the cloud, with pay-as-you-go pricing which saves cost. So, every organization is migrating to the cloud in order to save money. This course is an introductory level course for understanding the cloud technology concepts and gives a detailed introduction to the three largest cloud providers: Amazon Web Service (AWS), Microsoft Azure and Google Cloud Platform (GCP).

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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 Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS).	**PO1,PO2, PO3,PO8, PO11, PSO1, PSO3**
CO2	**Discuss** about each of the public cloud providers in detail: Amazon Web Service (AWS), Microsoft Azure and Google Cloud Platform (GCP).	**PO1,PO2, PO3,PO8, PO9, PO11, PSO1 PSO2**
CO3	**Experiment with** the cloud provider services and their infrastructure like API, CLI and SDK.	**PO1,PO2,PO3, PO9,PSO4**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11342	AWS / Azure Cloud Computing Course	3	3	3	-	-	-	-	2	2	-	2	-	2	2	2	2

1=weakly mapped 2= moderately mapped 3=strongly

CSE11343	ELECTIVE – IV (INDUSTRY ORIENTED CERTIFICATION COURSE) (SAS Global Certification Course for Big Data Analytics)	L	T	P	C
Version 1.0		0	0	0	3
Pre-requisites/Exposure	Knowledge on Programming Language (Java preferably), Practice of SQL (queries and sub queries), Exposure to Linux Environment.				
Co-requisites	--				

Course Objectives:

1. To Understand SAS/ACCESS technologies.
2. To perform extract, transform and load (ETL) tasks using SAS Data Integration Studio.
3. To use DataFlux Data Management Studio to understand and improve your data.
4. To understand the structure and functionality of the SAS Quality Knowledge Base.

Course Outcomes:

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

CO1. **Model** Different solutions using SAS tools.
CO2. **Construct** database to knowledge base.
CO3. **Experiment with** DataFlux to manage the data and improve the quality of data.

Catalog Description:

The main goal of this course is to get an insight and hands on experience using industry standard tools. In this course students will learn to convert the data base to knowledge base and practical exposure of handling big data through some industry standard tools. The DataFlux will help them to understand how to manage the real-life data which are not always formatted or supplied ideally. The course will help students to model different solutions for various business-related problems. The certification will be a global certification which will help the students to map the international standards.

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Model** Different solutions using SAS tools.	PO1,PO8,PSO1,PSO3
CO2	**Construct** database to knowledge base.	PO3, PO8, PO9, PO11, PSO2
CO3	**Experiment with** DataFlux to manage the data and improve the quality of data.	PO2,PO9,PSO4

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CSE11343	SAS Global Certification Course for Big Data Analytics	2	2	2	-	-	-	-	2	2	-	2	-	2	2	2	2

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

CSE14344	PROJECT/DISSERTATION	L	T	P	C
Version 1.0	Contact Hours -180	0	0	12	8
Pre-requisites/Exposure	Basic idea of the required subjects				
Co-requisites					

Course Objectives:

1. To be able to design, develop, document, and test software using current techniques.
2. To understand the fundamentals of computer architecture and computing theory.
3. To be able to solve problems working in group settings.
4. To demonstrate the ability to give presentations and write technical reports.
5. To demonstrate understanding of the importance of social and ethical issues related to the profession.

Course Outcomes:

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

CO1**. Identify** a real world problem
CO2. **Utilize** the modern tools to solve the problems
CO3. **Discuss** in a group to promote team spirit and leadership quality among the students
CO4. **Plan** a projects involving both technological aspects and finance
CO5. **Identify** newer areas of in depth study and research and lifelong learning

Catalog Description:

The course encourages students to take project works that are based on current trends and technologies in various subjects, which will augment the theory subjects. The students will form a group to do their project work. This teaming is to encourage team spirit and to insist the importance of team work. The students typically undergo group formation, finalization of area of work, testing, generation and verification of results, and possible research publication procedure.

Course Content:

The Evaluation of the project work are to be carried out in the following way:

1. In-depth study of a topic proposed by the supervisor
2. Continuous Evaluation through guide.
3. An open pre-submission seminar by the student.
4. End-semester University Examination (An open seminar followed by a Viva voce)

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

Components	Internal Assessment	Mid Semester Examination	End Semester Examination
Weightage (%)	30	20	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	**PO2, PO5**
CO2	**Utilize** the modern tools to solve the problems	**PO3, PO5, PO11**
CO3	**Discuss** in a group to promote team spirit and leadership quality among the students	**PO6, PO9, PSO3**
CO4	**Plan** a projects involving both technological aspects and finance	**PO2, PO6, PO9**
CO5	**Identify** newer areas of in depth study and research and lifelong learning	**PO3**

		Computational knowledge	Design/development of solutions	Problem analysis	The engineer and society	Conduct investigations of complex problems	Environment and sustainability	Modern tool usage	Individual and team work	Ethics	Communication	Project management and finance	Life-long learning	Explore technical knowledge in diverse areas of Computer Science and experience an environment conducive in cultivating skills for successful career, entrepreneurship and higher studies.	Competence to use research, experiment, contemporary issues to solve industrial problems.	Envisage and work on laboratory and multi- disciplinary tasks in computer science.	Expertise to face the challenges of changing trends and career opportunities as per local and global industry needs.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	P O 9	P O 10	PO 11	PO 12	PSO1	PS O2	PS O3	PSO4
CSE14 344	PROJECT/DIS SERTATION	-	2	2	-	2	2	-	-	3	-	2	-	2	2	2	-

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

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CO – PO & PSO MAPPING

Name of the Programme: B. Sc (Computer Science)

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	PSO3	PS04
CSE11301	COMPUTER PROGRAMMING	3	2	2	2	-	-	-	-	-	-	-	-	3	-	-	-
HEN11056	COMMUNICATIVE ENGLISH	-	-	-	-	3	3	-	2	-	-	3	-	-	-	-	2
MTH11211	LINEAR ALGEBRA	3	2	-	2	-	-	2	-	-	-	-	-	-	-	-	3
CSE11302	COMPUTER ORGANIZATION	3	2	3	-	-	-	-	-	-	-	-	3	3	3	3	2
CSE12303	COMPUTER PROGRAMMING LAB	3	3	3	2	-	-	-	-	-	-	-	-	-	3	2	-
CSE12304	COMPUTER ORGANIZATION LAB	3	-	3	-	3	-	-	-	-	-	-	3	3	3	3	-
MTH11518	DISCRETE MATHEMATICS	3	3	-	2	2	-	-	-	-	-	-	-	2	3	-	-
SDS11502	PROBABILITY & STATISTICS	3	2	2	2	-	-	-	-	-	-	-	-	-	2	-	-
EVS11108	ENVIRONMENTAL SCIENCE	-	-	2	2	-	2	3	3	2	-	-	-	-	-	-	2
CSE11305	DATA STRUCTURES	2	3	3	2	-	-	-	-	-	-	-	-	3	2	3	-
CSE11306	PROGRAMMING IN JAVA	3	3	3	2	-	-	-	-	-	-	-	-	3	-	3	3

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	PSO 3	PS 04
CSE12307	DATA STRUCTURES LAB	3	3	3	-	2	-	-	-	-	-	-	-	3	3	3	-
CSE12308	PROGRAMMING IN JAVA LAB	3	3	3	-	2	-	-	-	-	-	-	-	3	-	3	3
CSE11309	OPERATING SYSTEM	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3	-
CSE11310	DESIGN AND ANALYSIS OF ALGORITHM	2	2	3	2	3	-	-	-	-	-	-	3	2	3	3	-
CSE11311	COMPUTER ARCHITECTURE	3	2	3	-	-	3	-	-	-	-	-	3	3	2	3	2
CSE11312	WEB DESIGN AND PROGRAMMING	-	3	3	-	3	2	-	-	-	2	-	2	3	3	-	2
CSE11313	OPERATING SYSTEM LAB	2	3	3	-	3	-	-	-	-	-	-	3	-	3	3	-
CSE12314	DESIGN AND ANALYSIS OF ALGORITHM LAB	2	3	3	2	-	-	-	-	-	-	-	-	3	3	-	-
CSE12315	WEB PROGRAMMING LAB	3	3	3	-	-	-	-	2	-	2		2	2	3	2	-
CSE11316	DATABASE MANAGEMENT SYSTEM	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3	3
CSE11317	SOFTWARE ENGINEERING	3	2	2	-	2	-	-	-	2	-	2	-	2	3	2	2
CSE11318	COMPUTER NETWORKS	2	3	2	3	-	2	-	-	-	-	-	2	2	3	3	2

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	PSO 3	PS 04
CSE11319	THEORY OF COMPUTATION	3	3	3	2	-	-	-	-	-	-	-	2	2	2	-	2
CSE12320	DATABASE MANAGEMENT SYSTEM LAB	2	2	2	2	2	-	-	-	-	-	-	-	2	2	2	3
CSE12321	SOFTWARE ENGINEERING LAB	3	2	2	-	2	-	-	-	2	-	2	-	2	3	2	2
CSE12322	COMPUTER NETWORKS LAB	2	3	2	2	2	-	-	-	-	-	-	-	2	2	2	2
CSE11323	ARTIFICIAL INTELLIGENCE	3	2	2	2	-	2	-	-	-	-	-	2	-	2	2	-
CSE11324	WEB TECHNOLOGY	2	3	2	2	2	-	-	-	-	-	-	-	2	-	-	-
CSE11325	IMAGE AND VIDEO PROCESSING	3	3	2	2	-	2	-	-	-	-	-	-	2	-	2	-
CSE11326	CRYPTOGRAPHY & CYBER SECURITY	-	3	2	-	2	2	-	2	-	-	-	-	2	-	2	-
CSE11327	CLOUD COMPUTING	2	3	3	3	2	-	-	-	-	-	-	-	3	2	3	3
CSE11328	COMPUTER VISION	2	2	2	2	2	-	-	-	-	-	-	-	2	-	-	-
CSE11329	INTERNET OF THINGS (IOT)	3	2	2	-	2	2	-	2	-	-	-	-	2	3	2	2
CSE11330	MACHINE LEARNING	3	2	2	2	2	-	-	-	-	-	-	-	3	-	-	-

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	PSO 3	PS 04
CSE12331	IMAGE AND VIDEO PRO-CESSING LAB	3	3	2	3	3	-	-	-	-	-	-	-	2	-	2	-
CSE12332	CRYPTOG-RAPHY & CYBER SE-CURITY LAB	-	3	2	-	2	2	-	2	-	-	-	-	2	-	2	-
CSE12333	CLOUD COMPU-TING LAB	2	2	3	2	2	-	-	-	-	-	-	-	3	2	3	2
CSE12334	COMPUTER VISION LAB	2	2	2	2	-	-	-	-	-	-	-	-	2	-	2	-
CSE12335	INTERNET OF THINGS (IOT) LAB	3	2	2	-	2	2	-	2	-	-	-	-	2	3	2	2
CSE12336	MACHINE LEARNING LAB	2	2	3	2	2	-	-	-	-	-	-	-	3	2	-	-
CSE11337	COMPUTER GRAPHICS	3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-
CSE11338	BIG DATA ANALYTICS	3	2	2	3	2	-	-	2	-	-	-	-	3	2	3	2
CSE11339	ARTIFICIAL NEURAL NETWORK AND DEEP LEARNING	3	3	3	3	3	-	-	-	-	-	-	2	3	3	3	3
CSE11340	COMPUTER COMMUNI-CATION THEORY	2	3	2	3	-	2	-	-	-	-	-	-	2	-	-	2
CSE11341	INTERNET OF THINGS (IOT) USING AUG-MENTED REALITY (AR)	3	2	2	-	2	2	-	2	-	-	-	-	2	3	2	2

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	PSO 3	PS 04
CSE11342	AWS / AZ-URE CLOUD COMPU-TING COURSE	3	3	3	-	-	-	-	2	2	-	2	-	2	2	2	2
CSE11343	SAS GLOBAL CERTIFICA-TION COURSE FOR BIG DATA ANA-LYTICS	2	2	2	-	-	-	-	2	2	-	2	-	2	2	2	2
CSE14344	PROJECT/DI SSERTATIO N	-	2	2	-	2	2	-	-	3	-	2	-	2	2	2	-
Average of CO-PO Mapping		2.65	2.54	2.46	2.27	2.26	2.07	2.50	2.09	2.17	2.00	2.17	2.45	2.44	2.58	2.47	3.08