ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING

<u>POST-GRADUATE PROGRAM</u>

Course Structure and Syllabus

Master of Computer Applications(MCA)

W.e.f. AY 2022-23

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.

MISSION STATEMENTS OF THE UNIVERSITY

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

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

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

M.S 04: Collaborate with industries, research centres 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 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.

HEAD OF THE DEPARTMENT

DEAN / SCHOOL CONCERNED

ADAMAS UNIVERSITY KOLKATA
PURSUE EXCELLENCE

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

Name of the Programme: MCA

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

PEO 01: Develop software solutions to problems across a broad range of application domains through analysis and design.

PEO 02: Contribute to research of their chosen field and function and communicate effectively, to perform both individually and in a multi-disciplinary team.

PEO 03: Continue the process of life-long learning through professional activities, adapt themselves with ease to new technologies, while exhibiting high ethical and professional standards.

HEAD OF THE DEPARTMENT

DEAN / SCHOOL CONCERNED

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

Name of the Programme: MCA

GRADUATE ATTRIBUTES/PROGRAMME OUTCOMES

GA 01 / PO 01: Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.

GA 02 / PO 02: Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.

GA 03 / PO 03: Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies

GA 04 / PO 04: Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.

GA 05 / PO 05: Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions.

GA 06 / PO 06: Professional Ethics: Ability to apply and commit professional ethics and cyber regulations in a global economic environment.

GA 07 / PO 07: Life-long Learning: Recognize the need for and develop the ability to engage in continuous learning as a computing professional.

GA 08 / PO 08: Project Management and Finance: Ability to understand, management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

GA 09 / PO 09: Communication Efficacy: Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.

GA 10 / PO 10: Societal & Environmental Concern: Ability to recognize economic, environmental, social, health, legal, ethical issues involved in the use of computer technology and other consequential responsibilities relevant to professional practice.

GA 11 / PO 11: Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment.

GA 12 / PO 12: Innovation and Entrepreneurship: Identify opportunities, entrepreneurship vision and use of innovative ideas to create value and wealth for the betterment of the individual and society.

HEAD OF THE DEPARTMENT

DEAN / SCHOOL CONCERNED

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

Name of the Programme: MCA

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO 01: Globally expertise the technological planning and development of software applications in the usage of the modern era.

PSO 02: Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.

PSO 03: Ability to enhance and develop techniques for independent and lifelong learning in computer application.

HEAD OF THE DEPARTMENT	**DEAN / SCHOOL CONCERNED**

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
PG Program: MCA

COURSE STRUCTURE

FIRST YEAR

(Common for all streams)

SEMESTER I							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**H**	**C**
1	CSE21941	Introduction to Programming	3	0	0	3	3
2	MTH21201	Numerical & Statistical Methods	3	0	0	3	3
3	CSE21942	Computer Organization & Architecture	3	0	0	3	3
4	CSE21943	Software Engineering	3	0	0	3	3
5	ENG21112	HSSM– I (English Communication)	3	0	0	3	2
6	CSE21944	Operating System	3	0	0	3	3
7	CSE22945	Introduction to Programming Lab	0	0	3	3	2
8	MTH22201	Numerical & Statistical Methods Lab.	0	0	3	3	2
9	CSE22946	Computer Organization & Architecture Lab.	0	0	3	3	2
10	CSE22947	Operating System Lab	0	0	3	3	2
Semester I Total			**18**	**0**	**12**	**30**	**25**

SEMESTER II							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**H**	**C**
1	CSE21948	Switching Circuits and Logic Design	3	0	0	3	3
2	CSE21949	Object Oriented Programming with Java	3	0	0	3	3
3	CSE21950	Data Structures	3	0	0	3	3
4	CSE21951	Database Management System	3	0	0	3	3
5	MTH21519	Discrete Mathematics	3	0	0	3	3
6	CSE22952	Python Programming Lab	0	0	3	3	2
7	CSE22953	Object Oriented Programming with Java Lab	0	0	3	3	2
8	CSE22954	Data Structures Lab	0	0	3	3	2
9	CSE22955	Database Management System Lab	0	0	3	3	2
Semester II Total			**15**	**0**	**12**	**27**	**23**

1st Year Credits = 48

SECOND YEAR

SEMESTER III							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**H**	**C**
1	CSE21956	Design and Analysis of Algorithms	3	0	0	3	3
2	ECE21601	Data Communication & Computer Network	3	0	0	3	3
3	CSE21957	Graph Theory	3	0	0	3	3
4	CSE21958	Formal Language and Automata Theory	3	0	0	3	3
5		**Elective – I**	3	0	0	3	3
	CSE21959	Artificial Intelligence and Machine Learning					
	CSE21960	Fundamentals of Cloud Computing					
6		**Elective – II**	3	0	0	3	3
	CSE21961	Natural Language Processing and Its Application					
	CSE21962	Cloud Storage					
	CSE21963	Data Warehousing & Data Analytics					
7	CSE22964	Web Technology Lab	0	0	3	3	2
8	CSE22965	Mobile Applications using Android/IOS Lab	0	0	3	3	2
9		**Elective Course – I Lab**	0	0	3	3	2
	CSE22966	Artificial Intelligence and Machine Learning Lab					
	CSE22967	Fundamentals of Cloud Computing Lab					
10	CSE24968	Project - I	0	0	3	3	2
Semester III Total			**18**	**0**	**12**	**30**	**26**

SEMESTER IV							
S.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**H**	**C**
1		**Elective Course – III**	3	0	0	3	3
	CSE21969	Pattern Recognition					
	CSE21970	Public Blockchain					
	CSE21971	Cyber Security and Cryptography					
2	OBH21404	HSS-VI (Basics of Organizational Behaviours)	3	0	0	3	3
3	CSE21972	Compiler Design	3	0	0	3	3
4		**Elective Course – III Lab**	0	0	3	3	2
	CSE22973	Pattern Recognition Lab					
	CSE22974	Public Blockchain Lab					
	CSE22975	Cyber Security and Cryptography Lab					
5	CSE25976	Seminar	0	2	0	2	2
6	CSE24977	Project – II	0	0	6	6	4
Semester IV Total			**9**	**0**	**9**	**20**	**17**

2nd Year Total : 43

CREDIT DISTRIBUTION (SEMESTER-WISE)

SEM I	SEM II	SEM III	SEM IV	TOTAL
25	**23**	**26**	**17**	**91**

CREDIT DISTRIBUTION (YEAR-WISE)

YEAR I	YEAR II	TOTAL
48	**43**	**91**

CSE21941	**Introduction to Programming**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Knowledge on programming logic**				
Co-requisite	**NIL**				

Course Objectives:

- To motivate students to solve the problems in engineering using the concepts of procedural and object-oriented programming.
- To enable students to apply OOP concepts in building solutions to real-world problems.

- To help the student to acquire knowledge of software development
- To enable students to debug simple C++ programs.

To enable students to execute C++ programs successfully.

Course Outcomes:

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

1. **Discuss** fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. **Understand** fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.
3. **Explain** important topics related to functions and pointers.
4. **Understand** the scope of variables and utility of exception handling.
5. **Utilise** the OOP knowledge to create, debug and run simple C++ programs.

Course Description:

This course introduces students to C and C++ programming language. Students will be taught the fundamentals of programming. These concepts are applicable to programming in any language. Topics covered include basic principles of programming using C++, algorithmic and procedural problem solving, program design and development, basic data types, control structures, functions, arrays, pointers, and introduction to classes for programmer-defined data types..

Course Content:

Unit-I	**09 Lecture Hours**
C Programming: Procedural programming, variables & data types, operators and conditional execution, understanding loops, arrays, types of arrays, functions, pointers, use of pointers with arrays, basic use of structures.	
Unit-II	**09 Lecture Hours**
Introduction to OOP: Need for OOP Paradigm, Procedural programming vs object oriented programming, object oriented concepts. **Class concept in OOP**: Difference between C structure and class, specifying a class, Defining member functions: inside and outside class, scope resolution operator, Array within a class, array of objects, Static data members and member functions,Object as function arguments,returning objects,Friend function, Constructor and destructor:Constructor,types of constructors:default,parameterized and copy constructor,constructor overloading, constructor with default parameter,dynamic initialisation of objects,destructor Operator overloading and Type Conversion: Defining operator overloading, overloading unary and binary operator,Data Conversion: Basic to User Defined , User defined to basic, Conversion from one user-defined to other.	
Unit-III	**09 Lecture Hours**
Functions: Main function, function prototyping, inline functions, reference variables, call by reference ,Defaults arguments, function overloading, Math library functions. **Pointers**: memory allocation for objects,pointer to members,pointer to object,this pointer local classes.	
Unit-IV	**09 Lecture Hours**
Scope: Local and global scope, Inheritance and polymorphism: Base class, derived class, visibility modes, derivation and friendship,Types of inheritance,Containership,virtual function binding,pure virtual functions,Abstract class,**pointer to derived class.** **Console IO operations**: C++ stream classes, Unformatted IO operations, formatted IO operations, managing output with manipulators. **Exceptions**: Run time errors, exception handling using try, catch and throw, Working with files: Classes for file stream operations, opening and closing files,File opening modes, file Pointers, Error handling during file operations, command line arguments, templates	
Unit-V	**09 Lecture Hours**
Problem solving with C++: Case study for problem solving on various real life systems like Bank, Library, Hospital, Hotel, Employee management system etc.	
Text Books: 1. Bjrane Stroustrup, “C++ Programming language” , Pearson education Asia **Reference Books:** 1. Yashwant Kenetkar,”Let us C++”,Oxford University Press 2. B.A. Forouzan and R.F. Gilberg,CompilerScience,”A structured approach using C++” Cengage Learning, New Delhi.	

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Discuss** fundamentals of programming such as variables, conditional and iterative execution, methods, etc.	PO1, PSO1,PO12
CO2	**Understand** fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.	PO1, PO2, PO3, PSO1, PS03
CO3	**Explain** important topics related to functions and pointers.	PO1, PO2, PO3, PSO1,PO12
CO4	**Understand** the scope of variables and utility of exception handling.	PO1, PO2, PSO1,PSO3
CO5	**Utilise** the OOP knowledge to create, debug and run simple C++ programs.	PO1, PO12, PO3, PSO1, PSO3

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning newprogramming environments, analyse and	The ability to understand the evolutionary changes in computing, apply standard	Ability to analyse the impact of Computer Science and Engineering solutions in the
Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE21941	Introduction to Programming	3	3	3	-	-	-	-	-	-	-	-	3	3	-	3

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

MODEL QUESTION PAPER

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2022 – 23)		
Name of the Program:	MCA	**Semester:**	I
Paper Title:	Introduction to Programming	**Paper Code:**	CSE21941
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)	**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.		

Ques No.	Question	Knowledge Level	Course Outcome
	Group A : Answer ALL the questions (5 x 1 = 5)		
1	**Define** relational operators in C.	U	CO1
2	**Explain** class concept.	U	CO2
3	**Discuss** the significance of inline function with example.	U	CO3
4	**What** is exception handling?	R	CO4
5	**Discuss** any real life event suitable for object-oriented approach of programming.	U	CO5
	Group B : Answer ALL the questions (5 x 2 = 10)		
6	**a) Write** a C program to find the factorial of a number.	Ap	CO1
	(OR)		
	b) Write a C program to find the roots of a quadratic equation.		
7	a) **Explain** the major difference between procedural and object-oriented programming.	U	CO2
	(OR)		
	b) **Discuss** the need for object-oriented programming.		
8	a) **Write** suitable C++ code to illustrate function overloading.	Ap	CO3
	(OR)		
	b) Explain about function call by reference with suitable code**.**		
9	a) **Explain** how will you handle Arithmetic Exception through suitable C++ program.	U	CO4
	(OR)		
	b) **Discuss** local scope and global scope of a variable with example.		
10	a) **Discuss** the classes needed to design a object-oriented system	U	CO5

	for withdraw and deposit of money in a bank. **(OR)** b) **Discuss** the classes needed to design a object-oriented system to depict the check-in and check-out of boarders in a hotel.		
Group C : Answer ALL the questions (7 x 5 =35)			
11	a) **Write** a C program to find out whether a number is Armstrong or not. **(OR)** **b) Write** a C program to find out whether a number is prime or not.	**Ap**	**CO1**
12	**a) Explain** the benefits of object-oriented programming**.** **(OR)** **b)** What is an object? Explain with suitable C++ program**.**	**U**	**CO2**
13	a) **What** is pointer arithmetic? Explain the pointer operators. **(OR)** **b) Explain** the utility of function overloading with example**.**	**U**	**CO3**
14	a) **Explain** about new and delete operators in C++. **(OR)** b) **Discuss** the dynamic memory allocation for arrays.	**U**	**CO4**
15	c) **Discuss** the dynamic memory allocation for objects. **(OR)** c) **How** can you define your own exceptions in C++?	**U**	**CO4**
16	a) **Discuss** C++ program to maintain employee database using virtual class. **(OR)** b) **Discuss** C++ program to calculate volume of cube, cylinder, sphere by function overloading.	**Ap**	**CO5**
17	a) **Discuss** C++ program to enter student details of different stream using hierarchical inheritance. **(OR)** b) **Discuss** C++ program to calculate electric bill of person using class.	**Ap**	**CO5**

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

i) If the COs are higher in numbers that can be managed by equating sub-divisional questions

ii) If the COs are lower in numbers, the questions can be increased by equating the number of COs

MTH21201	Numerical & Statistical Methods	L	T	P	C
Version 1.0	**Contact Hour - 45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Basic math Skills**				
Co-requisites	**--**				

Course Objectives:

- To provide students with knowledge in different computational errors occurred in numerical calculation
- It can be minimized using different numerical techniques and, analyses and interpret statistical data using several statistical tools.

Course Outcomes:

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

CO1. **Find** skewness, kurtosis, correlation coefficient and fit linear curve with the available set of data.
CO2. **Explain** Baye's theorem for certainty of events and several probability distributions.
CO3. **Apply** test of hypothesis to test mean, variance and different attributes for a population.
CO4. **Find** real roots of algebraic and transcendental equations using Bisection method, Regula-Falsi method and Newton Raphson method.
CO5. **Utilize** Euler method, Runge-Kutta method to obtain the solution to ordinary differential equations with initial conditions and, direct and iterative methods in simultaneous linear equation.
CO6. **Explain** Numerical integration to obtain the value of an integral with finite limit and, finite differences to obtain interpolating and extrapolation values.

Catalogue Description:

This course introduces basic concepts in programming language to solve numerical and statistical 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 coordinator.

Course Content:

Unit-I	09 Lecture Hours
Introduction to stastics: **Statistics:** Definition, scope and limitation, presentation of data, diagrammatic and graphical	

representation of data, measures of central tendency, mean, median and mode, geometric and harmonic mean and their limitations, Measure of variations, Range, Quartile, Variance, Standard deviation, Skegness, moment and Kurtosis.

Correlation and Regression:

Introduction to Correlation analysis, Karl Pearson correlation coefficient, Rank Correlation,
Regression Analysis, Fitting Straight Lines, Method of least square, regression coefficients, properties of regression coefficients and applications

Unit-II	**09 Lecture Hours**

Introduction to Probability Distributions :

Probability: Introduction, Probability of an event, additive rule & multiplication rule, conditional probability Bayes' rule and applications.

Probability Distributions: Random variable, discrete and continuous probability distribution, Mathematical expectation, Variance of a random variable, Binomial, Hyper-geometric, Poisson distribution, Uniform, Normal, Exponential Distribution.

Test of hypothesis: Introduction, null hypothesis and alternative hypothesis, type I and type II errors, one and two tailed tests, test on a single mean when variance is known

.

Unit-III	**09 Lecture Hours**

Operation in Numerical solution of algebraic and transcendental equations :

Numerical solution of algebraic and transcendental equations: Introduction, Concept of Errors, Bisection Method, False Position Method, Secant Method, Newton-Raphson Method, Successive Approximation Method, Discussion of Convergence,

Solution of simultaneous linear equations: Gauss elimination method, pivoting, ill conditioned equations, Gauss Seidel and Gauss Jacobi iterative methods

Unit-IV	**09 Lecture Hours**

Finite difference analysis :

Finite difference analysis: Interpolation and Extrapolation, Calculus of difference, Newton's Forward Interpolation Formula and Backward Interpolation Formula, Lagrange's method, Newton's divided difference formula, Inverse Interpolation and its applications.

vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Unit-V	**09 Lecture Hours**

Case study in Numerical differentiation and integration:

Numerical differentiation and integration: Differentiation formulae based on polynomial fit, integration by trapezoidal and Simpson's one-third rules.Solution of simultaneous linear equations and ordinary differential equations: Euler methods,
Modified Euler method, Runge-Kutta method.

Text Books:
1. S.C. Gupta and V K Kapoor; Fundamentals of Mathematical Statistics, S Chand & Sons
2. Veerarajan, T Ramachandran; Numerical Methods.

Reference Books:

1. Manish Goyal; Numerical methods and Statistical Techniques using 'C', Laxmi Publications pvt. Ltd.
2. S Dey and S Gupta; Numerical Methods ,Tata McGraw-Hill Education, 2013
3. B.S. Grewal; Numerical methods in engineering and science, 42 Edition, Khanna ***Publishers.***

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

Examination Scheme:

Components	**Class Assessment**	**Mid term**	**End Term**
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 Program Outcomes**
CO1	**Find** skewness, kurtosis, correlation coefficient and fit linear curve with the available set of data.	**PO1,PO11**
CO2	**Explain** Baye's theorem for certainty of events and several probability distributions.	**PO1,PO2,PO11, PSO3**
CO3	**Apply** test of hypothesis to test mean, variance and different attributes for a population.	**PO1, PO4,PO5 PSO3**
CO4	**Find** real roots of algebraic and transcendental equations using Bisection method, Regula-Falsi method and Newton Raphson method.	**PO1, PO2, PO5**
CO5	**Utilize** Euler method, Runge-Kutta method to obtain the solution to ordinary differential equations with initial conditions and, direct and iterative methods in simultaneous linear equation.	**PO1, PO2,PO11**
CO6	**Explain** Numerical integration to obtain the value of an integral with finite limit and, finite differences to obtain interpolating and extrapolation values.	**PO1, PO2, PO5**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MTH 21201	Numerical & Statistical Methods	3	3	-	2	-	-	-	-	-	-	3	-	-	-	2

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

Model Question Paper

CSE21942	Computer Organization & Architecture	L	T	P	C

Name:

Enrolment No:

Course: Numerical & Statistical Methods (MTH21201)
Program: MCA **Time: 03 Hrs.**
Semester: I **Max. Marks: 50**
Instructions:
Attempt all questions from **Section A** (each carrying 1 marks); **Section B** (each carrying 5 marks)**. Section C** (carrying 10 marks)**.**

Section A (Answer all)

1.	**What** are normal equations in linear curve fitting?	**R**	**CO1**
2.	**Define** Bay's theorem.	**R**	**CO2**
3.	**What** is probability density function?	**R**	**CO2**
4.	**Define** type I and type II error.	**R**	**CO3**
5.	**What** is the range of the rank correlation coefficient?	**R**	**CO1**

SECTION B (Short answer type)

6.	**Find** a real root of the following equation x^2-5x-7=0 that lies between 2 and 3 correct to 4 decimal places using Regula-Falsi method.	**R**	**CO4**
7.	**Find** y (1.1) using Euler's method given as $\frac{dy}{dx}$= y^2+xy , y(1)=1. h=0.1.	**R**	**CO5**
8.	**Find** the integral value of $\int_0^8 \frac{dx}{1+x}$ by Simpson's 1/3rd rule, taking 8 equal sub-intervals. Hence estimate the value of log_e^3 .	**R**	**CO6**

SECTION C (Long answer type)

9.	**Utilize** Gauss elimination method. $\begin{aligned} 5x - y &= 3 \\ -x + 5y - z &= 4 \\ -y + 5z &= -6 \end{aligned}$	**Ap**	**CO5**
10.	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**	**CO3**

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
No. of accidents	14	16	8	12	11	9	14	84

Unit-I	**09 Lecture Hours**
Introduction to Functional blocks of a computer :	

Version 1.0	**Contact Hour-45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Basic computer Skills**				
Co-requisites	**--**				

Course Objectives:

- To study the basic organization and architecture of digital computers (CPU, memory, I/O, software).
- To Discussions will include digital logic and microprogramming. 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. **Analyse** the concepts of memory utilization in a computer system.
CO5**. Define** the implementation of parallel processors and analyse the synchronization techniques

Catalogue 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:

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 **09 Lecture Hours**

Operation in Peripheral devices and their characteristics :
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 **09 Lecture Hours**

Inter-process pipelining:

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

.

Unit-IV **09 Lecture Hours**

Memory and File organazation:

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

Unit-V **09 Lecture Hours**

Modern Case study in Parallel processor :
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

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

Components	Internal Assessment	MTE	ETE
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,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**
CO3	**Illustrate** pipelined execution, parallel processing and principles of scalable performances.	**PO1,PO3,PO6,PO11,PO12,PSO1,PSO3,PSO2**
CO4	**Analyse** the concepts of memory utilization in a computer system	**PO1,PO3,PO5,PO6,PO12,PO11,PSO3**
CO5	**Define** the implementation of parallel processors and Analyze the synchronization techniques	**PO1,PO3,PO11,PO6,PO12,PSO1,PSO3**

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and	The ability to understand the evolutionary changes in computing, apply standard	Ability to analyse the impact of Computer Science and Engineering solutions in the
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 21942	Computer Organization & Architecture	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: M.C.A **Semester: I**
Code- CSE21902 **Stream- CSE** **Time: 03 Hrs.**
Paper title– Computer Organization & Architecture **Total pages- 2**
Max. Marks: 50 **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 2 = 10)

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 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	**Ap, R**	**CO2**
8.	**Explain** clearly, the register-indirect, the indexed and the base	**U**	**CO3**

	register with indexed addressing modes. Next, point out the exact difference between the three..		
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 12.5 = 25)		
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 9th memory word Word address of the 9th 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**

CSE21943	**Software Engineering**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour-45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Software/Hardware evolution at basic level**				
Co-requisites	**--**				

Course Objectives:

- To help the student to acquire knowledge of software evolution process.
- To enable students modelling software project with appropriate metric and precision at workplace.
- 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.
- 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. **Compare** Effectively testing and maintenance of software project.
CO5. **Classify** software metric analysis for an effective model.

Catalogue 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: **9 lecture hours**
Introduction to Component based development:
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: **10 lecture hours**
Introduction to Software Process and project metrics:

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: **8 lecture hours**

Analysis to Risk management:
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: 9 lecture hours
Analysis to Software quality assurance:
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: 10 lecture hours
Case study analysis in Software design, Software testing techniques:
Software 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	**Class Assessment**	**Mid Term**	**End Term**
Weightage (%)	**30**	**20**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand t**he impact of software engineering.	**PO1, PO11,PSO1,PO10**
CO2	**Communicate** with proper software model paradigm to pupils.	**PO1, PO2, PO3, PO4, PO5, PO11, PSO1, PSO3**
CO3	**Enhancemen**t of software metric engineering application in industry.	**PO1, PO3, PO12, PSO2**
CO4	**Compare** Effectively testing and maintenance of software project	**PO1, PO6, PO9, PO12, PSO1**
CO5	**Classify** software metric analysis for an effective model .	**PO1, PO6, PO3, PO12, PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
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	PO12	PSO 1	PSO 2	PSO 3
CSE 21943	Software Engineering	3	2	3	-	2	3	-	-	-	-	-	3	3		3

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

Model Question Paper

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

Name of the Program: MCA Semester: I Stream: CSE
PAPER TITLE: Software Engineering PAPER CODE: CSE21943
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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 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.	**Describe** the stages of evolutionary model?	**U**	**CO1**
7.	**Examine** the essential phases of iterative water fall model then what is the expected performance over traditional water fall model?	**Ap**	**CO2**
8.	**Elucidate** the Black box testing and White box testing with suitable example.	**Ap**	**CO3**
9.	**Explain** Scrum and agile application briefly explain it with proper example?	**U**	**CO4 /CO2**
	SECTION C (Answer Any Two Questions) (2 x 12.5 = 25)		
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?	**U**	**CO5**

ENG21112	**HSSM-I (English Communication)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour -30**	**3**	**0**	**0**	**2**
Pre-requisites/Exposure	**English grammar knowledge at basic level**				
Co-requisites	**--**				

No	**Course Objectives:**
1	Introducing the concept of communication and imaginative thinking.
2	Acquainting the students with the newest techniques and formats of different types of communication.
3	Enhancing the potential of the students.
4	Enabling the students to stimulate their thinking and enhance their presentational skills.

Course Objectives:

- To help the student to acquire knowledge of business communication process.
- To enable students modelling English communication and precision at workplace.
- To give the students a perspective of well communication.

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. **Develop** the various elements of communicative skills
CO2. **Categorize** different theories of communication
CO3. **Relate** the role of the society in the development of language
CO4. **Evaluate** spaces of communication to understand the nuances of speech and writing
CO5. **Maximize** imaginative thinking to express ideas.

Catalog Description:

English Communication course aims at empowering students with the power of Language by helping them develop the skills of presentation and performance. At the same time an average student gains access to the basics of Grammar and the dynamics of language and message conveyance. Students are encouraged to think with imagination, write or speak with their own linguistic abilities and engage in further reading and conversational styles. They become better acquainted to deal with interviews and screening processes.

Course Content:

Unit I: **6 lecture hours**

Introduction, relevance of English language, different theories of Communication.

Unit II: **6 lecture hours**

Grammar, Syntax, basic components, Tense, Prepositions and other parts of speech.

Unit III: **6 lecture hours**

Reading and listening skills

Unit IV: **6 lecture hours**

Speaking and presentational skills.

Unit V: **6 lecture hours**

Writing skills, letters, Essays and other documents of writing.

Text books:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Strunk Jr, William and White, E.B; The Elements of Style; 4th Edition; Longman; 1999
4. Language, Literature and Creativity, Orient Blackswan, 2013
5. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas
6. Wren, P.C. and H. Martin. High School Grammar and Composition. New Delhi: S Chand, 2017

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

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

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Develop** the various elements of communicative skills	**PO1, PO3,PSO3. PSO1**
CO2	**Categorize** different theories of communication	**PO3, PSO3,PSO1, PSO2**
CO3	**Relate** the role of the society in the development of language	**PO1, PO2, PO3, PO6, PO7**
CO4	**Evaluate** spaces of communication to understand the nuances of speech and writing	**PO1, PO2, PO3**
CO5	**Maximize** imaginative thinking to express ideas.	**PO1, PO3,PO4, PO8, PO12 ,PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ENG 21112	HSS I (ENGLISH COMMUNICATION)	3	2	3	-	2	3	-	-	-	-	-	3	3	2	3

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

Name:

Enrolment No:

END-SEMESTER EXAMINATION: DECEMBER 2019
(Academic Session: 2019 – 20, Semester: Aug. 2019 – Dec. 2019)

SCHOOL OF ENGINEERING AND TECHNOLOGY

Name of the Program: M.C.A. **Semester: I**
Paper Title: HSS -I (ENGLISH COMMUNICATION) **Paper Code: ENG21112**
Maximum Marks: 50 **Time duration: 3 hours**
Total No of questions: 12 **Total No of Pages: 1**

Section A (Answer All the Questions)

1.	**Define** Communication Skills. **Narrate** an incident where lack of proper Communication skills end in a hilarious situation.	**R & U**	**CO1**
2.	**Evaluate** any 4 hurdles to successful Communication.	**U**	**CO5**
3.	**Write** a job application to an organization/ company of your choice stating your eligibility conditions.	**U**	**CO4**
4.	**Write** a report as a journalist of a monthly magazine on an incident of female foeticide that you have witnessed in a remote village in Haryana.	**U**	**CO3**
5.	**Write** a paragraph in not more than 450 words about your experience in a favorite holiday destination.	**U**	**CO4**
	SECTION B (Attempt any **Three Questions)**		
6.	**Write** a short note on Inter-personal and intra-personal Communication by pointing out the differences between them.	**Ap**	**CO5**
7.	**What** are the linguistic barriers in Communication? Discuss this in brief.	**U & R**	**CO1**
8.	**Write** down the two major characteristics of Verbal Communication with examples.	**Ap & R**	**CO2**
9.	**Illustrate** the stages of Communication with a suitable image.	**U**	**CO3**
	SECTION C (Answer Any Two Questions)		
10.	**What** are the major components of a message transference? Illustrate with an image.	**R & U**	**CO4**
11.	**Explain** 5 major hurdles to Virtual Communication.	**U**	**CO5**
12.	**Explain** how Noise and Attitude serves as barriers to effective communication.	**U**	**CO2**

CSE21944	Operating System	L	T	P	C
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	Data structures, Programming Languages, and Computer Architecture.				
Co-requisite	**NIL**				

Course Objectives:

- To understand the students to study the basic principles and functionality of operating systems
- To provide the students to identify the concepts of CPU scheduling, concurrent processes, deadlock
- To allow the students to identify the significance of memory management and virtual memory.
- To enhance the skill of students to identify the disk scheduling, file systems, and device management.
- To understand the students to explain the performance trade-offs inherent in advance OS implementation.

Course Outcomes:

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

CO1: Understand functionalities and features of Operating System

CO2: Analyzing various scheduling algorithms and threading concepts to identify a suitable algorithm for a Given criteria.

CO3: Assessing various solutions for critical Section problem. Applying deadlock avoidance principles and Check for the occurrence of deadlock.

CO4: Explain different memory management techniques and its uses. Structuring an overview of file Systems and mass storage

CO5: Understand the functionalities of modern operating system like Android, oxygen, Windows11 etc.

Course Description:

The course will begin with an overview of the structure of computer operating systems. The purpose of this course is to provide students basic knowledge of operating systems, difference between the kernel and user modes, concepts of application program interfaces, methods and implementations of interrupts. Students are introduced to the schedulers, policies, processes, threads, memory management, virtual memory, protection, access control, and authentication. Students learn system calls in different popular operating systems used in the industry. Particular emphasis will be given to three major OS subsystems: process management (processes, threads, CPU scheduling, synchronization, and deadlock), memory management (segmentation, paging, swapping), and file systems; and on modern operating system architecture.

Course Content:

Unit-I | **09 Lecture Hours**

Introduction to operating System:
Introduction: Concept of Operating Systems, Operating Systems Objectives and Functions, Generations of Operating systems, Types of Operating Systems, OS Services, System Calls, Structure of an OS - Layered, Protection and Security, Case study on UNIX and WINDOWS Operating System.

Unit-II | **09 Lecture Hours**

Introduction to Process and Process Scheduling :
Process Management – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms (FCFS, SJF, Priority, RR, Multilevel queue Scheduling), and their evaluation.

Unit-III | **09 Lecture Hours**

Inter-process Communication and Deadlock :

Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Producer Consumer problem, Readers & Writers Problem, Dining Philosopher Problem .

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

Unit-IV | **09 Lecture Hours**

Memory and File Management :

Memory Management : Swapping, contiguous memory allocation, paging, structure of the page table, segmentation, Virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing.

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.

Unit-V | **09 Lecture Hours**

Modern OS Architectures :
Case Study on: Android, Windows 11, Mac, oxygen OS and other contemporary Operating system.

Text Books:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 9th Edition, John Wiley publishers, 2012
2. Operating Systems' – Internal and Design Principles, Stallings, Sixth Edition, Pearson education, 2005.

Reference Books:

1. Operating System a Design Approach-Crowley, 3 rd Edition, Tata Mcgraw Hill, 2009.
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, Tata Mcgraw Hill, 2012
3. Modern Operating Systems, Andrew S Tanenbaum 3rd edition Prentice-Hall, Inc, 2008

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Understand** functionalities and features of Operating System.	PO1, PO12
CO2	**Analyzing** various scheduling algorithms and threading concepts to identify a suitable algorithm for a Given criteria.	PO1, PO2,
CO3	**Assessing** various solutions for critical Section problem. Applying deadlock avoidance principles and check for the occurrence of deadlock.	PO1, PO2 ,PO3
CO4	**Explain** different memory management techniques and its uses. Structuring an overview of file systems and mass storage.	PO2, PO3, PO5 ,PSO3
CO5	**Understand** the functionalities of modern operating system like Android, oxygen, Windows11 etc.	PO1, PO3, PO5,PSO3

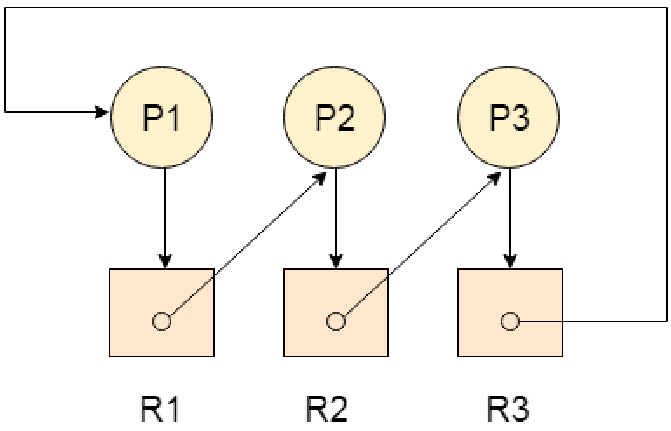
		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in	Expertise to communicate in both oral and written forms, demonstrating the practice of	Ability to enhance and develop techniques for independent and lifelong learning in computer
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
CSE21944	Operating System	3	3	3	-	2	-	-	-	-	-	-	3	-	-	2

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

ADAMAS UNIVERSITY
END SEMESTER EXAMINATION
(Academic Session: 2020 – 21)

Name of the Program:	MCA	**Semester:**	II
Paper Title:	OPERATING SYSTEM	**Paper Code:**	CSE21944
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	3
(Any other information for the student may be mentioned here)	At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. Assumptions made if any, should be stated clearly at the beginning of your answer.		

Group A **Answer All the Questions (5 x 1 = 5)**			
1	How race condition blocks a process in action and why it do so, suggest your answer?	**R**	**CO1**
2	What is significance of RTOS?	**U**	**CO2**
3	How Context switching swap user action between user mode and kernel mode?	**C**	**CO3**
4	Define multitasking and why is it necessary?	**Ap**	**CO4**
5	Differentiate scheduler and dispatcher?	**An**	**CO5**
Group B **Answer All the Questions (5 x 2 = 10)**			
6 a)	i)Explain Internal Fragmentation with suitable diagram. ii)Define the role of Process control block.	**R**	**CO1**
(OR)			
6 b)	i)Define external fragmentation with suitable diagram. ii)Analyze fixed memory allocation technique and it's impact on memory.	**U**	**CO1**
7 a)	Explain FIFO page replacement technique where frame size is three and page string is (1,3,0,3,5,6,3).	**U**	**CO2**
(OR)			
7 b)	Difference between multitasking and multi-processing	**U**	**CO2**
8 a)	State the difference between Volatile and non volatile memory.	**C**	**CO3**
(OR)			
8 b)	Explain Thread control block with neat diagram.	**Ap**	**CO3**
9 a)	Analyze the action of demand paging and why it is necessary.	**An**	**CO4**
(OR)			
9 b)	Define the usage of FORK() and EXEC() system call in OS.	**Ap**	**CO4**
10 a)	Define the role of Long term and short term scheduler.	**An**	**CO5**
(OR)			
10 b)	Define the term dead lock and starvation.	**R**	**CO1**
Group C **Answer All the Questions (7 x 5 = 35)**			

11 a)	i)Define necessary condition for dead lock. ii)How RAG detect dead lock give a suitable analysis.	**Ap**	**CO4**
(OR)			
11 b)	i) Explain spooling with suitable example? ii)Explain 1^{st} generation computer and their usage.	**Ap**	**CO4**
12 a)	Is there any dead lock in graph given below suggest your answer how to detect dead lock 	**Ap**	**CO4**
(OR)			
12 b)	Explain dynamic partitioning and it's advantages over fixed partioning?	**U**	**CO2**
13 a)	Consider a main memory with five page frames and the following sequence of page references: 3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. Use the page replacement with respect to First-In-First-out (FIFO) ,Find the number of HIT and MISS in each technique with a neat diagram.	**Ap**	**CO3**
(OR)			
13 b)	Consider a main memory with five page frames and the following sequence of page references: 3, 8, 2, 3, 9, 1, 6, 3, 8, 9, 3, 6, 2, 1, 3. Use the page replacement with respect to Least Recently Used (LRU)?Find the number of HIT and MISS in each technique with a neat diagram.	**Ap**	**CO3**
14 a)	Define the working mechanism of secondary memory in terms of track and sector with suitable diagram.	**Ap**	**CO4**
(OR)			
14 b)	Define seek time ,rotational latecy,data tranfer time,controller time,and average rotational latency.	**U**	**CO2**
15 a)	Consider a hard disk with: 4 surfaces,64 tracks/surface,128 sectors/track 256 bytes/sector, What is the capacity of the hard disk?	**Ap**	**CO4**
(OR)			
15 b)	Explain magnetic disk structure with suitable diagram.	**U**	**CO1**
16 a)	Analyze different features of kernel.	**U**	**CO1**
(OR)			
16 b)	Write short notes on i)NETWORK-OS,ii)Distributed OS	**Ap**	**CO5**
17 a)	Explain FCFS disk scheduling algorithm,and compute total seek time of the sequence given (82,170,43,140,24,16,190) And current position of Read/Write head is : 50	**An**	**CO5**
(OR)			

17 b)	State the difference between Firmware and Operating system.	**Ap**	**CO5**

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

iii) If the COs are higher in numbers that can be managed by equating sub-divisional questions
iv) If the COs are lower in numbers, the questions can be increased by equating the number of COs

CSE22945	**Introduction to Programming Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**0**	**0**	**3**	**2**
Pre-requisite/Exposure	**Knowledge on programming basics**				
Co-requisite	**NIL**				

Course Objectives:

- To motivate students to solve the problems in engineering using the concepts of procedural and object-oriented programming.
- To enable students to apply OOP concepts in building solutions to real-world problems.

- To help the student to acquire knowledge of software development

- To enable students to debug simple C++ programs.
- To enable students to execute C++ programs successfully.

Course Outcomes:

On the completion of this course the student 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: Apply fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.

CO3: Explain important topics related to functions and pointers.

CO4: **Understand** the scope of variables and utility of exception handling..

CO5: Utilise the OOP knowledge to create, debug and run simple C++ programs.

Course Description:

This course introduces students to C and C++ programming language. Students will be taught the fundamentals of programming. These concepts are applicable to programming in any language. Topics covered include basic principles of programming using C++, algorithmic and procedural problem solving, program design and development, basic data types, control structures, functions, arrays, pointers, and introduction to classes for programmer-defined data types..

Course Content:

Unit-I **09 Lecture Hours**

Write a C program to find factorial of a number.
Write a C program to find roots of a quadratic equation.
Write a C program to find whether the number is Armstrong.

Unit-II **09 Lecture Hours**

Write a C++ program that demonstrate the basic class program to get department, name and salary of an employee.
Write a C++ program that to calculate area of circle, square, rectangle and triangle using switch-case statements
Write a C++ program to that accepts number from user and displays all the factors of that number.

Unit-III **09 Lecture Hours**

Write a C++ Program to swap two numbers using pointers.
Write a C++ Program to add two numbers using pointers.
Write a C++ Program to find length of string using pointer.

Unit-IV **09 Lecture Hours**

Write a C++ Program to show multiple inheritance
Write a C++ Program to show multilevel inheritance
Write a C++ Program to fetch the content of an existing file and display its contents.

Unit-V **09 Lecture Hours**

Write a C++ Program to read the name and roll numbers of students from keyboard and write them into a file and then display it.

Define a class “Time” that contains following data members and member functions.
Data members: 1. Hours 2. Minutes 3. Seconds
Member Functions: 1. To get time from user 2. To display time on the screen 3. To calculate sum of two time objects. Write a C++ program that can read values of Time for two objects T1 and T2, calculate sum and display sum using defined member functions

Create class “Sales” having following data members and member functions:
Data Members: 1. Name of Salesman 2. Sales of Salesman
Member functions to calculate commission 1. Commission is Rs. 10 per thousand if sales are at least Rs. 25000 or more 2. Commission is Rs. 5 otherwise. Write a C++ program that calculate and print name and sales of salesman.

Text Books:

2. Bjrane Stroustrup, “C++ Programming language” , Pearson education Asia

Reference Books:

3. Yashwant Kenetkar,”Let us C++”,Oxford University Press
4. B.A. Forouzan and R.F. Gilberg,CompilerScience,”A structured approach using C++” Cengage Learning, New Delhi.

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

Examination Scheme:

Components	**Internal**	**End Term**
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Define** classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.	PO1, PSO1
CO2	**Apply** fundamentals of object-oriented programming in C++, including defining classes, invoking methods, using class libraries, etc.	PO1, PO2, PO3, PSO1, PS03
CO3	**Explain** important topics related to functions and pointers.	PO1, PO2, PO5, PSO1
CO4	**Understand** the scope of variables and utility of exception handling..	PO1, PO2, PSO1
CO5	**Utilise** the OOP knowledge to create, debug and run simple C++ programs.	PO1, PO2, PO3, PSO1, PSO3

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in	Expertise to communicate in both oral and written forms, demonstrating the practice of	Ability to enhance and develop techniques for independent and lifelong learning in computer
Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE22945	Introduction to programming lab	3	3	3	-	3	-	-	-	-	-	-	-	3	-	3

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

MODEL QUESTION PAPER

ADAMAS UNIVERSITY PURSUE EXCELLENCE	**ADAMAS UNIVERSITY** **END SEMESTER EXAMINATION** (Academic Session: 2022 – 23)		
Name of the Program:	MCA	**Semester:**	I
Paper Title:	Introduction to Programming Lab	**Paper Code:**	CSE22945
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**05**	**Total No of Pages:**	01
(Any other information for the student may be mentioned here)	**4.** At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. **5.** All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. **6.** Assumptions made if any, should be stated clearly at the beginning of your answer.		

Ques No.	Question	Knowledge Level	Course Outcome
	Group A : Answer ALL the questions (5 x 10 = 50)		
1	**Write a C** program to find factorial of a number. **Write a C** program to find whether a number is Armstrong number.	**Ap**	**CO1**
2	**Write a C++** program to create a class for Student and implement some functionality of Student class.	**Ap**	**CO2**
3	**Write a C++** Program to make the use of inline function.	**Ap**	**CO3**
4	**Write a C++** Program to handle exception handling for Arithmetic Exception.	**Ap**	**CO4**
5	**Write a C++** Program to read the name and roll numbers of students from keyboard and write them into a file and then display it.	**Ap**	**CO5**

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

v) If the COs are higher in numbers that can be managed by equating sub-divisional questions
vi) If the COs are lower in numbers, the questions can be increased by equating the number of COs

MTH22201	**Numerical & Statistical Methods Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hour -45**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Basic math Skills**				
Co-requisites	**--**				

Course Objectives:

- To provide students with computing knowledge in Numerical and Statistical problems using programming language.

Course Outcomes:

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

CO1**. Find** real roots of algebraic and transcendental equations using Bisection method, Regula-Falsi method and Newton Raphson method.
CO2. **Solve** system of linear equations using direct method and iteration method.
CO3**. Illustrate** several methods of finite differences to obtain interpolating and extrapolating values from a set of data using.
CO4**. Classify** Trapezoidal rule and Simpson's 1/3rd rule to obtain the value of an integral with finite limit.
CO5**. Utilize** Euler method, Runge-Kutta to obtain the solution to ordinary differential equations with initial conditions.
CO6**. Find** mean, variance, correlation coefficient and fit linear curve with the available set of data.

Course Description:

This course introduces basic concepts in programming language to solve numerical and statistical 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 coordinator.

Course Content:

List of experiments

Write and execute C-code for the following programs:

Sl. No.	Name of the experiment
1	To find real roots of algebraic and transcendental equations using Bisection method.
2	To find real roots of algebraic and transcendental equations using Regula-Falsi method.
3	To find real roots of algebraic and transcendental equations using Newton Raphson method.
4	To find solution of system of simultaneous algebraic equations using Gauss elimination method.
5	To find solution of system of simultaneous algebraic equations using Gauss-Seidal iterative method.

6	To find interpolating values using Newton's Forward interpolation formula.
7	To find interpolating values using Newton's Backward interpolation formula.
8	To find interpolating values using Lagrange's interpolation formula.
9	To evaluate integral value of a given function using Trapezoidal rule for numerical integration
10	To evaluate integral value of a given function using Simpson's 1/3rd rule for numerical integration
11	To find numerical Solution of ordinary differential equation using Euler's method.
12	To find numerical Solution of ordinary differential equation using 4th order Runge-Kutta method.
13	To calculate mean and variance from a statistical data set.
14	To calculate Correlation coefficient.
15	To fit a linear curve using available data set.

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

Examination Scheme:

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

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

Mapping between COs, POs and PSOs

Course Outcomes (COs)		**Mapped POs , PSOs**
CO1	**Find** real roots of algebraic and transcendental equations using Bisection method, Regula-Falsi method and Newton Raphson method.	**PO1, PO2,PO3,PSO3**
CO2	**Solve** system of linear equations using direct method and iteration method.	**PO1, PSO3**
CO3	**Illustrate** several methods of finite differences to obtain interpolating and extrapolating values from a set of data using.	**PO1,PO12,PO3, PSO3**
CO4	**Classify** Trapezoidal rule and Simpson's 1/3rd rule to obtain the value of an integral with finite limit.	**PO1, PO2,PO3,PSO1**
CO5	**Utilize** Euler method, Runge-Kutta to obtain the solution to ordinary differential equations with initial conditions.	**PO1, PO12,PO3,PO7, PSO1**
CO6	**Find** mean, variance, correlation coefficient and fit linear curve with the available set of data.	**PO12, PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
MTH 22201	Numerical & Statistical Methods Lab	3	3	2	-	-	-	-	-	-	-	-	3	3	-	

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

Question Paper

Name:

Enrolment No:

Course Name: Numerical & Statistical Methods Lab **Course Code: MTH22201**
Program: MCA **Time: 03 Hrs.**
Semester: I **Max. Marks: 50**

Answer any four Question (5X 10 = 50)

1	**Find** real roots of algebraic and transcendental equations using Bisection method.	**R**
2	**Find** real roots of algebraic and transcendental equations using Regula-Falsi method.	**R**
3	**Find** real roots of algebraic and transcendental equations using Newton Raphson method.	**R**
4	**Find** solution of system of simultaneous algebraic equations using Gauss elimination method.	**AP**
5	**Find** solution of system of simultaneous algebraic equations using Gauss-Seidal iterative method.	**AP**
6	**Find** interpolating values using Newton’s Forward interpolation formula.	**U**
7	**Find** interpolating values using Newton’s Backward interpolation formula.	**U**
8	**Find** interpolating values using Lagrange’s interpolation formula.	**U**

CSE22946	**Computer Organization & Architecture Lab.**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 30 Hours**	**0**	**0**	**3**	**2**
Pre-requisite/Exposure	Fundamentals of Computer Architecture.				
Co-requisite	**NIL**				

Course Objectives:

- To study the basic organization and architecture of digital computers (CPU, memory, I/O, software).
- Discussions will include digital logic and microprogramming. 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. **Write** VHDL & Verilog programs.
CO2**. Design** Logic circuit & ALU
CO3. **Analyze** logic circuit
CO4. **Implement** memory management schemes and page replacement schemes.

CO5. **Simulate** file allocation and organization techniques.

Catalogue 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:

1. Implementation based on basic Logic Gates (AND, OR, NOT, NAND, NOR, XOR, XNOR)
2. Implementation based on Half adder and Full adder (using data flow, behavioral, structural modelling)
3. Implementation based on Half subtractor and Full subtractor (using data flow, behavioral, structural modelling)
4. Implementation based on Full adder using two half adders and Full subtractor using two half subtractors
5. Implementation based on multiplexer, demultiplexer, Encoder and Decoder
6. Implementation based on D Flip Flop, SR Flip Flop, JK Flip Flop, T Flip Flop
7. Implementation based on 4 Bit Register (using Structural modelling)
8. Implementation based on 4 Bit Comparator (using Behavioral modelling)
9. Implementation based on 4 Bit ALU

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

Components	**Internal Assessment**	**ETE**	**Total**
Weightage (%)	**50**	**50**	**100**

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,PO2,PO12,PSO1,PSO2.PSO3**
CO2	**Design** Logic circuit & ALU.	**PO1,PO3,PO5,PO12,PSO1,PSO2,PSO3**
CO3	**Analyze** logic circuit	**PO1,PO3,PO5,PO12,PSO1,PSO2,PSO3**
CO4	**Implement** memory management schemes and page replacement schemes	**PO1,PO3,PO5,PO12,PSO1,PSO2,PSO3**
CO5	**Simulate** file allocation and organization techniques	**PO1,PO3,PO5,PO12,PSO1,PSO2,PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application
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	PSO3
CSE22946	Computer Organization & Architecture Lab	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: MCA **Semester: I**
Code- CSE22946 **Stream- CSE**
Time: 03 Hrs.
Paper title– Computer Organization & Architecture lab **Total pages- 1**
Max. Marks: 50 **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.**

1.	**Construct** a VHDL program implementation based on Full adder using two half adders and Full subtractor using two half subtractors	**C**	**CO1**
2.	**Explain** a VHDL program Implementation based on Half adder and Full adder (using data flow, behavioral, structural modeling)	**C**	**CO2**
3.	**Apply** a VHDL program Implementation based on D Flip Flop, SR Flip Flop, JK Flip Flop, T Flip Flop	**Ap**	**CO4**
4.	**Analyse** a VHDL program Implementation based on multiplexer, demultiplexer, Encoder and Decoder	**An**	**CO5**
5.	**Construct** a VHDL program Implementation based on 4 Bit ALU	**An**	**CO3**

CSE22947	**Operating System Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**0**	**0**	**3**	**2**
Pre-requisite/Exposure	Data structures, Programming Languages, and Computer Architecture.				
Co-requisite	**NIL**				

Course Objectives:

- To introduce basic Unix commands, system call interface for process management, interprocess communication and I/O in Unix.
- To understand the students to study the basic principles and functionality of operating systems.
- To provide the students to identify the concepts of CPU scheduling, concurrent processes, deadlock
- To allow the students to identify the significance of memory management and virtual memory.
- To enhance the skill of students to identify the disk scheduling, file systems, and device management.

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Course Outcomes:

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

CO1: Understand and implement basic services and functionalities of the operating system using system calls and shell script.

CO2: Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.

CO3: Assessing various solutions for critical Section problem. Applying deadlock avoidance principles and

Check for the occurrence of deadlock.

CO4: Implement memory management schemes and page replacement schemes.

CO5: Simulate file allocation and organization techniques.

Course Description:

The goal of this course is to have students understand and appreciate the principles in the design and implementation of operating systems software. The course will cover the concepts of operating systems, process management, memory management, file systems. Experiments on process scheduling and other operating system duties will be conducted through simulation/implementation in the laboratory.

Course Content:

Unit-I | **09 Lecture Hours**

Linux Commands/Shell Programming:

1. To study about the basics of Linux commands.
2. Implementation of shell scripting using conditional/branching statement.
3. Implementation of shell scripting using Loop statement.
4. Implementation of shell scripting using Array.
5. Implementation of shell scripting using String.
6. Implementation of shell scripting using Function and recursion.

Unit-II | **09 Lecture Hours**

Process Scheduling Algorithm:

1. Simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.
   a) FCFS b) SJF c) Priority
2. Simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time.
   a) Shortest Remaining Time First b) Round Robin c) Priority
3. Simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.

Unit-III | **09 Lecture Hours**

Process Synchronization Problems /Deadlock:

1. Simulate producer-consumer problem using semaphores.
2. Simulate the concept of Dining-Philosophers problem.
3. Simulate Bankers algorithm for the purpose of deadlock avoidance.

Unit-IV | **09 Lecture Hours**

Memory Management Techniques:

1. Simulate page replacement algorithms
   a) FIFO b) LRU c) Optimal
2. Simulate disk scheduling algorithms
   a) FCFS b) SCAN c) C-SCAN
3. Simulate selection partition algorithm
   a). Best Fit b). First Fit c). Worst Fit

Unit-V | **09 Lecture Hours**

File Organization Techniques:

1. simulate the following file organization techniques
   a) Single level directory b) Two level directory c) Hierarchical

Text Books:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 9th Edition, John Wiley publishers, 2012
2. Operating Systems' – Internal and Design Principles, Stallings, Sixth Edition, Pearson education, 2005.

Reference Books:

1.Operating System a Design Approach-Crowley, 3 rd Edition, Tata Mcgraw Hill, 2009.

2.Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, Tata Mcgraw Hill, 2012

3.Modern Operating Systems, Andrew S Tanenbaum 3rd edition Prentice-Hall, Inc, 2008

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Understand** and implement basic services and functionalities of the operating system using system calls and shell script.	PO1,PO3, PO12
CO2	**Analyze** and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority.	PO1, PO2,PO3
CO3	**Assessing** various solutions for critical Section problem. Applying deadlock avoidance principles and check for the occurrence of deadlock.	PO1, PO2 ,PO3
CO4	**Implement** memory management schemes and page replacement schemes.	PO2, PO3, PO5 ,PSO3
CO5	**Simulate** file allocation and organization techniques.	PO1, PO3, PO5,PSO3

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and	The ability to understand the evolutionary changes in computing, apply standard	Ability to analyse the impact of Computer Science and Engineering solutions in the
Course Code	**Course Title**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CSE 22947	Operating System Lab	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: MCA **Semester: I**
Code- CSE22947 **Stream- CSE**
Time: 03 Hrs.
Paper title– Operating system lab **Total pages- 1**
Max. Marks: 50 **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.**

1.	**Construct** a directory in UNIX apply delete,create file operation on it	**C**	**CO1**
2.	**Explain** a GREP, command and all it's application	**C**	**CO2**
3.	**Apply** a FCFS scheduling operation on it.	**Ap**	**CO4**
4.	**Analyse** a SJF program and its implementation	**An**	**CO5**
5.	**Construct** a sell programming in UNIX	**An**	**CO3**

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

vii) If the COs are higher in numbers that can be managed by equating sub-divisional questions

viii) If the COs are lower in numbers, the questions can be increased by equating the number of COs

CSE21948	**Switching Circuit and Logic Design**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	Basic Electronics, Modern Physics				
Co-requisite	Digital Electronics				

Course Objectives:

- To introduce an overview of logic families.
- To develop students for building k-map.
- To provide the students a detailed analysis of sequential circuit.
- To introduce the students to formalize with ASM chart.

Course Outcomes:

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

CO1:	**Understand** and construct the basic design principles of logic gate.
CO2:	**Understand** the different fabrication techniques used in Bipolar, CMOS and PLA.
CO3:	**Formaliz**e with mealy and Moore machine.
CO4:	**Construct** ROM design.
CO5:	Realization of the ASM Charts

Course Description:

The world of electronics is a lot easier to understand if we start by dividing it into two distinct categories: the “analog” world and the “digital” world. The analog world generally refers to any natural phenomenon that varies its own properties over a period of time. Take the outside temperature, for example. We notice that it changes rather slowly throughout the day, and at any instant we can measure how hot or cold it really is by using a simple thermometer.

The same changing properties can be observed, measured, and recorded in other natural phenomenon such as barometric pressure, wind speed, solar radiation, etc. If you were to record and graph each of the above events over a 24 hour period, you would notice one similar characteristic: the physical properties of each phenomenon change over time**.**

Course Content:

Unit-I	**7 Lecture Hours**
Switching Circuits: Logic families: TTL, nMOS, CMOS, dynamic CMOS and pass transistor logic (PTL) circuits, inverters and other logic gates, area, power and delay characteristics, concepts of fan-in, fan-out and noise margin.	
Unit-II	**10 Lecture Hours**
Switching theory: Switching algebra, logic gates, switching functions, truth tables and switching expressions, minimization of completely and incompletely specified switching functions, Karnaugh map and Quine-McCluskey method, multiple output minimization, representation and manipulation of functions using BDD's, two-level and multi-level logic circuit synthesis.	
Unit-III	**7 Lecture Hours**
Combinational logic circuits: Realization of Boolean functions using NAND/NOR gates, Decoders, multiplexers. logic design using ROMs, PLAs and FPGAs. Case studies, fault diagnosis of combinational circuits	
Unit-IV	**15 Lecture Hours**
Sequential circuits: Clocks, flip-flops, latches, counters and shift registers, finite-state machine model, Mealy and Moore machines, synthesis of synchronous sequential circuits, Conversion of Mealy m/c to Moore m/c and vice-versa, minimization and state assignment, Incompletely specified m/c's, asynchronous sequential circuit synthesis.	
Unit-V	**6 Lecture Hours**
ASM charts: Representation of sequential circuits using ASM charts, synthesis of output and next state functions, data path control path partition-based design.	
Text Books: 1. H. Taub and D. Schilling, Digital Integrated Electronics, McGraw-Hill. **Reference Books:** 1. Z. Kohavi, Switching and Finite Automata Theory, Tata McGraw-Hill 2. Randy H. Katz and Gaetano Borriello, Contemporary Logic Design, Prentice Hall of India	

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Understand** and construct the basic design principles of logic gate.	PO1,PO2,PO3
CO2	**Understand** the different fabrication techniques used in Bipolar, CMOS and PLA.	PO1,PO3, PO2, PO6, PO7
CO3	**Formaliz**e with mealy and Moore machine.	PO1,PO2, PO6, PO7,PO12
CO4	**Construct** ROM design.	PO1,PO3,PO2
CO5	Realization of the ASM Charts.	PO2, PO6, PO7, PO8

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and	The ability to understand the evolutionary changes in computing, apply standard	Ability to analyse the impact of Computer Science and Engineering solutions in the
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
CSE21948	Switching Circuit and Logic Design	3	2	3	3	3	3	3	3	-	-	2	3	3	2	2

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

MODEL QUESTION PAPER

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2022 – 23)		
Name of the Program:	MCA	**Semester:**	II
Paper Title:	SWITCHING CIRCUIT AND LOGIC DESIGN	**Paper Code:**	CSE21948
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)	**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.		

Ques No.	Question	Knowledge Level	Course Outcome
	Group A : Answer ALL the questions (5 x 1 = 5)		
1	**Explain** C-MOS	**R**	**CO1**
2	**Define** NAND gate	**U**	**CO2**
3	**Explain** NOR gate	**C**	**CO3**
4	**Application** of Logic gate with example	**Ap**	**CO4**
5	**Analyse** Universal gate	**An**	**CO5**
	Group B : Answer ALL the questions (5 x 2 = 10)		
6	a) i) **Define** PLA with example? ii)**What** is NOR/NAND gate	**R**	**CO1**
	(OR)		
	b) i) Explain sequential circuit ii)Explain combinational circuit		
7	a) **Explain** the use of ROM	**U**	**CO2**
	(OR)		
	b) Give a brief **understanding** in noise margin		
8	a) **Analyse** the use of PTL	**A**	**CO3**
	(OR)		
	b) **Analyse** SR flip flop		
9	a)**Analyse** master slave flip flop	**A**	**CO4**
	(OR)		
	b)**Explain** T flip flop		
10	a)**Explain** D-flip flop	**AN**	**CO5**

	(OR)		
	b)**Analyse** the usage of D-flip flop		
Group C : Answer ALL the questions (7 x 5 =35)			
11	a) i) What is volatile memory ii)What is the usage of ROM	**R**	**CO1**
	(OR)		
	b) i) What is minimization ii)Explain SOP and POS		
12	a) Give a brief overview of transistor	**U**	**CO2**
	(OR)		
	b) What is TTL		
13	a) Explain Mealy m/c	**A**	**CO3**
	(OR)		
	b) Analyse Moore m/c		
14	a) Write the difference between Moore and Mealy m/c	**AP**	**CO4**
	(OR)		
	b) Apply the use of ASM chart		
15	a) Analyse the use of booting	**AN**	**CO4**
	(OR)		
	b) Analyse the use of SR ff		
16	a) Apply your understanding in C-MOS	**AP**	**CO5**
	(OR)		
	b) Analyse the use of T ff		
17	a) Analyse the Toggle concept in T ff	**AN**	**CO5**
	(OR)		
	b) Explain Mealy m/c		

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

i) If the COs are higher in numbers that can be managed by equating sub-divisional questions
ii) If the COs are lower in numbers, the questions can be increased by equating the number of COs

CSE21949	**Object Oriented Programming with Java**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Basic concept of programming**				
Co-requisites	**--**				

Course Objectives:

Students will be motivated 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: **09 lecture hours**
Introduction to oop concepts:
OOP Concepts - Data Abstraction, Encapsulation, Inheritance, Benefits of Inheritance, Polymorphism, Classes and Objects, Procedural and OOP Paradigms. Introduction To Java, Data Types, Variables & Constants, Scope & Life Time Of Variables, Precedence Of Operator, Expressions, Type Casting, Enumerated Types, Block Scope, Control Flow, Conditional Statements, Loops, Break & Continue Statements, Arrays, Console Input/Output, Formatting Output, Constructors Methods, Parameter Passing, Static Fields & Methods, Access Control, “This” Reference, Method Overloading, Recursion, Garbage Collection, Building Strings, String Class.

Unit II: **09 lecture hours**
Idea on Inheritance and polymorphism Concepts:
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: 09 lecture hours

Brief operation in Exception Handling Concepts:

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: 09 lecture hours

Brief operation in Connecting To Database:

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: 09 lecture hours

Case study in GUI Programming:

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.
“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**	**MTE**	**ETE**
Weightage (%)	**30**	**20**	**50**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
	CO1															
	CO2															
	CO3															
	CO4															
	CO5															
	CO6															

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

Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CSE21949	Object Oriented Programming with Java	3	3	3	-	3	-	-	-	-	-	-	-	2	-	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: MCA Semester: II Stream: CSE
PAPER TITLE: Object Oriented Programming with Java PAPER CODE: CSE21949
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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.	**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 12.5 = 25)		
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.	**R, U**	**CO1, CO5,**

	iii) **Illustrate** the different stages in the life cycle of a thread with a suitable block diagram.		**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.	**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.	**Ap**	**CO5, CO6**

CSE21950	**Data Structures**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Concept of C**				
Co-requisite	**NIL**				

Course Objectives:

- To make students familiar with data structure
- To enable students to know and conceptualize stack, queue, linked list concept
- To enhance the skill of solving data problems over real time.

Course Outcomes:

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

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

Course Description:

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

Course Content:

Unit-I: Introduction	**10 Lecture Hours**
Unit Heading: Concepts on Pointer, Dynamic Memory allocation, Structure, Recursion. Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Arrays, 1D array, Operations on Array, 2D Array, Memory Representation of 2D Array, Operations on 2D Array, Searching, Linear Search, Binary Search	
Unit-II: Stacks and Queues	**8 Lecture Hours**
Unit Heading: ADT Stack and its operations, Applications of Stacks: Expression Conversion and evaluation – 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: Linked List	**10 Lecture Hours**
Unit Heading: Linked lists: Single, Doubly, Circular and Circular Doubly. Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list (For all four kinds); Linked representation of Stack and Queue. Polynomial representation using Linked List.	
Unit-IV: Trees and Graphs	**12 Lecture Hours**
Unit Heading: **Tree:** 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. Threaded Binary Tree. B Tree, B+ Tree: definitions, algorithms and analysis, Minimal Spanning Tree. **Graphs:** Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	
Unit-V: Sorting and Hashing	**10 Lecture Hours**
Unit Heading: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing, Hash Functions, Collision, Collision Resolution Techniques.	

Text Books:

- Fundamentals of Data Structures, Illustrated Edition by Ellis Horowitz, SartajSahni and Computer Science Press..
- Classic Data Structure, Debashis Samanta, PHI

Reference Books:

- Data Structure Using C, Reema Thareja, Oxford University Press
- Algorithms, Data Structures, and Problem Solving with C++, Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company.

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Define** the concept of Dynamic memory management, data types, and algorithms.	PO1, PO2
CO2	**Illustrate** advantages and disadvantages of specific algorithms and data structures.	PO1,PO2, PO3, PSO3
CO3	**Solve** bugs in program, recognize needed basic operations with data structures	PO1,PO2, PO3
CO4	**Interpret** algorithms and data structures in terms of time and memory complexity of basic operations	PO1, PO2, PO3, PSO3
CO5	**Compare** the computational efficiency of the principal algorithms for sorting, searching, and hashing.	PO1, PO2, PO3, PSO4

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE21950	Data Structures	3	3	3	1	-	-	-	-	-	-	-	-	-	-	1

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

CSE21951	Database Management System	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Set Theory, Knowledge of programming language.				
Co-requisites	--				

Course Objectives:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical, and network models.
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency.
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS

Course Outcomes:

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

CO1. **Describe** the fundamental elements of relational database management systems.
CO2**.** **Define** the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
CO3**.** **Design** ER-models to represent simple database application scenarios.
CO4. **Build** Structured Query Language (SQL) and apply to query a database.
CO5**.** **Improve** the database design by normalization.
CO6**.** **Familiar** with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
CO7**.** **Convert** the ER-model to relational tables, populate relational database and formulate SQL queries on data.

Catalog Description:

This is an introductory course in database management systems (DBMS) and file management systems. The course will cover the role of data, files and databases in information systems, data modeling concepts, data definition and manipulation using SQL, issues in data management and the development and implementation of database applications. Students will work in the Lab on various assignments including prototyping and SQL, utilizing state of the art DBMS and CASE tools.

Course Content:

Unit I: **8 lecture hours**

Introduction to Database system architecture

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, network model, relational and object-oriented data models, integrity constraints, data manipulation operations.

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

Unit II: **9 lecture hours**

Introduction Relational query languages

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: 10 lecture hours

Operation in , Dependency preservation, Lossless design

Relational database design: Integrity Constraint, Domain Constrain, Referential Integrity, Functional Dependencies, Closure of Set, Cover and Canonical Cover, Types of Anomalies, Armstrong's axioms, Extended Armstrong's axioms, Assertions and Demons.

Data Base Decomposition: Domain and data dependency, Normal forms: 1NF, 2 NF, 3 NF, BCNF, Dependency preservation, Lossless design.

Unit IV: 9 lecture hours

Analysis in Query processing and optimization

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Storage strategies: Indices, B-trees, B+-trees, hashing, File System, Disk Organization, Physical Storage, Buffer management.

Unit V: 9 lecture hours

Case study in Database Security

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	MTE	ETE
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 elements of relational database management systems.	**PO1,PSO1**
CO2	**Define** the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.	**PO1,PO2,PO12**
CO3	**Design** ER-models to represent simple database application scenarios.	**PO2,PO5,PSO3**
CO4	**Build** Structured Query Language (SQL) and apply to query a database.	**PO1,PO4, PO5**
CO5	**Improve** the database design by normalization.	**PO1,PO3**
CO6	**Familiar** with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.	**PO12,PO2, PSO3**
CO7	**Convert** the ER-model to relational tables, populate relational database and formulate SQL queries on data.	**PO2,PO12, PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
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	PSO 2	PSO 3
CSE21951	Database Management System	2	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: MCA, Semester: II	Stream: CSE
PAPER TITLE: Database Management System	PAPER CODE: CSE21951
Maximum Marks: 50	Time duration: 3 hours
Total No of questions: 12	Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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.	**Explain** the Insertion anomalies with proper example?	**U**	**CO1**
2.	**Define** is FD with example?	**R**	**CO5**
3.	**Explain** Super key and Candidate Key with proper example?	**U**	**CO4**
4.	**Explain** Multivalued attribute with proper example?	**U**	**CO3**
5.	**Explain** Strong entity with proper example?	**U**	**CO3**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Define** the Relational Algebra Fundemental operator 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.	Suppose you are given the following requirements for a simple database for the • National Hockey League (NHL): • the NHL has many teams, • each team has a name, a city, a coach, a captain, and a set of players, • each player belongs to only one team, • each player has a name, a position (such as left wing or goalie), a skill level, and • a set of injury records, • a team captain is also a player, • a game is played between two teams (referred to as host_team and guest_team) and has a date (such as April 15th, 2018) and a score (such as 5 to 3). **Develop** a clean and concise ER diagram for the NHL database.	**AP**	**CO2**
	SECTION (Answer Any Two Questions) (2 x 12.5= 25)		
10.	a) **What is** the highest NF of each of the following relations? i) R1 (A, B, C, D, E, F) with FDs are ABC → D, D → EF, A → BC ii) R2 (J, K, L, M, N, O, P) with FDs are JN → KL, LM → K, NO→ P b) **Explain** ACID Properties with proper example. 5+5	**R** **U**	**CO5,** **CO4**

11.	i). Consider the following schema: Book(acc no, yr_pub, title) User(card no, bname, baddress,dob,phno) Borrow(acc no, doi, card_ no) Supp(S_name,S_add,S_Phone) where acc_ no is accession number, yr_pub is year of publication, bname is borrower name, baddress is borrower address, doi is date of issue, dob is the date of birth for the users, phno is the phone number of the user,S_name is the supplier name, S_add is the supplier address and S_Phone is the supplier phone number. **Build** the following queries on the table. (In SQL) (a) Find the Users who are 30 years and above. (b) Display the title of the book which Starts with "D" (c) Find the supplier name who supplied the book "Data Base Management Systems". (d) Find the borrower name and phone number who had issue book on 25-08-2010 (e) Find the name of the books which had been supplied by "XYZ" supplier.	**AP**	**CO4**
12.	**Explain** Deadlock recovery techniques? **Explain** Deadlock Prevention techniques? 5+5	**U**	**CO2**

MTH21519	**Discrete Mathematics**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisites	**--**				

Course Objectives:

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

Course Outcomes:

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

CO**1. 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. **Analyse** the advance concept of graph theory in various mathematical fields.

Catalogue 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: **[11 lecture hours]**

Introduction to Sets, Relation and Function

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: **[12 lecture hours]**

Introduction to Advanced Counting Techniques

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: **[11 lecture hours]**

Operation in Algebraic Structures and Morphism

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: **[06 lecture hours]**

Case study in Isomorphism, Eulerian and Hamiltonian Walks

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 example

Unit V: **[05 lecture hours]**

Case study in planar graph

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:

Components	**Class Assessment**	**Mid Term Assessment**	**End Term**
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
CO1	**Define** the fundamental knowledge to state the mathematical skills in Discrete Structure &Logic and allied fields.	**PO1,PO2,PO6,PSO2**
CO2	**Define** the fundamental knowledge to state the mathematical skills in basic and advance algebraic structures.	**PO1,PO2,PO7,PO8,PO9,PSO2**
CO3	**Demonstrate** basic concepts of combinatorics including generating functions.	**PO1,PO2, PO7,PO8,PO9,PSO1,PSO2**
CO4	**Analyze** the advance concept of graph theory in various mathematical fields.	**PO1,PO2, PO7,PO8,PO9,PSO1,PSO2**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
MTH21519	Discrete Mathematics	3	3	-	-		-	3	3	3	-	-	-	2	3	-

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

Name:

Enrolment No:

CSE22952	**Python Programming Lab**

Course: Discrete Mathematics
Subject Code:MTH21519
Program: MCA **Time: 03 Hrs.**
Semester: II **Max. Marks: 50**

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)	**R**	**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)	**U**	**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)	**R**	**CO3**
4.	**Show** that a graph is a tree if and only if it is minimally connected. (AP)	**R**	**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)	**R**	**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)	**U**	**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)	**R**	**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)	**Ap**	**CO4**

Version 1.0	**Contact Hour -45**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Knowledge of Python Language**				
Co-requisites	**--**				

Course Objectives:

- To **acquire** programming skills in core Python.
- To **acquire** Object Oriented Skills in Python
- To **develop** the skill of designing Graphical user Interfaces in Python
- To **develop** the ability to solve and analyse mathematical problem in Python

Course Outcomes:

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

CO1. **Classify** how to Write, Test and Debug Python Programs
CO2. **Inspect** Conditionals structure Loops and various operators used in Python Programs
CO3 **Experiment with** functions and **demonstrate** compound data using Lists, Tuples and Dictionaries
CO4 **Analyse** how Read and write data from & to files in Python.
CO5. **Explain** and **develop** the concept of OOP in Python.

Catalogue 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:

a. Running instructions in Interactive interpreter and a Python Script.
b. Develop a program to purposefully to raise Indentation Error and Correct it.

Experiment 2:
Implement different data types, Operators and Expressions using Python language..

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

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

Experiment 5:
Implement Python program using different sequential data types like List, Tuple, Dictionary Set
Experiment 6:
Understand and develop function programming, its types and function-call.

Experiment 9:
Implement the concept of data files and file handling in Python language.

Experiment 10:
Implement the concept of OOP properties with the help of Python syntax.

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

Components	Internal Assessment	ETE
Weightage (%)	**50**	**50**

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

Course Outcomes (COs)		Mapped POs and PSOs
CO1	**Classify** how to Write, Test and Debug Python Programs	**PO11, PO3, PSO3**
CO2	**Inspect** Conditionals structure Loops and various operators used in Python Programs	**PO2, PO3, PSO3**
CO3	**Experiment with** functions and **demonstrate** compound data using Lists, Tuples and Dictionaries	**PO11, PO2, PO3, PSO3**
CO4	**Analyze** how Read and write data from & to files in Python.	**PO1, PO2, PO3, PSO3**
CO 5	**Explain** and **develop** the concept of OOP in Python.	**PO1,PO11, PO2, PO3, PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
CSE 22952	Python Programming Lab	2	3	3	-	-	-	-	-	-	-	3	-	-	-	3

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

CSE22953	**Object Oriented Programming with Java Lab**	**L**	**T**	**P**	**C**

Model Question Paper

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

Name of the Program: MCA Semester: I Stream: CSE
PAPER TITLE: Python Programming Lab PAPER CODE: CSE22952
Maximum Marks: 50 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 10= 50)			
1.	Write a program to purposefully to **Inspect** Indentation Error and Correct it.	**AN**	**CO1**
2.	**Solve** a program to swap values of two variables with and without using third variable.	**AP**	**CO2**
3.	**Develop** a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)	**AP**	**CO2**
4.	**Construct** a program to create a structure named company which has name, address, phone and no Of Employee as member variables. Read name of company, its address, phone and no Of Employee. Finally display these members‟ value.	**AP**	**CO3**
5.	Write a program to **summarize** the concept of Multiple Inheritance with the help of Python syntax.	**U**	**CO5**

Version 1.0	**Contact Hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisites	**--**				

Course Objectives:

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.

Catalogue 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:

List of Programs:

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
9.Design a applet in Realtime web page design
10. Apply the concept in multi-threading
11. Apply the analysis in Java application development
12. Design a case study in android application.

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	ETE
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Define** classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem	**PO1,PO2,PO4 PSO1**
CO2	**Illustrate** object oriented modelling techniques like classes and Instances modelling techniques	**PO1, PO2, PO4, PSO1, PS03**
CO3	**Solve** programs using standard design patterns.	**PO1, PO2, PO4, PSO1**
CO4	**Interpret** fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.	**PO1, PO4, PSO1**
CO5	**Construct** programming solutions with exception handling and multi-threading concept	**PO1, PO2, PO4, PSO1, PSO3**
CO6	**Solve** GUI program with proper event handling techniques	**PO1, PO2, PO4, PSO1, PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE22953	Object Oriented Programming with Java Lab	3	3	-	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: MCA Semester: II Stream: CSE
PAPER TITLE: Object Oriented Programming with Java Lab PAPER CODE: CSE22953
Maximum Marks: 50 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 10 = 50)			
1.	**Give a overview** a java program to implement the concept of method overloading.	**C**	**CO2, CO3**
2.	**Construct** a java program to implement the concept of method overriding.	**C**	**CO2, CO3**
3.	**Develop** a java program to implement the concept of nesting of methods.	**Ap**	**CO1, CO3**
4.	**Analyze** a java program to implement multiple inheritance.	**An**	**CO2, CO3**
5.	**Apply** a java program to implement the concept of multithreaded programming.	**Ap**	**CO2, CO5**

CSE22954	Data Structures Lab	L	T	P	C
Version 1.0	**Contact Hours – 45 Hours**	**0**	**0**	**3**	**2**
Pre-requisite/Exposure	**Concept in C-Programming**				
Co-requisite	**NIL**				

Course Objectives:

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

Course Outcomes:

On the completion of this course the student 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:

Unit-I: Array	**9 Lecture Hours**

1. Write a program in C to Search an element into a 1D array.
2. Write a program in C to search an element into a 1D array using Binary Search.
3. Write a program in C to insert an element into a 1D array.
4. Write a program in C to delete an element from a 1D array.
5. Write a program in C to add two given matrices.
6. Write a program in C to multiply two given matrices.
7. Write a program in C to find the transpose of a given matrix.

Unit-II: Stacks and Queues	**8 Lecture Hours**

1. Write a program in C to implement Stack using Array.
2. Write a program in C to convert an Infix Expression to an Post Fix Expression using Stack.
3. Write a program in C to implement a Queue using Array.
4. Write a program in C to implement a Circular Queue.

Unit-III: Linked List	**12 Lecture Hours**

1. Write a program in C to insert an element at the beginning into a Single Linked List
2. Write a program in C to insert an element at the end into a Single Linked List
3. Write a program in C to insert an element after a given element into a Single Linked List
4. Write a program in C to insert an element at the beginning into a circular Linked List
5. Write a program in C to insert an element at the end into a circular Linked List
6. Write a program in C to insert an element at the beginning into a Doubly Linked List
7. Write a program in C to insert an element at the end into a Doubly Linked List
8. Write a program in C to insert an element after a given node into a Doubly Linked List
9. Write a program in C to delete an element from a Single Linked List
10. Write a program in C to delete an element from a Circular Linked List
11. Write a program in C to delete an element from a Doubly Linked List

Unit-IV: Trees and Graphs	**11 Lecture Hours**

1. Write a program in C to implement a tree
2. Write a program in C to implement a Binary Search Tree.
3. Write a program in C to implement Minimal Spanning Tree Using Kruskal’s Algorithm.
4. Write a program in C to implement Minimal Spanning Tree using Prim’s Algorithm.
5. Write a program in C to implement Depth First Search
6. Write a program in C to implement Breadth First Search.

Unit-V: Sorting	**5 Lecture Hours**

1. Write a program in C to implement Bubble Sort.
2. Write a program in C to implement Insertion Sort.
3. Write a program in C to implement Quick Sort.
4. Write a program in C to implement Merge Sort.
5. **Write a program in C to implement Heap Sort.**

Text Books:

2. Chuck Lam, Hadoop in Action, Manning Publications,2010.
3. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.

Reference Books:

4. Big Data and Analytics by Seema Acharya, Subhashini Chellapan
5. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses by Michael Minelli ,Michele Chambers , Ambiga Dhiraj

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Explain** asymptotic performance of the algorithms	PO1,PO2
CO2	**Illustrate** Linear data structures and their applications such as Stacks, Queues and Linked Lists	PO1,PO2,PO3, PSO1
CO3	**Solve** and understand Non-Linear Data Structures and their Applications such as Trees and Graphs	PO1,PO2,PO3, PSO3
CO4	**Interpret** searching and sorting algorithms	PO1,PO2,PO3,PSO3

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE22954	Data Structures Lab	3	3	3	-	-	-	-	-	-	-	-	-	-	-	3

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

MODEL QUESTION PAPER

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

Name of the Program: MCA Semester: II Stream: CSE
PAPER TITLE: Data Structures Lab PAPER CODE: CSE22953
Maximum Marks: 50 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 10 = 50)			
1.	**Give a overview** a stack program to implement the concept of method deletion and insertion.	**C**	**CO2, CO3**
2.	**Construct** a C program to implement the concept of insertion in queue.	**C**	**CO2, CO3**
3.	**Develop** a C program to implement the concept of nesting of methods.	**Ap**	**CO1, CO3**
4.	**Analyze** a program in C to implement Merge Sort.	**An**	**CO2, CO3**
5.	**Apply** a program in C to implement Heap Sort.	**Ap**	**CO2, CO5**

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

ix) If the COs are higher in numbers that can be managed by equating sub-divisional questions
x) If the COs are lower in numbers, the questions can be increased by equating the number of COs

CSE22955	**Database Management System 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:

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modelling, relational, hierarchical, and network models
- To understand and use data manipulation language to query, update, and manage a database
- To develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency,
- To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.

Course Outcomes:

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

CO1. **Identify** the use of Database Systems in different software and applications.
CO2. **Develop** the queries using SQL in database creation interaction.
CO3. **Define** a commercial relational database system (Oracle, MySQL) by writing SQL using the system.

Catalog Description:

This course introduces the core principles and techniques required in the design and implementation of database systems. This introductory application-oriented course covers the relational database systems RDBMS - the predominant system for business scientific and engineering applications at present. It includes Entity-Relational model, Normalization, Relational model, Relational algebra, and data access queries as well as an introduction to SQL. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

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	**Internal Assessment**	**ETE**
Weightage (%)	**50**	**50**

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

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the	Ability to enhance and develop techniques for independent and lifelong learning in computer application.

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE22955	Database Management System Lab	3	3	-	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: MCA Semester: II Stream: CSE
PAPER TITLE: Database Management System Lab PAPER CODE: CSE22955
Maximum Marks: 50 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.

Part A **(1X 20=20)**

Q1.

1. **Table: *Customer***

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

2. **Table: *Movie_Gallery***

Column	Format	Remarks

R

CO1, CO2

Name		
Movie_No	**Varchar(3)**	**Primary Key**
Movie_Title	**Char(20)**	**Not Null**
Movie_Type	**Char(10)**	**Not Null**
Movie_Rating	**Number(05)**	
CD_Rack_No	**Number(05)**	

3. **Table:** ***Invoice_Details***

Column Name	**Format**	**Remarks**
Invoice_No	**Varchar(3)**	**Primary Key**
Movie_No	**Char(20)**	**Foreign Key(Table 2)**
Customer_ID	**Varchar(3)**	**Foreign Key(Table 1)**
Issue_Date	**Date**	
Return_Date	**Date**	

Please enter at least 15 values for each table. Please follow your query before entering your values.

Part-B **(6X5=30)**

Q2.	Create a SQL query to find out the from where most of the customer resides.	**U**	**CO2**
Q3.	Find the movie name which had been rented highest no of times.	**R**	**CO3**
Q4.	Write a SQL query to find the average price of a movie.	**AP**	**CO2**
Q5.	Select the First name and phone number of the customers who had rented the movie “xyz”.	**R**	**CO2**

CSE21956	Design and Analysis of Algorithms	L	T	P	C
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Discrete Mathematics**				
Co-requisite	**Concepts on Programming, Logical Ability, Problem Solving**				

Course Objectives:

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

Course Outcomes:

On the completion of this course the student 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.

Course 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	**09 Lecture Hours**
Introduction: Characteristics of algorithm. Analysis of algorithm: Asymptotic analysis of complexity bounds – best, average and worst-case behaviour; Performance measurements of Algorithm, Time and space trade-offs, Analysis of recursive algorithms through recurrence relations: Substitution method, Recursion tree method and Masters’ theorem. Algorithm Design Paradigms.	
Unit-II	**09 Lecture Hours**
Sorting Algorithms & Data Structures: Selection sort, bubble sort, insertion sort, Sorting in linear time, count sort, Linear search, **Divide & Conquer:** Quick sort, worst and average case complexity, Merge sort, Matrix multiplication Binary search, Binary search tree, Strassen’s algorithm for matrix multiplication, The substitution method for solving recurrences, The recursion-tree method for solving recurrences, The master method for solving recurrences.	
Unit-III	**09 Lecture Hours**
Greedy algorithms: General Characteristics of greedy algorithms, Problem solving using Greedy Algorithm- Activity selection problem, Minimum Spanning trees (Kruskal’s algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem **Dynamic programming:** Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming- Making Change Problem, Assembly Line Scheduling, Knapsack problem, Matrix chain multiplication, Longest Common Subsequence Dynamic Programming using Memoization.	
Unit-IV	**09 Lecture Hours**
Graph Algorithms : Representations of graphs, Breadth-first search, Depth-first search, Topological sort, Strongly connected components, Minimum Spanning Trees, Growing a minimum-spanning tree, The algorithms of Kruskal and Prim, Single-Source Shortest Paths, Bellman-Ford algorithm, Single-source shortest paths in directed acyclic graphs, Dijkstra’s algorithm, Difference constraints and shortest paths, Proofs of shortest-paths properties, All-Pairs Shortest Paths, Shortest paths and matrix multiplication, The Floyd-Warshall algorithm, Johnson’s algorithm for sparse graphs, Maximum Flow, Flow-networks, The Ford-Fulkerson method, **Branch & Bound & Backtracking**	
Unit-V	**09 Lecture Hours**
String Matching The naive string-matching algorithm, The Rabin-Karp algorithm, String matching with finite automata, The Knuth-Morris-Pratt algorithm **Approximation Algorithms:** The vertex-cover problem, The traveling-salesman problem, The set-covering problem, Randomization and linear programming **NP-Completeness:** Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs , NP-complete problems.	

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.
3. Algorithm Design, 1ST Edition, Jon Kleinberg and Évatardos, Pearson.
4. Book 3 – Author – Publisher

Reference Books:

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

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Understand** the basics about algorithms and learn how to analyse and design algorithms	PO1, PO2 ,PO4
CO2	Choose brute force, divide and conquer, dynamic programming and greedy techniques methods to solve computing problems	PO1, PO2,PO5
CO3	Understand the approach for solving problems using iterative method.	PO1, PO2 ,PSO1, PO6, PO7,PO8,PO9,PSO1,PSO2
CO4	Describe the solution of complex problems using backtracking, branch and bound techniques.	PO1, PO2,PO5, PO6, PO7,PO8,PO9,PSO1,PSO2
CO5	Classify the different Computability classes of P, NP, NP-complete and NP-hard.	PO6, PO7,PO8,PO9,PSO1,PSO2

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments,	The ability to understand the evolutionary changes in	Ability to analyse the impact of Computer Science and Engineering
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
CSE21956	Design and Analysis of Algorithms	3	3	1	1	-	3	-	2	-	-	-	-	3	3	-

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

ECE21601	**Data Communication & Computer Network**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour-45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Computer Fundamentals**				
Co-requisites	**--**				

- To become familiar with fundamentals of computer network.
- To become familiar with transmission media and data communication.
- To become familiar with addressing techniques and protocols.
- To 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: **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**	**MTE**	**ETE**
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,PO4,PSO1,PSO3**
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, PO2,PO4,PSO1,PSO3**
CO3	**Describe** different types of networked applications and what underlying network protocols are needed to meet their diverse requirements.	**PO1, PO2,PO4,PSO1,PSO3**
CO4	**Distinguish** between control and data planes in computer networks, and their corresponding architectures in real-world networks (including the Internet).	**PO2, PO9, PSO1**
CO5	**Illustrate** reliable transport protocols and networked system architectures via implementation using Socket APIs, measurement and analysis.	**PO12, PSO2, PO9**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
ECE21601	Data Communication and Computer Network	3	3	-	3	-	-	-	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

Name of the Program: MCA Semester: III Stream: CSE
PAPER TITLE: Data Communication & Computer Network PAPER CODE: ECE21601
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

SECTION A (Attempt all questions)(5x2=10)			
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)(2x12.5=25)		
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**

CSE21957	**Graph Theory**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Data Structures**				
Co-requisite	**--**				

Course Objectives:

1. To understand and apply the fundamental concepts in graph theory.
2. To apply graph theory-based tools in solving practical problems.
3. To improve the proof writing skills.
4. To state the theorems and prove formally using various techniques.
5. To understand various graphs algorithms and analyse them.

Course Outcomes:

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

CO1: **Understand** the different distance measures in graphs. Define the special types of graphs – complete graph, regular graph, bipartite graph and their properties.

CO2: **Discuss** the properties of trees, Arboricity, vertex and edge connectivity, auto-morphism groups, reconstruction problem and Mengers theorem.

CO3: **Distinguish** between Eulerian and Hamiltonian Graphs. Demonstrate Euler's theorem, Kuratowski's theorem, Colouring of planar graphs, Crossing number and thickness.

CO4: **Explain** Query processing and optimization. Analyze the storage strategies

CO5: **Differentiate** among the matching factors, decomposition and domination in graph theory.

Course Description:

This course is aimed to cover a variety of different problems in Graph Theory with an emphasis on applications and modelling. Graph theory is a study of graphs, trees and networks. In this course students will come across a number of theorems and proofs. Theorems will be stated and proved formally using various techniques. Topics that will be discussed include Euler formula, Hamilton paths, planar graphs and coloring problem; the use of trees in sorting and prefix codes; useful algorithms on networks such as shortest path algorithm, minimal spanning tree algorithm and min-flow max-cut algorithm.

Course Content:

Unit-I	**8 Lecture Hours**
Basics: Graph – definition; Degree sequences, Different distance measures in graphs, Special types of graphs – complete graph, regular graph, bipartite graph and their properties.	
Unit-II	**9 Lecture Hours**
Structure and Symmetry: Cut vertices, bridges and blocks, auto-morphism groups, reconstruction problem. Trees and Connectivity: Properties of trees, Arboricity, vertex and edge connectivity, Mengers theorem .	
Unit-III	**10 Lecture Hours**
Eulerian and Hamiltonian Graphs: Characterization of Eulerian graphs, Sufficient Conditions for Hamiltonian graphs. Colouring and Planar Graphs: Vertex and edge colouring, perfect graphs, planar graphs, Euler's theorem, Kuratowski's theorem, Colouring of planar graphs, Crossing number and thickness.	
Unit-IV	**9 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	**9 Lecture Hours**
Vert Matching, factors, decomposition and domination. External Graph Theory: Turan's theorem, Ramsay's theorem, Szemeredi's regularity lemma and their applications.	
Text Books: 1. Graph Theory, J. A. Bondy and U. S. R. Murthy, Sringer Verlag, 2008. 2. Introduction to Graph Theory, D. B. West, PHI, 2004.	
Reference Books: 1. Graph Theory, R. Diestel, Sringer Verlag, 2003.	

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Illustrate** the different distance measures in graphs. Define the special types of graphs – complete graph, regular graph, bipartite graph and their properties.	**PO1, PO2**
CO2	**Explain** the properties of trees, Arboricity, vertex and edge connectivity, auto-morphism groups, reconstruction problem and Mengers theorem.	**PO2, PO3**
CO3	**Distinguish** between Eulerian and Hamiltonian Graphs. Demonstrate Euler's theorem, Kuratowski's theorem, Colouring of planar graphs, Crossing number and thickness.	**PO3, PSO3**
CO4	**Explain** Query processing and optimization. Analyze the storage strategies.	**PO4, PSO1, PSO3**
CO5	**Contrast** among the matching factors, decomposition and domination in graph theory.	**PO12, PSO2**

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and design algorithms for efficient computer-based systems of	The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using	Ability to analyse the impact of Computer Science and Engineering solutions in the societal and human context, design, model, develop, test
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
CSE21957	Graph Theory	3	2	3	3	-	-	-	-	-	-	-	3	3	3	2

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

MODEL QUESTION PAPER

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2022 – 23)		
Name of the Program:	MCA	**Semester:**	III
Paper Title:	Graph Theory	**Paper Code:**	CSE21957
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	
(Any other information for the student may be mentioned here)	At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. Assumptions made if any, should be stated clearly at the beginning of your answer.		

Ques No.	Question	Knowledge Level	Course Outcome
	Group A: Answer ALL the questions (5 x 1 = 5)		
1	**What is** Graph	**R**	**CO1**
2	**Explain** Edge and vertex	**U**	**CO2**
3	**List the feature of** associativity	**R**	**CO3**
4	**Explain** Inverse law	**U**	**CO4**
5	**Demonstrate** additive inverse	**Ap**	**CO5**
	Group B: Answer ALL the questions (5 x 2 = 10)		
6	**a) i) What** is group and its features **ii) Explain additive inverse** [1+1]	**R & U**	**CO1**
	(OR)		
	b) i) Illustrate ring **ii) Explain multiplicative inverst** [1+1]	**R & U**	
7	**a) Explain features fir ring**	**U**	**CO2**
	(OR)		
	b) Compare group and ring	**An**	
8	**a) Explain** Kuratowski's theorem	**U**	**CO3**
	(OR)		
	b) Discuss planar graph	**U**	
9	**a) Explain ring**	**U**	**CO4**
	(OR)		
	b) Examine colouring of graph	**An**	

10	**a) Interpret buffer management**	**An**	**CO5**
	(OR)		
	b) Demonstrate Hamiltonian cycle	**Ap**	
Group C : Answer ALL the questions (7 x 5 =35)			
11	**a) i) Discuss** HAM **ii) Explain** server model	**R & U**	**CO1**
	(OR)		
	b) i) Why **ii) Explain**, B+-trees, g [2+3]	**An & U**	
12	**a) Explain** Characterization of Eulerian graphs,	**U**	**CO2**
	(OR)		
	b) Identify. B-trees	**R**	
13	**a) Explain** hashing	**U**	**CO3**
	(OR)		
	b) Explain Sufficient Conditions for Hamiltonian graphs	**U**	
14	**a) Explain** forward hashing	**U**	**CO4**
	(OR)		
	b) Explain . B-trees and features	**U**	
15	**a) Examine** Sufficient Conditions for Hamiltonian graphs	**An**	**CO4**
	(OR)		
	b) Examine collision free hashing	**An**	
16	**a) Demonstrate** Cut vertices	**Ap**	**CO5**
	(OR)		
	b) Demonstrate. bridges and blocks	**Ap**	
17	**a) Demonstrate**, bridges and blocks	**Ap**	**CO5**
	(OR)		
	b) Demonstrate , auto-morphism groups	**Ap**	

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

xi) If the COs are higher in numbers that can be managed by equating sub-divisional questions
xii) If the COs are lower in numbers, the questions can be increased by equating the number of Cos

CSE21958	**Formal Language and Automata Theory**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**NIL**				
Co-requisite	**NIL**				

Course Objectives:

1. Introduce concepts in automata theory and theory of computation
2. Identify different formal language classes and their relationships
3. Design grammars and recognizers for different formal languages
4. Prove or disprove theorems in automata theory using its properties
5. Determine the decidability and intractability of computational problems

Course Outcomes:

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

CO1: Define the basic concepts in formal language theory, grammars, automata theory, computability theory, and complexity theory.

CO2: Demonstrate abstract models of computing, including deterministic (DFA), non-deterministic (NFA), Push Down Automata (PDA) and Turing (TM) machine models and their power to recognize the languages.

CO3: Prove and disprove theorems establishing key properties of formal languages and automata.

CO4: **Acquire** a fundamental understanding of core concepts relating to the theory of computation and computational models including (but not limited to) decidability and Intractability.

CO5: **Solve** fundamental problems related to Computational Model.

Course Description:

This course will provide a foundation to the “Theory of Computation”. The student will realize that the sometimes chaotic technology oriented world of computers has a very elegant mathematical basis to it. This basis is deeply rooted in mathematics developed before the days of modern computers. Our study will lead to some interesting implications concerning the theoretical limits of computing. On the practical side, this course is a background for a course on compilers. Topics covered in this course include: mathematical prerequisites, finite state machines (automata), concept of a language and grammars, deterministic and non-deterministic accepters, regular expressions and languages, context-free languages, normal/canonical forms, pushdown automata, Turing machines, context sensitive languages, recursive and recursively enumerable languages. Each of the language classes has two points of view: a class of automata defining the language, and a class of grammars defining the language. This dual approach to defining languages, will finally lead to the Chomsky hierarchy of languages. We shall observe that the Turing Machine not only serves to define a language class, but also a mathematical model for computation itself and defines the theoretical limits of computation.

Course Content:

Unit-I	**09 Lecture Hours**

Mathematical Preliminaries:

Set Theory, Describing a Set, Empty Set, Identity and Cardinality, Subset, Power Sets, Operations on Sets: Union, Intersection, Set Theoretic Equalities, Sequence versus Set, Ordered Pairs, Cartesian Product,Relations, Binary Relation, Domain and Range of Relation, Operations on Relations, Properties of Relations, Functions, Types of Functions, Alphabet, String and Language, Operations on Language, Grammars, Types of Grammars–Chomsky Hierarchy, Graphs and Trees, Directed Graph, Undirected Graph, Trees, Lemma, Theorem Proving, Proof by Induction Proof by Contradiction, Proof by Example.

Unit-II	**09 Lecture Hours**

Finite Automata:

Finite-state Machine, Finite-Automaton Model, Properties of Transition Function ‘c’, Transition Diagram, Transition Table, Language Acceptance, Two Types of Finite Automata, Deterministic Finite Automata (DFA) Non-deterministic Finite Automaton, Acceptance of NFA, Equivalence of DFAs and NFAs, Converting NFA to DFA, Subset Construction, NFA with Epsilon-(ε) Transitions, Epsilon Closure (e-closure), Eliminating e-Transitions, Converting NFA with ε-Transition to NFA, without ε-Transition, Converting NFA with ε-Transition to DFA, Comparison Method for Testing, Equivalence of Two FA, Reduction of Number of States in FA, Indistinguishable States, Equivalent Classes, Minimization of DFA, Minimization of DFA Using Myhill Nerode Theorem, Finite Automata with Output, Moore Machine, Mealy Machine, Equivalence Between Moore and Mealy Machines, Interconversions Between Machines, Applications of Finite Automata with Output, The Full-adder, The String Sequence Detector.

Regular Languages and Regular Grammar:

Regular language, Regular expressions, Deterministic finite automata (DFA) and equivalence with regular expressions, NFA and equivalence with DFA, Regular grammars and equivalence with finite automata, Properties of regular languages, Pumping lemma for regular languages, Problem solving using pumping lemma.

Unit-III	**09 Lecture Hours**

Pushdown Automata & Context Free Languages:

Graphical Representation of PDA, Instantaneous Description of PDA, Language Acceptance by PDA, Equivalence of Acceptance of Final State and Empty Stack, Types of PDAs, Deterministic PDA, Closure Properties of DCFL, Decision Properties of DCFLs, DPDA and Regular Languages, DPDA and Ambiguous Grammar, Equivalence of PDA’s and CFG’s, Nondeterministic pushdown automata (NPDA), NPDA and equivalence with CFG, Constructing PDA for Given CFG, Constructing CFG for the Given PDA, Two-stack PDA, Applications of PDA, PDA as a Parser, Top-down Parser Using the PDA, Pumping lemma for context-free languages.

Context Free Grammar:

Context-free grammars (CFG), Leftmost and Rightmost Derivations, Derivation Tree, Equivalence of Parse Trees and Derivations, Ambiguous Grammar, Removing Ambiguity, Inherent Ambiguity, Simplification of Grammars, Elimination of Useless Symbols, Elimination of e-Productions, Eliminating Unit Productions, Chomsky normal forms, Greibach normal forms

Unit-IV	**09 Lecture Hours**

Context Sensitive Grammar and Languages:

Context-sensitive grammars (CSG), Context-sensitive Languages, Linear bounded automata, Linear bounded automata and equivalence with CSG, Properties of Context-sensitive grammars (CSG) and Languages, Properties of Linear bounded automata.

Turing Machine :

Turing Assumptions, Instantaneous Description, Turing Machine as Language Accepter, Turing Machine as a Computational Machine, Techniques for Turing Machine Construction, Storage in Finite Control, Multi-track Tape, Checking off Symbols, Subroutines, Shifting Over, Types of Turing Machines, Non-deterministic Turing Machines, Turing Machines with Two-dimensional, Tapes, Turing Machines with Multiple Tapes, Turing Machines with Multiple Heads, Turing Machines with Infinite Tape, Church’s Thesis, Turing Machines as Enumerators, Universal Turing Machine, Counter Machine, Recursive and Recursively Enumerable Languages

Unrestricted grammars and equivalence with Turing machines, Church-Turing thesis, universal Turing machine, Rice's theorem, undecidable problems about languages.

Unit-V	**09 Lecture Hours**

Decidability:

Decidable Languages, Decidable problems concerning regular languages, Decidable problems concerning context-free languages, Undecidability, The diagonalization method, An undecidable language

A Turing-unrecognizable language

Reducibility:

Undecidable Problems from Language Theory, Reductions via computation histories, Simple Undecidable Problem, Mapping Reducibility , Computable functions, Formal definition of mapping reducibility

Time Complexity:

Measuring Complexity, Big-O and small-o notation, Analyzing algorithms, Complexity relationships among models, The Class P, Polynomial time, Examples of problems in P, The Class NP, Examples of problems in NP,

P versus NP, NP-completeness, Polynomial time reducibility, Definition of NP-completeness, The Cook–Levin Theorem

Space Complexity:

Savitch’s Theorem, The Class PSPACE, PSPACE-completeness

Text Books:

1. Introduction to Automata Theory, Languages, and Computation, 3rd Edition, John E. Hopcroft Rajeev Motwani and Jeffrey D. Ullman, Pearson Education.
2. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing
3. An Introduction To Formal Languages And Automata, Peter Linz

Reference Books:

1. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation,Pearson Education Asia.
2. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	Define the basic concepts in formal language theory, grammars, automata theory, computability theory, and complexity theory.	**PO1, PO2,PO4,PSO1,PSO3**
CO2	Demonstrate abstract models of computing, including deterministic (DFA), non-deterministic (NFA), Push Down Automata (PDA) and Turing (TM) machine models and their power to recognize the languages.	**PO1, PO2,PO4,PSO1,PSO3**
CO3	Demonstrate abstract models of computing, including deterministic (DFA), non-deterministic (NFA), Push Down Automata (PDA) and Turing (TM) machine models and their power to recognize the languages.	**PO1, PO2,PO4,PSO1,PSO3**
CO4	**Acquire** a fundamental understanding of core concepts relating to the theory of computation and computational models including (but not limited to) decidability and Intractability.	**PO2, PO9, PSO1**
CO5	Prove and disprove theorems establishing key properties of formal languages and	**PO12, PSO2, PO9**

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and	The ability to understand the evolutionary changes in computing, apply standard	Ability to analyse the impact of Computer Science and Engineering solutions in the
Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE21958	Formal Language and Automata Theory	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3

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

MODEL QUESTION PAPER

ADAMAS UNIVERSITY
END SEMESTER EXAMINATION
(Academic Session: 2022 – 23)

Name of the Program:	MCA	**Semester:**	III
Paper Title:	Formal Language and Automata Theory	**Paper Code:**	CSE21958
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	2
(Any other information for the student may be mentioned here)	**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.		

Ques No.	Question	Knowledge Level	Course Outcome
Group A : Answer ALL the questions (5 x 1 = 5)			
1	**What is** NFA	**R**	**CO1**
2	**Explain** Edge and vertex	**U**	**CO2**
3	**List the feature of a**ssociativity in PDA	**R**	**CO3**
4	**Explain** Inverse law	**U**	**CO4**
5	**Demonstrate** additive inverse	**Ap**	**CO5**
Group B: Answer ALL the questions (5 x 2 = 10)			
6	**a) i) What** Converting NFA to DFA, without ε-Transition, Converting NFA with ε-Transition to DFA, **ii)** Minimization of DFA Using Myhill Nerode Theorem	**R & U**	**CO1**
	(OR)		
	b) i) Illustrate Subset Construction, NFA with Epsilon-(ε) Transitions, Epsilon Closure (e-closure), **ii) Explain** Eliminating e-Transitions, Converting NFA with ε-Transition to NFA,	**R & U**	
7	**a) Explain features** Equivalence of Two FA	**U**	**CO2**
	(OR)		
	b) Compare Reduction of Number of States in FA, Indistinguishable States,	**An**	
8	**a) Explain** Kuratowski's theorem	**U**	**CO3**
	(OR)		
	b) Discuss , Comparison Method for Testing, , Equivalent Classes, Minimization of DFA	**U**	
9	**a) Explain** Decidable problems concerning context-free languages	**U**	**CO4**

	(OR)		
	b) Examine Un-Decidable problems concerning context-free languages	**An**	
10	**a) Interpret buffer management**	**An**	**CO5**
	(OR)		
	b) Demonstrate Hamiltonian cycle	**Ap**	
	Group C : Answer ALL the questions (7 x 5 =35)		
11	**a) i) Discuss** HAM **ii) Explain** Decidable problems concerning context-free languages	**R & U**	**CO1**
	(OR)		
	b) i) Why, Decidable problems concerning regular languages, , Undecidability, The diagonalization method, An undecidable language **ii) Explain**, A Turing-unrecognizable language [2+3]	**An & U**	
12	**a) Explain** Characterization of Decidable Languages,	**U**	**CO2**
	(OR)		
	b) Identify Decidable Languages	**R**	
13	**a) Explain** hashing	**U**	**CO3**
	(OR)		
	b) Explain Sufficient Conditions for Hamiltonian graphs	**U**	
14	**a) Explain** Decidable Languages	**U**	**CO4**
	(OR)		
	b) Explain . B-trees and features	**U**	
15	**a) Examine** Sufficient Conditions for Hamiltonian graphs	**An**	**CO4**
	(OR)		
	b) Examine collision free hashing	**An**	
16	**a) Demonstrate PDA**	**Ap**	**CO5**
	(OR)		
	b) Demonstrate. bridges and blocks	**Ap**	
17	**a) Demonstrate**, DFA	**Ap**	**CO5**
	(OR)		
	b) Demonstrate , auto-morphism NFA	**Ap**	

CSE21959	Artificial Intelligence and Machine Learning (Elective -1)	L	T	P	C
Version 1.0	Contact hours -45	3	0	0	3
Pre-requisites/Exposure	Basics of Algorithm, Linear Algebra, Probability, and Statistics				
Co-requisites	--				

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

i) If the COs are higher in numbers that can be managed by equating sub-divisional questions
ii) If the COs are lower in numbers, the questions can be increased by equating the number of COs

Course Objectives:

- To help the student to acquire knowledge of basics of artificial intelligent computing.
- To enable students to gain basic knowledge of machine learning.
- To incorporate the evolutionary computational knowledge.
- To enable students to acquire various problem solving, learning, and planning ability.
- 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**. Define** solution according to real problem, apply search proper strategies for a particular problem, and construct logical propositions to conclude a proof statement.
CO2. **Construct** and differentiate plan for specific problem solution using various planning strategies.
CO3. **Implemen**t predictive and classification model using regression method.
CO4**. Design** and deploy Multilayer Artificial Neural Network using backpropagation algorithm for different dataset, probabilistic model using conditional probability (Baye's Theorem).
CO5**. Construct** SVM for linearly and non-linearly (kernel method) separable data. Generate Ability to select best features from the dataset using PCA.

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: **8 lecture hours**

Module 1:

Introduction, Agents, Problem formulation, Uninformed search strategies, Heuristics, Informed search strategies, Satisfying constraints

Logical agents, Propositional logic, Inference rules, First-order logic, Inferences in first order logic

Unit II: 10 lecture hours

Planning with state-space search, Partial-order planning, planning graphs, Planning and acting in the real world Forward and backward chaining, Unification, Resolution.

Introduction to Machine Learning: Overview of machine learning, related areas, applications, software tools, course objectives.

Basics of Machine Learning: Learning Topologies: Training-Testing-Validation; Error: Actual Output; Target Output; Error Optimization: Gradient Descent (SGD, Minibatch); Parameter Update; Dataset and cleaning, Normalization; Bias and Variance; Hypothesis Testing;

Unit III: 6 lecture hours

Regression: Linear Regression: Single, Polynomial Regression, Gradient Descent, ANOVA, Logistic Regression, Generalization: Ridge and Lasso regression.

Case Study: Media Company Case Study; Cynlate Bank Loan Disbursement.

Unit IV: 11 lecture hours

Neural networks: The perceptron algorithm, various activation functions and their differentiability, multilayer perceptrons, back-propagation, nonlinear regression, multiclass discrimination, training procedures,

Bayesian Learning, Decision Tree

Unsupervised Learning: Uses of Unsupervised Learning; Data Clustering: K-means and Kernel K-means;

Unit V: 10 lecture hours

Support vector machines: Functional and geometric margins, optimum margin classifier, constrained optimization, Lagrange multipliers, KKT conditions, soft margins, kernels.

Dimensionality Reduction: Feature Selection, Principle Component Analysis (PCA).

Text Books:

1. Artificial Intelligence – A Modern Approach, Second Edition, S. Russel and P. Norvig Pearson Education, 2003.
2. Artificial Intelligence, Ritch& Knight, TMH
3. “Machine Learning”, 1st Edition, Tom M. Mitchell, McGraw-Hill Series In Computer Science

Reference Books:

1. Artificial Intelligence; Structures for Complex Problem Solving, Fourth edition, G. Lugar, Pearson Education, 2002
2. Artificial Intelligence: A New Synthesis, Nils J. Nilsson, Morgan Kaufmann Publishing, Inc., Year 1998
3. “INTRODUCTIONTOMACHINE LEARNING”, 2005 Edition, Nils J Nillsson, Morgan Kaufmann
4. “Foundations of Machine Learning”, 2012 Edition, Mehryar Mohri, Afshin Rostamezadeh, Ameet Talwalkar, The MIT Press
5. Python Data Science Handbook Essential Tools for Working with Data”, 1st Edition, Jake Vander Plas, O’Reilly

Modes of Evaluation: Quiz/Assignment/Written Examination

Examination Scheme:

Components	Internal Assessment	MTE	ETE

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** solution according to real problem, apply search proper strategies for a particular problem, and construct logical propositions to conclude a proof statement.	**PO1, PO2,PO4,PSO1,PSO3**
CO2	**Construc**t and differentiate plan for specific problem solution using various planning strategies.	**PO1, PO2,PO4,PSO1,PSO3**
CO3	**Implement** predictive and classification model using regression method.	**PO1, PO2,PO4,PSO1,PSO3**
CO4	**Design** and deploy Multilayer Artificial Neural Network using backpropagation algorithm for different dataset, probabilistic model using conditional probability (Baye's Theorem).	**PO1, PO5, PO12, PSO1**
CO5	**Construct** SVM for linearly and non-linearly (kernel method) separable data. Generate Ability to select best features from the dataset using PCA.	**PO2, PO5, PSO1, PSO2**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the	Expertise to communicate in both oral and written forms, demonstrating the practice of	Ability to enhance and develop techniques for independent and lifelong learning in computer
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE	Artificial Intelligenc	3	3	-	3	-	-	-	2	-	-	-	-			

21959	e and Machine Learning													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: MCA Semester: III Stream: CSE
PAPER TITLE: Artificial Intelligence and Machine Learning PAPER CODE: CSE21959
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

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

Section A (Answer All the Questions) (5 x 2 = 10)			
1.	**What** is Heuristic value?	**R**	**CO1**
2.	**How** do you symbolize existential quantifiers?	**R**	**CO2**
3.	**State** if Bayesian Learning is parametric model or not?	**R**	**CO2**
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.	Express **what** is ridge in context of Hill-Climbing algorithm?	**R**	**CO2**
7.	**Explain** the theme of Backtracking search for CSP.	**U**	**CO2**
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 C (Answer Any Two Questions) (2 x 12.5 = 25)		
10.	**Define** problem solving agents and list its algorithms. R **Why** problem formulation must follow goal Formulation?	**Ap**	**CO2**

CSE21960	**Fundamental of Cloud Computing (Elective -1)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**DBMS, Java, Python, Computer Networking**				
Co-requisites	**--**				

11.	**Write** short notes on: - i) Bias ii) Variance. **Explain** using Simple Linear Regression R	**An**	**CO1**
12.	Cluster the dataset using K-Means clustering into 4 clusters. **Find out** the inter-cluster dissimilarity and intra-cluster similarity.	**U**	**CO4**

Course Objectives:

- To introduce cloud computing-based programming techniques and cloud services.
- To introduce concepts and security issues of cloud paradigm.
- To impart the fundamentals of virtualization techniques.

Course Outcomes:

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

CO1. **How** to provide Flexible and scalable infrastructures.
CO2. **Organize** process to reduce implementation and maintenance costs.
CO3. The case studies will help us to **understand** more of practice of cloud computing in the market.
CO4. **Determine** flexible and scalable infrastructure suitable to the organizational need.
CO5. **Comparison** of cost-wise solution to the problem and selecting the best solution for the problem suggested to the organization.

Catalog Description:

This course focuses on concepts of cloud, fundamental building blocks like Resource Consolidation, Hypervisor, VM etc. and the cloud service models. It gives students the insight into how to build clouds. And provides practices on building the cloud. It also gives exposure to Public and Privacy Clouds. It gives students the future directions in cloud domain.

Course Content:

Unit I: **08 lecture hours**

Data communication Components: Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks.

Unit II: **10 lecture hours**

Working with Cloud- Infrastructure as a Service: conceptual model and working Platform as a Service: conceptual model and functionalities Software as a Service: conceptual model and working Technologies and Trends in Service provisioning with clouds.

Service management, Computing on demand, Identity as a Service, Compliance as a Service

Unit III: **6 lecture hours**

Abstraction and Virtualization: Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability, Virtual Machines Manageability, Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action, Provisioning in the Cloud Context.

Unit IV: **10 lecture hours**

Cloud Infrastructure and Cloud Resource: Management Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources., Administrating the Cloud, Cloud Management Products, Emerging Cloud Management Standards.

Unit V: **11 lecture hours**

Cloud Security: Security Overview, Cloud Security Challenges and Risks, Software-as-a Service Security, Cloud computing security architecture: Architectural Considerations, General Issues Securing the Cloud, Securing Data, Data Security, Application Security, Virtual Machine Security, Identity and Presence, Identity Management and Access Control, Autonomic Security, Storage Area Networks, Disaster Recovery in Clouds.

Text Books:

1. Rajkumar Buyya et. el., Cloud Computing: Principles and Paradigms, Wiley India Edition
2. Sosinsky B., “Cloud Computing Bible”, Wiley India

Reference Books:

1. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola & S. Thamarai SelviMcGRAW Hill Publication
2. Miller Michael, “Cloud Computing: Web Based Applications that Change the Way You Work and Collaborate Online”, Pearson Education India
3. Velte T., Velte A., Elsenpeter R., “Cloud Computing – A practical Approach”, Tata McGrawHill

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

Examination Scheme:

Components	**Internal Assessment**	**MTE**	**ETE**
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	**How** to provide Flexible and scalable infrastructures.	**PO1, PO2,PO4,PSO1,PSO3**
CO2	**Organize** process to reduce implementation and maintenance costs.	**PO1, PO2,PO4,PSO1,PSO3**
CO3	The case studies will help us to **understand** more of practice of cloud computing in the market.	**PO1, PO2,PO4,PSO1,PSO3**

CO4	**Determine** flexible and scalable infrastructure suitable to the organizational need.	**PO4,PO12**
CO5	**Comparison** of cost-wise solution to the problem and selecting the best solution for the problem suggested to the organization.	**PO1,PO5,PSO3**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE 21960	Fundamentals of Cloud Computing	3	3	-	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: MCA Semester: III Stream: CSE
PAPER TITLE: Fundamentals of Cloud Computing

PAPER CODE: CSE21960
Maximum Marks: 50
Time duration: 3 hours
Total No of questions: 12
Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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.	**What** is meant Scale-Up scale-Down?	**U**	**CO2**
2.	**Express** data center with example.	**U**	**CO3**
3.	**What is** Hardware Virtualization?	**R**	**CO1**
4.	**Define** is cloud computing with example?	**R**	**CO3**
5.	**List** the main characteristics of cloud computing?	**R**	**CO5**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** in detail about Deployment Models in cloud computing.	**U**	**CO4**
7.	**Distinguish** three major differences that separate cloud architecture from the tradition one?	**An**	**CO5**
8.	**Describe** Distributed computing?	**R**	**CO2**
9.	**List** the pros and cons of cloud computing.	**U**	**CO2**
	SECTION C(Answer Any Two Questions) (2 x 12.5= 25)		
10.	**Illustrate** the following in detail i. Demand-Driven Resource Provisioning ii. Event-Driven Resource Provisioning iii. Popularity-Driven Resource Provisioning	**U**	**CO3**
11.	What is the difference between recovery time objective and recovery point objective? How do they depend on each other? **Justify** your answer with appropriate examples.	**E**	**CO4**
12.	**Demonstrate** thee architectural design of compute and storage clouds.	**AP**	**CO2**

CSE21961	Natural Language Processing and Its Application (Elective -II)	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	Computer Programming with python, Computer Programming with Python Lab				
Co-requisites	-				

Course Objectives:

- To understand key concepts from NLP are used to describe and analyse language
- To understand semantics and pragmatics of language for processing
- To apply structured semantic models on information retrieval and natural language applications.

Course Outcomes:

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

CO**1. Recall** linguistic phenomena and an ability to model them with formal grammars.
CO2**. Illustrate** proper experimental methodology for training and evaluating empirical NLP systems
CO3**. Identify** natural language processing techniques to process speech and analyse text.
CO4**. Examine** algorithms of natural language processing
CO5. **Evaluate** different language modeling Techniques.

Catalog Description:

This course introduces the fundamental concepts and techniques of natural language processing (NLP). Students will gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information. The course examines NLP models and algorithms using both the traditional symbolic and the more recent statistical approaches.

Course Content:

Unit I: **5 lecture hours**

Introduction: Context - Classical Toolkit - Text Pre-processing – Tokenization – Sentence Segmentation
Lexical Analysis: Finite State Morphonology Paradigm based Lexical Analysis - Syntactic Parsing – Cocke-Kasami-Younger Algorithm – Deductive Parsing – LR Parsing – Constraint based Grammars – Issues in Parsing
Semantic Analysis: Theories and approaches to Semantic Representation – Fine Grained Lexical
Case studies - Natural Language Generation – Components of a Generator – Approaches to Text Planning – Linguistic Component.

Unit II: **11 lecture hours**

Corpus Size, Representation, Sampling – Data Capture – Corpus Markup and Annotation – Multilingual Corpora – Multimodal Corpora -Corpus Annotation Types
Morphosyntactic Annotation – Treebanks: Syntactic, Semantic, and Discourse Annotation - Process of Building Treebanks - Applications of Treebanks - Searching Treebanks.

Fundamental Statistical Techniques: Binary Linear Classification – One-versus-All Method for Multi-Category Classification - Maximum Likelihood Estimation - Generative and Discriminative Models - Mixture Model and EM - Sequence Prediction Models.
Part-of-Speech Tagging: General Framework – POS Tagging Approaches – Other Statistical and Machine Learning Approaches.
Statistical Parsing: Basics - Probabilistic Context-Free Grammars - Generative Models – Discriminative Models - Beyond Supervised Parsing.

Unit III: 10 lecture hours
Multiword Expressions (MWE): Linguistic Properties, Types, Classification of MWEs – Research Issues Methods of Word Similarity – Normalized Web Distance Method – Kolmogorov Complexity – Information Distance – Normalized Web Distance – Applications –
Word Sense Inventories and Problem Characteristics – Applications of Word Sense Disambiguation – Approaches to Sense Disambiguation: Supervised, Lightly Supervised and Unsupervised.

Unit IV: 10 lecture hours
Modern Speech Recognition: Architectural Components – Historical Developments – Speech Recognition Applications – Technical Challenges and Future Research Directions
Alignment: Basics – Sentence Alignment – Character, Word, Phrase Alignment – Structure and Tree Alignment – Biparsing and ITG Tree Alignment
Statistical Machine Translation: Approaches – Language Models – Parallel Corpora – Word Alignment – Phrase Library – Translation Models – Search Strategies – Research Areas.

Unit V: 09 lecture hours
Information Retrieval – Indexing – IR Models – Evaluation and Failure Analysis
Natural Language Processing and Information Retrieval – Question Answering – Generic Question Answering System – Evaluation of Question Answering system – Multilingualism in Question Answering System
Recent trends and Related Works – Information Extraction – IE with Cascaded Finite State Transducers – Learning based Approaches in IE – Report generation – Emerging Applications of Natural language Generation in Information – Biomedical Text Mining – Sentiment Analysis and Subjectivity.

Text Books:
1. Daniel Jurafsky and James H. Martin Speech and Language Processing (2nd Edition), Prentice Hall; 2 editions, 2008

2. Foundations of Statistical Natural Language Processing by Christopher D. Manning and Hinrich Schuetze, MIT Press, 1999

Reference Books:

1.James Allen, Natural Language Understanding, Addison Wesley; 2 edition 1994

2. Steven Bird, Ewan Klein and Edward Loper Natural Language Processing with Python, O'Reilly Media; 1 edition, 2009

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

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

	Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
CO1															
CO2															
CO3															
CO4															
CO5															

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

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE 21920	Natural Language Processing and Its Applications	-	-	-	3	-	2	-	2	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: JULY 2020

Name of the Program: MCA Semester: III Stream: CSE
PAPER TITLE: Natural Language Processing and Its Applications
PAPER CODE: CSE21961
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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 questions)			
1.	**Explain** the concept of Hidden Markov Model.	**U**	**CO1** **CO2**
2	**What** is IDF?	**R**	**CO3**
3.	**How** a natural language model is being tested? Name some packages used for NLP tasks.	**U**	**CO1**
4.	Suppose a real case where you have to **identify** the customers to be included in a promotional campaign for maximizing response regarding a product in a textual form. What kind of methods would you suggest to analyze the responses?	**U**	**CO1**
5.	**Explain** the concept of Latent Semantics Indexing. Suppose we want to extract some features. Is it possible in NLP? If yes how it can be done?	**U**	**CO2** **CO3**
	SECTION B (Attempt any **Three Questions)**		
6.	**Design** a grammar that handles C English-subject verb agreement. The grammar that can be handled as follows a) She sings b) We sing	**U**	**CO1** **CO3**
7.	**What** are the major challenges in NLP? What is morphology? Briefly explain the concept of parts of speech tagging.	**R**	**CO3** **CO4**
8.	**Explain** working of Information retrieval Systems with proper schematic diagram.	**U**	**CO4** **CO5**
9.	**Compare** Information Extraction and Information Retrieval in NLP Applications.	**U**	
	SECTION C (Attempt any **Two Questions)**		
10.	Levenshtein edit distance is the number of insertions, substitutions, or deletions required to convert to one string to other. a) **Define** a finite-state acceptor that accepts all strings with edit distance *l* from the target string. *Target* b) **How** to generalize design to accept all strings edit distance from the target string equal to d. If the target string has length *l*, what is the minimal number of states required?	**U**	**CO1** **CO2**
11.	**How** Hidden Markov Model is used in speech processing? Explain with the help of state diagram.	**Ap**	**CO4**
12.	Sentiment Analysis are used as Social Media Analytics. **Explain** with the help of some example.	**U**	**CO5**

CSE21962	**Cloud Storage (Elective -II)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**DBMS, Java, Python, Computer Networking**				
Co-requisites	**--**				

Course Objectives:

- To introduce cloud computing-based programming techniques and cloud services.
- To introduce concepts and security issues of cloud paradigm.
- To impart the fundamentals of virtualization techniques.

Course Outcomes:

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

CO1. **Explain** the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing.
CO2. **Identify** the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc..
CO3. **Explain** the core issues of cloud computing such as security, privacy, and interoperability CO4. **Determine** flexible and scalable infrastructure suitable to the organizational need.

CO4. **Identify** problems, and explain, analyze, and evaluate various cloud computing solutions.
CO5. **Explain** the appropriate cloud computing solutions and recommendations according to the applications used.

Catalog Description:

This course provides a post graduate-level comprehensive introduction to cloud computing with an emphasis on advanced topics. The objective of this course is to provide graduate students of MCA with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing and researching state-of-the-art in Cloud Computing fundamental issues, technologies, applications and implementations. Another objective is to expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research. The goal of the final paper is to present a new idea or innovation using cloud computing.

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Course Content:

Unit I: **8 lecture hours**

Virtualized data center architecture: Cloud infrastructures; public, private, Hybrid Cloud**,** Service provider interfaces; Saas, Paas, Iaas**,** VDC environments; concept, planning and design**,** Business continuity principles, Disaster recovery principles, Managing VDC, Managing cloud environments and infrastructures.

Unit II: **10 lecture hours**

Information storage security & design: Storage strategy and governance; Security and regulations, Designing secure solutions; The considerations and implementations involved, Securing storage in virtualized environments., Securing storage in cloud environments,Monitoring and management; Security auditing and SIEM.

Unit III: **6 lecture hours**

Information availability design: Designing backup/recovery solutions to guarantee data availability in a virtualized environment, Design a replication solution, local remote and advanced, Investigate Replication in NAS and SAN environments, Data archiving solutions; analyzing compliance and archiving design considerations.

Unit IV: **10 lecture hours**

Storage network design: Architecture of storage, analysis, Planning, Storage network design considerations; NAS and FC sans, Hybrid storage networking technologies (iscsi, FCIP, fcoe), Design for storage virtualization in cloud computing, Host system design considerations.

Unit V: **11 lecture hours**

Optimization of cloud storage: Global storage management locations, Scalability, Operational efficiency. Global storage distribution; terabytes to petabytes and greater, Policy based information management; metadata attitudes; file systems or object storage.

Text Books:

1. Greg Schulz, “Cloud and Virtual Data Storage Networking”, Auerbach Publications [ISBN: 978-1439851739], 2011.
2. Marty Poniatowski, “Foundations of Green IT” Prentice Hall; 1 edition [ISBN: 978-0137043750], 2009.

Reference Books:

1. Mastering Cloud Computing by Rajkumar Buyya, C. Vecchiola & S. Thamarai SelviMcGRAW Hill Publication

2. Miller Michael, “Cloud Computing: Web Based Applications that Change the Way You Work and Collaborate Online”, Pearson Education India
3. Velte T., Velte A., Elsenpeter R., “Cloud Computing – A practical Approach”, Tata McGrawHill

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

Components	**Internal Assessment**	**MTE**	**ETE**
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 main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing	**PO4,PO10, PO11, PSO2,PSO3**
CO2	**Identify** the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.	**PO4,PO10, PO11, PSO2,PSO3**
CO3	**Explain** the core issues of cloud computing such as security, privacy, and interoperability.	**PO4,PO10, PO11, PSO2,PSO3**
CO4	**Identify** problems, and explain, analyze, and evaluate various cloud computing solutions.	**PO1,PO4, PO6,PO12, PSO2, PSO3**
CO5	**Explain** the appropriate cloud computing solutions and recommendations according to the applications used.	**PO1,PO4, PO6,PSO2, PSO3**

		Computational Knowledge	Problem Analysis	Design / Development of Solutions	Design / Development of Solutions	Modern Tool Usage	Professional Ethics	Life-long Learning	Project Management and Financ	Communication Efficacy	Societal & Environmental Concern	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare	Ability to enhance and develop techniques for independent and lifelong learning in computer
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3

CSE21962	Elective – II (Cloud Storage)			-	3	-	2	-	2	2	3	3	-		3	3

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

Model Question Paper

ADAMAS UNIVERSITY
PURSUE EXCELLENCE

ADAMAS UNIVERSITY
SCHOOL OF ENGINEERING AND TECHNOLOGY
END-SEMESTER EXAMINATION

Name of the Program: MCA   Semester: III   Stream: CSE
PAPER TITLE: Elective Course – II (Cloud Storage)   PAPER CODE: CSE21962
Maximum Marks: 50   Time duration: 3 hours
Total No of questions: 12   Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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.	**Define** Hybrid Cloud.	**R**	**CO1**

CSE21963	**Data Warehousing & Data Analytics (Elective -II)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**DBMS, Java, Python, Computer Networking**				
Co-requisites	**--**				

2.	**What** are the advantages of Cloud Computing?	**U**	**CO2**
3.	**What** are some of the popularly used cloud computing services?	**U&R**	**CO3**
4.	**Explain** DFS**.**	**R**	**CO1, CO4**
5.	**What** is Hybrid IT?	**R & U**	**CO5**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** the different cloud service models?	**Ap**	**CO3**
7.	**What** is the difference between the Hybrid Cloud and Hybrid IT?	**U**	**CO2**
8.	**What** is The Packaging of Hybrid Cloud?	**An**	**CO5**
9,	**What** is cloud computing?		
	SECTION C(Answer Any Two Questions) (2 x 12.5 = 25)		
10.	**What** is a Distributed Cloud?	**E & R**	**CO3, CO1, CO2**
11.	**What** is a multi-cloud strategy?	**R & U**	**CO5**
12.	**What** are the two main types of packaged hybrid cloud?	**U**	**CO4**

Course Objectives:

- To be familiar with mathematical foundations of data mining tools.
- To understand and implement classical models and algorithms in data warehouses and data mining

- To characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- To understand the Big Data Platform and its Use cases
- To provide an overview of Apache Hadoop
- To provide HDFS Concepts and Interfacing with HDFS
- To understand Map Reduce Jobs

Course Outcomes:

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

CO1. **Understand** the functionality of the various data mining and data warehousing component.
CO2. **Appreciate** the strengths and limitations of various data mining and data warehousing models.
CO3. **Explain** the analysing techniques of various data.
CO4. **Identify** Big Data and its Business Implications.
CO5. **List** the components of Hadoop and Hadoop Eco-System

Catalog Description:

This course will introduce the concepts of data ware house and data mining, which gives a complete description about the principles, used, architectures, applications, design and implementation of data mining and data ware housing concepts along with the added advantage of data analytics. Which will 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.

Course Content:

Unit I: **09 lecture hours**

Data Warehouse Fundamentals: Introduction to Data Warehouse, Data Warehouse Environment, OLTP Systems; Differences between OLTP Systems and Data Warehouse: Characteristics of Data Warehouse; Functionality of Data Warehouse: Advantages and Applications of Data Warehouse; Advantages, Applications

Planning and Requirements: Introduction: Planning Data Warehouse and Key Issues: Planning and Project Management in constructing Datawarehouse: Data Warehouse Project; Data Warehouse development Life Cycle, Kimball Lifecycle Diagram, Requirements Gathering Approaches: Team organization, Roles, and Responsibilities:

Unit II: **6 lecture hours**

Data Warehouse Architecture: Introductions, Components of Data warehouse Architecture: Data Warehouse vs Data Mart, Component based architecture, Dimensional Modelling: Introduction: E-R Modelling: Dimensional Modelling: E-R Modelling VS Dimensional Modelling: Data Warehouse Schemas; Star Schema, Inside Dimensional Table.

Unit III: **8 lecture hours**

Bring data into data warehouse: ETL, Role of data transformation, Data Warehouse & OLAP: Introduction: What is OLAP? Characteristics of OLAP, Steps in the OLAP Creation Process, Advantageous of OLAP: What is Multidimensional Data: OLAP Architectures; MOLAP, ROLAP, HOLAP.

Unit IV: **10 lecture hours**

Data pre-processing : Data cleaning , Data transformation , Data mining knowledge representation, Data Mining Algorithms: Association Rules, Classification, Prediction Data Definitions and Analysis Techniques

Elements, Variables, and Data categorization Levels of Measurement Data management and indexing Introduction to statistical learning Descriptive Statistics: Measures of central tendency, Measures of location of dispersions, Basics and Usage of Rapidminer and Weka as mining tool.

Unit V: **12 lecture hours**

Basic analysis techniques Statistical hypothesis generation and testing Chi-Square test t-Test Analysis of variance Correlation analysis Maximum likelihood test. Foundation of Data Analytics: - Introduction ,Evolution , Concept and Scopes , Data , Metrics and Data classification, Data Reliability & Validity, Problem Solving with Analytics, Different phases of Analytics in the business and Data science domain, Descriptive Analytics, Predictive Analytics and Prescriptive Analytics , Different Applications of Analytics in Business, Data analysis techniques: Regression analysis; Classification techniques; Clustering: Association rules analysis. Case studies and projects: Understanding business scenarios; Feature engineering and visualization;

Case Studies: Finance, Car Sales, Bank Customer Complaints, etc.

Text Books:

1. Data Ware Housing Fundamentals, Pualraj Ponnaiah, Wiley Student Edition
2. Data Mining-Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.
3. Data Warehousing, Data Mining, and OLAP, Alex Berson, Stephen J. Smith, MGH, 1998.
4. Data Analytics: Become A Master In Data Analytics, Richard Dorsay, CreateSpace Independent Publishing Platform.

Reference Books:

1. The Data Ware House Life Cycle Toolkit- Ralph Kimball, Wiley Student Edition.
2. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION

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

Components	Internal Assessment	MTE	ETE
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 functionality of the various data mining and data warehousing component.	**PO4,PO10, PO11, PSO2,PSO3**
CO2	**Appreciate** the strengths and limitations of various data mining and data warehousing models.	**PO4,PO10, PO11, PSO2,PSO3**
CO3	**Explain** the analyzing techniques of various data.	**PO4,PO10, PO11,**

		PSO2,PSO3
CO4		
CO5		

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE21963	Data Warehousing & Data Analytics	-	-	-	3	-	2	-	2	2	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: MCA Semester: III Stream: CSE
PAPER TITLE: Data Warehousing & Data Analytics
PAPER CODE: CSE21963
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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 key features of Data Ware house?	**R**	**CO1**
2.	**What** do you mean by HiveQL Data Definition Language?	**R**	**CO4**
3.	**Explain** how big data processing differs from distributed processing?	**U**	**CO5**

4.	**List** various application of big data?	**R**	**CO5**
5.	**Define** Data Mart?	**R**	**CO2**

CSE22964	**Web Technology Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Basic Knowledge of Coding**				
Co-requisites	**---**				

	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	With proper examples **compare** structured, unstructured and semi-structured data? **Describe** how type of data affects data serialization?	**U**	**CO5**
7.	Name the OLAP operations and **explain** about various schemas?	**U**	**CO3**
8.	**Explain** about Multidimensional data models?	**R**	**CO2**
9.	**Discuss** briefly with an example about multidimensional schemas?	**U**	**CO1**
	SECTION (Answer Any Two Questions) (2 x 12.5 = 25)		
10.	**Identify** the areas where Big data analytics can be useful for a smart city? Write a short note on NoSQL databases?	**AP & R**	**CO4**
11.	**Discuss** briefly about data smoothing techniques?	**E**	**CO2**
12.	**Explain** mining of huge amount of data (eg: billions of tuples) in comparison with mining a small amount of data (Eg: data set of few hundred of tuples).	**AP**	**CO2**

Course Objectives:

1. To introduce students how to design static webpage using HTML and CSS
2. To provide knowledge on web architecture, web services, client side and server side scripting technologies to focus on the development of web-based information systems and web services
3. To provide skills to design interactive and dynamic web sites
4. To develop students knowledge for implementing web applications using PhP

Course Outcomes:

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

CO1: **Design** a static webpage by applying HTML elements
CO2: **Apply** CSS concepts for designing HTML web pages.
CO3: **Develop** DHTML pages by using JavaScript with DOM events
CO4**:** **Implement** a webpage with database connectivity using PhP
CO5: **Create** rich internet application using XML.

Catalog Description:

The main objective of this course is on the World Wide Web as a platform for interactive applications, content publishing and social services. The development of web-based applications requires knowledge about the underlying technology and the formats and standards the web is based upon. In this course you will learn about the HTTP communication protocol, the markup languages HTML, XHTML and XML, the CSS and XSLT standards for formatting and transforming web content, interactive graphics and multimedia content on the web, client-side programming using JavaScript.

Course Content:

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

HTML, CSS, Java script, XML and PH

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

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

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

Experiment 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)

Experiment 5:

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

Experiment 6:

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

Experiment 7:

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

Experiment 8:

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

Experiment 9:

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

Experiment 10:

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

Experiment 11:

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

Experiment 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. "Web Design The Complete Reference", Thomas Powell, Tata McGraw-Hill
2. "Web Design The Complete Reference", Thomas Powell, Tata McGraw-Hill.

Reference Books:

1. "PHP : The Complete Reference", Steven Holzner, Tata McGraw-Hill The Easy Guide to Operating Systems, Larry Miller, 2012.
2. "Javascript 2.0 : The Complete Reference", Second Edition By Thomas Powell And Fritz Schneider

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

Components	Internal Assessment	ETE
Weightage (%)	50	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Design** a static webpage by applying HTML elements	PO4,PO6,PO10,PO11.PSO2,PSO3
CO2	**Apply** CSS concepts for designing HTML web pages	PO4,PO6,PO10,PO11.PSO2,PSO3
CO3	**Develop** DHTML pages by using JavaScript with DOM events	PO4,PO6,PO10,PO11.PSO2,PSO3
CO4	**Implemen**t a webpage with database connectivity using PhP	PO3,PO5,PO8,PO12
CO5	**Create** rich internet application using XML	PO3,PO5,PO8,PO12,PSO1

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PO 9	PO10	PO 11	PO12	PSO1	PSO 2	PSO 3
CSE 22964	Web Technology Lab	-	-	-	3	-	3	-	2	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: JULY 2020

Name of the Program: MCA Semester: III Stream: CSE
PAPER TITLE: Web Technology Lab
PAPER CODE: CSE22964
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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 questions)(5 x 10=50)

1.	**Develop** the web page for Student database.	**Ap**	**CO4**
2.	**Define** Imagemap? Design a webpage to display the cricket player's information using Imagemap.	**R**	**CO1**
3.	**Construct** a webpage for creating a registration form using HTML &CSS.	**Ap**	**CO4**
4.	**Build** a webpage in such a way that display MCA course Details with Routine	**Ap**	**CO5**
5.	**Illustrate** the use of <form> tag and action Attribute with an example.	**U**	**CO1**

CSE22965	Mobile Application using Android/IoS Lab	L	T	P	C
Version 1.0	**Contact Hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Set Theory, Knowledge of programming language.**				
Co-requisites	**--**				

Course Objectives:

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

Course Outcomes:

CO1**. Produce** apps for iOS platform devices (iPhone/iPad/iPod Touch)

CO2**. Develop** a working knowledge of Apple's Xcode app development tool

CO3**. Identify** need and opportunity in app markets

Catalog Description:

Although they have only become widely used in the past few years, mobile devices have already had a tremendous impact on our culture and its social dynamics. Recent rapid growth in the mobile device market has not been primarily driven by voice communications, but rather by the limitless ways in which these devices may be used to explore our local environments. These new communicative modes are expressed through small and self-contained "apps" that are focused around a central concept, and that leverage many of the advanced features of these devices to augment a user's understanding of her environment. This course operates in two distinct but related modes: development, wherein an app is made functional; and design, through which an app is made usable. Students will be expected to consider both modes when producing their apps. Students will work throughout the semester to produce a compelling app of interest to the UNC community

Course Content:

List of Experiments:

1. Introduction to Android platform and the tools used in the lab, demonstrating various mobile apps such as Google Drive, Google Assistant and Google Maps to get an essence of the hardware and software advancement

2. Illustrating the structure of an Android Project, Creating a new AVD and Create a simple Android application that displays the message "Welcome to Android Development". Test this app on an AVD.

3. Developing of an application with Graphical User Interface such as Task Scheduler app to keep track of the tasks the user needs to complete within a specific due date.

4. Developing Movie Rating App to add validation for the inputs and handling UI events.

5. Enhancing the Movie Rating App for handling data in the mobile app to display the list of reviews in the app fetched from the SQLite database.

6. Enhancing the Task Scheduler app for handling data in the mobile app to store in the database and display the task details entered by the user.

7. Developing a Note Management app to store and retrieve data from a file.

8. Enhancing the Movie Rating App to create options and context menu for adding new reviews, exit option etc.

9. Enhancing the Movie Rating App to create notifications such as a confirm delete dialog box during deleting a review.

10. Developing of a Media Player app to gain knowledge on the integration of graphics and multimedia with a mobile app.

11. Securing an Android app by declaring permissions using graphical user interface.

12. Developing of an app Find the Greatest that accepts three numbers from the user and computes the greatest of the three numbers. Test the project to find whether it is working properly or not by creating a test project for the app.

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

Components	Internal Assessment	ETE
Weightage (%)	50	50

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

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	**Produce** apps for iOS platform devices (iPhone/iPad/iPod Touch)	PO1, PO2,PO7,PO8,PO9, PSO2
CO2	**Develop** a working knowledge of Apple's Xcode app development tool	PO1, PSO2,PO2, PO7,PO8,PO9
CO3	**Identify** need and opportunity in app markets	PO1, PO2, PO7,PO8,PO9, PSO2, PO5

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO 3
CSE 22965	Mobile Applications using Android/IoS Lab	3	3	-	-		-	3	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: MCA Semester: II Stream: CSE
PAPER TITLE: Mobile Applications using Android/IoS Lab PAPER CODE: CSE22965
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 5 Total No of Pages: 01

Section A (Answer All the Questions) (5 x 10 = 50)			
1.	**Developing** Movie Rating App to add validation for the inputs and handling UI events	**U**	**CO1**
2.	**Write** Dynamic HTML with Java Script.	**Ap**	**CO1**
3.	**Write** the steps of Compiling and Installing the Servlet	**Ap**	**CO2**
4.	**Examine** JDBC Process.	**Ap**	**CO2**
5.	**Describe** Database Connection.	**U**	**CO6**

CSE22966	**Artificial Intelligence and Machine Learning Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Data Structure and Python Basics**				
Co-requisites	**--**				

Course Objectives:

- To help students gain practical insights of AI Algorithm through functional programming.
- To enable students, communicate with clarity and precision of ML Algorithm.
- To give the students a perspective enhancement of present system.
- 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 functions, 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. I**mplement** 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 D**ecision 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:

Experiments:

1. Introduction to Tensorflow:
   a. Introduction;
   b. Installation; Introduction to Tensors – Variable, Constants; Data Flow Graph; TensorBoard; Mathematics with TensorFlow.
2. Starting with Machine Learning using TensorFlow:
   a. Linear Regression (Lasso and Ridge Regression, Elastic Net Regression)
   b. Dataset loading
   c. Gradient Descent Algorithm
   d. Accuracy
   e. Optimization

    f. ROC and AUROC Curve generation
    g. Nearest Neighbour Model (K-NN) Classifier
    h. Data Clustering (K-Means, K-Medoid, Hierarchical Clustering)
3. Artificial Neural Network
    a. Introducing Neural Networks
    b. TensorFlow implementation of Single Layer Perceptron using logistic regression
        i. Building the model
        ii. Fit the model
        iii. Test evaluation
    c. TensorFlow implementation of Multi-Layer Perceptron
    d. Multi-Layer Perceptron classification
        i. Build the model
        ii. Fit the model
        iii. Test evaluation
    e. Multi-Layer Perceptron function approximation
        i. Build the model
        ii. Fit the model
        iii. Test evaluation
4. Bayesian Method implementation using TensorFlow
5. Decision Tree
    a. Implementation of ID3 algorithm using Tensorflow
6. Support Vector Machine (SVM)
    a. Linear SVM
    b. Reduction to Linear Regression
    c. SVM Kernels in TensorFlow
    d. Implementation of a Non-Linear SVM
    e. Implementation of a Multi-Class SVM
7. Principle Component Analysis using TensorFlow
    a. Linear Dependence and Span
    b. Norms
    c. Special Kinds of Matrices and Vectors
    d. Eigen decomposition
    e. Singular Value Decomposition
    f. The Moore-Penrose Pseudoinverse
    g. The Trace Operator
    h. The Determinant

Text Books:

1. G. Zaccone, Getting started with TensorFlow: Get up and running with the latest numerical computing library by google and dive deeper into your data! Community experience distilled, Packt Publishing, 2016.
2. A. G´eron, Hands-on machine learning with SciKit-Learn, Keras, And TensorFlow: Concepts, tools, and techniques to build intelligent systems, O'Reilly Media, Incorporated, 2019.
3.

Reference Books:

1. "Python Data Science HandbookEssential Tools for Working with Data", 1st Edition, Jake VanderPlas, O'Reilly

Modes of Evaluation: Quiz/Assignment/Written Examination

Examination Scheme:

Components	**Internal Assessment**	**ETE**
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Implement** and Evaluate different search strategies using Prolog	**PO4,PO10,PO11, PSO2,PSO3**
CO2	**Execute** and Memorize and different various libraries and the most frequently used functions, methods, constants required for the implementation of any machine learning	**PO4,PO10,PO11, PSO2,PSO3**
CO3	**Implemen**t and Appraise Linear and Logistic Regression and Classify using K-NN for smaller dataset.	**PO4,PO10,PO11, PSO2,PSO3**
CO4	**Implemen**t 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	**PO4,PO10,PO11, PSO2,PSO3**
CO5	**Implement** Decision Tree and Naïve Bayes classifier, Design Linear SVM and appraise.	**PO3, PO5, PSO2**

		Computational Knowledge	Problem Analysis	Design / Development of Solutions	Design / Development of Solutions	Modern Tool Usage	Professional Ethics	Life-long Learning	Project Management and Financ	Communication Efficacy	Societal & Environmental Concern	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application
Course Code	Course Title	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO 2	PS O3
CSE 22966	Artificial Intelligence and Machine Learning Lab			-	3	-	2	-	2	2	3	3	-		3	3

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

Model Question Paper

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

Name of the Program: MCA
Semester: III
Stream: CSE
PAPER TITLE: Artificial Intelligence and Machine Learning Lab
PAPER CODE: CSE22966
Maximum Marks: 50
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 10 = 50)			
1.	**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**
2.	**Solve** Hill Climbing problem to overcome local minima problem by writing a program.	**Ap**	**CO2**
3.	**Implement Fuzzy K-Means clustering.** Use Sklearn library of Python.	**Ap**	**CO3**
4.	**Write** a prolog program to determine if a string is a palindrome or not.	**U**	**CO1**
5.	**Implement** PCA.	**Ap**	**CO3**

CSE22967	**Foundation of 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:

- To understand the installation of hypervisors.
- To understand the installation of different cloud simulation tools and cloud setup tools.
- To deploy cloud services.

Course Outcomes:

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

CO1. **Describe** the key concepts and technologies in cloud computing.
CO2. **Evaluate** cloud computing technologies and platforms in the context of the needs of a specific application
CO3. **Design** data storage components for cloud-based software systems.
CO4**. Assess** and monitor resource use of applications in virtualized environments
CO5. **Design, implement, and deploy** cloud applications for current cloud platforms
CO6. **Evaluate** privacy and security issues for cloud infrastructure and cloud applications

Catalog Description:
This course introduces students to fundamentals of cloud computing and software development for cloud platforms. It covers topics such as virtualization, architecture of cloud systems, programming for the cloud, resource management, as well as privacy and security issues. Students gain practical experience developing applications for cloud platforms through a series of hands-on assignments.

Course Content:

Experiment 1:
Introduction to cloud computing
Experiment 2:
Hands on creation of virtual machine using computer server.
Experiment 3:
Design virtual machine
Experiment 4:
Key based authentication and login virtual machine from the host machine
Experiment 5:
Create Backend logic to communication with frontend app using Ajax
Experiment 6:
Using Backend logic setup communication with frontend app using Ajax
Experiment 7:

1. Create SQL DB and design schema for user session
2. Login using username and password and validate in SQL

Experiment 8:

1. Procedure to setup one Hadoop Cluster
2. Access the Hadoop using API's from the application and show the data

Experiment 9:

1. Demonstrate the use of map/reduce using simple program
2. AWS Free Tier Account Creation

Experiment 10:

1. In AWS account enabling Multi-Factor Authentication to Secure Your Access and create your First Linux Instance
2. In AWS create your First EC2 windows instance In AWS assign Elastic IP Addresses to Instance (Static IP Address)

Text Books:

1. Barrie Sosinsky, “Cloud Computing Bible”, Wiley India Edition.
2. Anthony Velte, tobyVelte, Robert Elsenpeter, “Cloud Computing – A Practical Approach”, Tata McGraw-Hill Edition.

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

Examination Scheme:

Components	**Internal Assessment**	**ETE**
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Describe** the key concepts and technologies in cloud computing.	**PO4,PO6,PO10,PO11.PSO2,PSO3**
CO2	**Evaluate** cloud computing technologies and platforms in the context of the needs of a specific application.	**PO4,PO6,PO10,PO11.PSO2,PSO3**
CO3	**Design** data storage components for cloud-based software systems.	**PO4,PO6,PO10,PO11.PSO2,PSO3**
CO4	**Assess** and monitor resource use of applications in virtualized environments.	**PO1, PO4,PO5,PO7, PSO1**
CO5	**Design, implement, and deploy** cloud applications for current cloud platforms	**PO8, PO9,PSO3**
CO6	**Evaluate** privacy and security issues for cloud infrastructure and cloud applications	**PO8,PO3, PO9**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE 22967	Foundation Cloud Computing Lab			-	3	-	3	-	2	2	3	3	-		3	3

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

CSE24968	**Project -I**	**L**	**T**	**P**	**C**

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

Name of the Program: MCA
Semester: III
Stream: CSE
PAPER TITLE: Foundation of Cloud Computing Lab
PAPER CODE: CSE22967
Maximum Marks: 50
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 10= 50)			
1.	A. **Demonstrate** the use of map/reduce using simple program B. AWS Free Tier Account Creation	**AP**	**CO2**
2.	A. Procedure to setup one Hadoop Cluster B. **Access** the Hadoop using API's from the application and show the data	**U**	**CO3**
3.	A. **Create** SQL DB and design schema for user session B. Login using username and password and validate in SQL	**U**	**CO4**
4.	A. Using Backend logic setup communication with frontend app using Ajax B. **Create** Backend logic to communication with frontend app using Ajax	**U**	**CO5, CO6**
5.	A. **Design** virtual machine B. Key based authentication and login virtual machine from the host machine	**AP**	**CO1**

Version 1.0	**Contact Hours -45**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Basic Knowledge of Coding**				
Co-requisites	**---**				

Course Objectives:

- To be able to design, develop, document, and test software using current techniques.
- To understand the fundamentals of computer architecture and computing theory.
- To be able to solve problems working in group settings.
- To demonstrate the ability to give presentations and write technical reports.
- 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**	**ETE**
Weightage (%)	**50**	**50**

CO1	**Inves**
CO2	**Utiliz**
CO3	**Discu** leader
CO4	**Plan** and fi
CO5	**Ident** and li

		Computational Knowledge	Problem Analysis	Design / Development of Solutions	Conduct Investigations of Complex Computing Problems	Modern Tool Usage	Professional Ethics	Life-long Learning	Project Management and Finance	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare	Ability to enhance and develop techniques for independent and lifelong learning in computer
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	P O	PO 7	P O	P O	P O 1	P O 1	P O 1	PSO1	PSO2	PS

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

							6		8	9	0	1	2			O3
CSE249 68	Project -I	3	-	-	3	-	3	-	2	2	3	3	-	-	3	3

1=weakly mapped 2= moderately mapped 3=strong

CSE21969	**Pattern Recognition**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Algebra, Probability and Statistics**				
Co-requisite	**Basics of Machine Learning**				

Course Objectives:

- To equip students with basic mathematical and statistical techniques commonly used in pattern recognition.
- To introduce students to a variety of pattern recognition algorithms.
- Enable students to apply machine learning concepts in real life problems.
- Enable students to apply machine learning concepts in real life problems.

Course Outcomes:

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

CO1: **Explain** a variety of pattern classification, structural pattern recognition, and pattern classifier combination technique
CO2: **Compare** and parameterize different learning algorithms.
CO3: **Summarize** research in the pattern recognition area verbally and in writing.
CO4: **Apply** performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature
CO5: **Implement** simple pattern classifiers, classifier combinations, and structural pattern recognizers.

Course Description:

Pattern recognition is the process of recognizing patterns by using machine learning algorithm. Pattern recognition can be defined as the classification of data based on knowledge already gained or on statistical information extracted from patterns and/or their representation. One of the important aspects of the pattern recognition is its application potential. For example, Speech recognition, speaker identification, multimedia document recognition (MDR), automatic medical diagnosis. In a typical pattern recognition application, the raw data is processed and converted into a form that is amenable for a machine to use. Pattern recognition involves classification and cluster of patterns.

Course Content:

Unit-I	**9 Lecture Hours**
Introduction: Paradigms for pattern recognition, Statistical and Syntactic pattern Recognition, Soft and Hard computing schemes for pattern recognition. Statistical Pattern Recognition: Patterns and classes, Supervised, Semi-supervised, and Unsupervised classification.	
Unit-II	**9 Lecture Hours**
Representation: Vector space representation of patterns and classes, patterns and Classes as strings, Tree-based representations, Frequent item sets for representing classes and clusters, Patterns and classes as logical formulas.	
Unit-III	**9 Lecture Hours**
Proximity Measures: Dissimilarity measures, metrics, similarity measures, Edit Distance, Hausdorff metric between point sets, Kernel functions, Contextual and conceptual similarity between points.	
Unit-IV	**9 Lecture Hours**
Dimensionality Reduction: Feature selection: Branch and bound, Sequential feature election, Feature extraction: Fisher's linear discriminant, Principal components as features; Nearest Neighbour Classifiers: Nearest neighbour classifier, Soft nearest neighbour classifiers, Efficient algorithms for nearest neighbour classification, K-Nearest Neighbour classifier, minimal distance classifier, condensed nearest neighbour classifier and its modifications.	
Unit-V	**9 Lecture Hours**
Bayes Classifier: Bayes classifier, naïve Bayes classifier, Bayesian Network, Belief network, Decision Trees Axis parallel and oblique decision trees, Learning decision trees, Information gain and Impurity measures. **Linear Discriminant Functions**: Characterization of the decision boundary, Weight vector and bias, Learning the discriminant function, Perceptron's; Support Vector Machines Maximizing the margin, Training support vector machines, Kernel functions.	
Unit-VI	
Clustering: Clustering process, Clustering algorithms, and Clustering large datasets. **Combination of Classifiers:** AdaBoost for classification, Combination of Homogeneous classifiers, Schemes for combining classifiers.	
Text Books: 1.Pattern Recognition Principles, Julius T. Tou, Rafael C. González, Addison-Wesley Pub. Co., 1974.	

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Explain** a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.	**PO1, PSO1**
CO2	**Compare** and parameterize different learning algorithms.	**PO1, PO2**
CO3	**Summarize** research in the pattern recognition area verbally and in writing.	**PO2, PO4,PSO3**
CO4	**Apply** performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature.	**PO1, PO5, PSO2**
CO5	**Implement** simple pattern classifiers, classifier combinations, and structural pattern recognizers.	**PO1, PO3**

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and design algorithms for efficient computer-based systems of	The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using	Ability to analyse the impact of Computer Science and Engineering solutions in the societal and human context, design, model, develop, test
Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE21969	Pattern Recognition	3	2	2	2	3	-	-	-	-	-	-	-	3	2	3

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

MODEL QUESTION PAPER

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2022 – 23)		
Name of the Program:	MCA	**Semester:**	IV
Paper Title:	PATTERN RECOGNITION	**Paper Code:**	CSE21969
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	
(Any other information for the student may be mentioned here)	At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. Assumptions made if any, should be stated clearly at the beginning of your answer.		

Ques No.	Question	Knowledge Level	Course Outcome
	Group A: Answer ALL the questions (5 x 1 = 5)		
1	**What** Characterization of the decision boundary,	**R**	**CO1**
2	**Explain** Weight vector and bias	**U**	**CO2**
3	**List** Learning the discriminant function	**R**	**CO3**
4	**Explain** Perceptron's; Support Vector Machines Maximizing the margin	**U**	**CO4**
5	**Demonstrate** Training support vector machines, Kernel functions	**Ap**	**CO5**
	Group B: Answer ALL the questions (5 x 2 = 10)		
6	a) i) **What** Soft nearest neighbour classifiers ii) **Explain** Soft nearest neighbour classifiers [1+1]	**R** **&** **U**	**CO1**
	(OR)		
	b) i) **Illustrate** Perceptron's; Support Vector Machines Maximizing the margin ii) **Explain** Training support vector machines, Kernel functions [1+1]	**R** **&** **U**	
7	**a) Explain** Perceptron's; Support Vector Machines Maximizing the margin	**U**	**CO2**
	(OR)		
	b) Compare Feature selectionfor Efficient algorithms for nearest neighbour classification, ,.	**An**	
8	**a) Explain** Branch and bound	**U**	**CO3**
	(OR)		
	b) Discuss Sequential feature election	**U**	
9	**a) Explain** Feature extraction	**U**	**CO4**

	(OR)		
	b) Examine Fisher's linear discriminant	**An**	
10	**a) Interpret** Principal components as features	**An**	**CO5**
	(OR)		
	b) Demonstrate K-Nearest Neighbour classifier	**Ap**	
Group C : Answer ALL the questions (7 x 5 =35)			
11	**a) i) Discuss** Nearest Neighbour **ii) Explain** Classifier in Nearest neighbour [3+2]	**R & U**	**CO1**
	(OR)		
	b) i) Why classifier is used **ii) Explain**. Vector space representation of patterns and classes [2+3]	**An & U**	
12	**a) Explain** Vector space representation of patterns and classes	**U**	**CO2**
	(OR)		
	b) Identify Patterns and classes as logical formulas	**R**	
13	**a) Explain** minimal distance classifier,	**U**	**CO3**
	(OR)		
	b) Explain Patterns and classes as logical formulas	**U**	
14	**a) Explain** condensed nearest neighbour classifier and its modifications	**U**	**CO4**
	(OR)		
	b) Explain Patterns and classes as logical formulas	**U**	
15	**a) Examine** Vector space representation of patterns and classes	**An**	**CO4**
	(OR)		
	b) Examine Vector space representation of patterns and classes, , , ,.	**An**	
16	**a) Demonstrate** patterns and Classes as strings	**Ap**	**CO5**
	(OR)		
	b) Demonstrate. Tree-based representations	**Ap**	
17	**a) Demonstrate** Frequent item sets for representing classes and clusters	**Ap**	**CO5**
	(OR)		
	b) Demonstrate Patterns and classes as logical formulas	**Ap**	

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

i) If the COs are higher in numbers that can be managed by equating sub-divisional questions

ii) If the COs are lower in numbers, the questions can be increased by equating the number of COs

CSE21970	**Public Blockchain**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours-45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Crypto currency and computer security basics**				
Co-requisites	**--**				

Course Objectives:

- To gain knowledge about the building blocks of blockchain ethereum.
- To enable students to install and configure Mist browser,
- To give the students a perspective to learn the basics of EVM and Solidity programming.
- To enable students acquire knowledge about smart contract and tokens..

Course Outcomes:

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

CO1**. Understand** the basics of blockchain ethereum.
CO2**. Explain** the procedure of installation of Mist browser and its configuration.
CO3**. Explain** the role of Ethereum protocol in Banking.
CO4**. Understand** the basics of Solidity programming primer.
CO5**. Understand** the utility of smart contract and token.
CO6**. Evaluate** the ancestry of blocks and transactions.

Catalog Description:

This course is the definitive introduction to permissioned blockchain for the students. Beyond the technology, this course will introduce you to some of the philosophy behind decentralization and why there is so much excitement around it.
During the tenure of the course, the students will be introduced to blockchain and the technology behind it. In the later modules, the topics beyond bitcoin will be taken up and delve deeper into a next-generation blockchain called Ethereum to introduce students to what modern blockchains can do.

Course Content:

Unit I: **6 lecture hours**
Bridging the Blockchain Knowledge Gap: What Ethereum Does, Three Parts of a Blockchain, Ether as a Currency and Commodity , The Power Is in the Protocol , You Can Build Trustless Systems, What Smart Contracts: Objects and Methods for Value , Just Add Commerce ,Content Creation; Where's the Data? : What Is Mining? , Ether and Electricity Prices; EVM:The Mist Browser , Browser vs. Wallet or Keychain; What Ethereum Is Good For : State of Smart Contract Development
Unit II: **8 lecture hours**
The Mist Browser: introduction, The Bank Teller Metaphor , In Cryptocurrency, You Hold Your Own Assets , Visualizing Ethereum Transactions, Breaking with Banking History , How Encryption Leads to Trust, System Requirements , More about Eth.guide and This Book, Tools for Developers, CLI Nodes, Recommended: Using Parity with Geth, Finally, into the Mist! , Downloading and Installing Mist, Configuring Mist, Finding Your New Address, Sending and Receiving Ether, Understanding Ethereum Account Types, Backing Up and Restoring Your Keys, Using Paper Wallets, Using Mobile Wallets,

Working with Messages and Transactions, So, What Is a Blockchain? , Paying for Transactions, Understanding Denominations, Getting Ether, Anonymity in Cryptocurrency, Blockchain Explorers .

Unit III: **8 lecture hours**

The EVM: The Role of the Ethereum Protocol in Banking , What the EVM Does, EVM Applications Are Called Smart Contracts, The Name "Smart Contracts" , Understanding State Machines , Digital vs. Analog, "Statements" , Data's Role in State , How the Guts of the EVM Work, The EVM Constantly Checks for Transactions, Creating a Common Machine Narrative of What Happened, Cryptographic Hashing , Hash Functions (or Hash Algorithms), Blocks: The History of State Changes, Block Time, Drawbacks of Short Blocks, "Solo Node" Blockchain , Distributed Security, Mining's Place in the State Transition Function , Renting Time on the EVM , Gas : Why Is Gas So Important?, Why Isn't Gas Priced in Ether?, Fees as Regulation , Working with Gas

Unit IV: **8 lecture hours**

Solidity Programming Primer: Global Banking Made (Almost) Real, Extra-Large Infrastructure, Worldwide Currency? , Complementary Currency, The Promise of Solidity, Browser Compiler, Learning to Program the EVM , Easy Deployment, The Case for Writing Business Logic in Solidity, Code, Deploy, Relax, Design Rationale , Writing Loops in Solidity, Expressiveness and Security, The Importance of Formal Proofs, Historical Impact of a Shared Global Resource , How Attackers Bring Down Communities, Hypothetical Attack Written in Solidity , Automated Proofs to the Rescue?, Determinism in Practice , Lost in Translation,

Unit V: **7 lecture hours**

Smart Contracts and Tokens: EVM as Back End, Smart Contracts to Dapps, Assets Backed by Anything , Bartering with Fiat Currency, Ether as Glass Beads, Cryptocurrency Is a Measure of Time, Asset Ownership and Civilization , Coins are Collectibles , The Function of Collectibles in Human Systems , Early Counterfeiting, Jewelry and Art as Money , The Step Toward Banknotes , Platforms for High-Value Digital Collectibles , Tokens Are a Category of Smart Contract , Tokens as Social Contracts, Tokens Are a Great First App, Creating a Token on the Testnet , Getting Test Ether from the Faucet, Registering Your Tokens , Deploying Your First Contract, Same House, Different Address , Playing with Contracts .

Unit VI: **8 lecture hours**

Mining Ether: Ether's Source, Mining , Self-Regulation, and the Race for Profit , How Proof of Work Helps Regulate Block Time , What's Going on with the DAG and Nonce?, Making Fast Blocks Work , How Ethereum Uses Stale Blocks , Uncle Rules and Rewards, The Difficulty Bomb, Miner's Winning Payout Structure , Limits on Ancestry, The Block Processing Play by Play , Evaluating the Ancestry of Blocks and Transactions, How Ethereum and Bitcoin Use Trees , Merkle-Patricia Trees, Contents of an Ethereum Block Header, Forking , Installing Geth on macOS ,

Text Books:

1. Mayukh Mukhopadhyay - Ethereum smart contract development_ build blockchain-based decentralized applications using Solidity-Packt Publishing (2018)
2. Chris Dannen (auth.) - Introducing Ethereum and Solidity_ Foundations of Cryptocurrency and Blockchain Programming for Beginners-Apress (2017)
3. Mastering Bitcoin: Programming The Open Blockchain, Andreas M. Antonopoulos, O'Reilly, ISBN: 9789352135745.

Reference Books:

1. Ethereum for Architects and Developers: With Case Studies and Code Samples in Solidity by Debajani Mohanty
2. Blockchain for Business by Jai Singh Arun
3. Blockchain Applications: A Hands-on Approach by Arshdeep Bahga and Vijay K. Madisetti, ISBN: 9780996025560.

	CO1	**Und**
	CO2	**Exp** brov
	CO3	**Exp**
	CO4	**Und** prim
	CO5	**Und**
	CO6	**Eva**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2	PSO 3
CSE21970	Public Blockchain	3	-	-	3	-	-	2	2	2	3	3	-	-	3	3

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

Components	**Internal Assessment**	**Mid term**	**ETE**
Weightage (%)	**30**	**20**	**50**

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

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: MCA	Semester: IV	Stream: CSE
PAPER TITLE: Public Blockchain		PAPER CODE: CSE21970
Maximum Marks: 50		Time duration: 3 hours
Total No of questions: 12		Total No of Pages: 01

Instruction for the Candidate:

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

Section A (Answer All the Questions) (5 x 2 = 10)			
1.	**List** the three parts of a blockchain.	**U**	**CO1**
2.	**Enumerate** the steps of installation of Mist browser.	**U**	**CO2**
3.	**Define** mining.	**R**	**CO3**
4.	**What** is EVM?	**R**	**CO4**
5.	**Define Smart contract.**	**R**	**CO5**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** the characteristics of cryptocurrency	**U**	**CO1**
7.	**Examine** the ancestry of blocks and transactions.	**An**	**CO6**
8.	**Explain** the historical impact of a shared global resource.	**U**	**CO4**
9.	**Explain** Ethereum protocol in banking.	**U**	**CO3**
	SECTION C(Answer Any Two Questions) (2 x 12.5 = 25)		
10.	**Explain** any two use cases of Internet of Ethereum things.	**U**	**CO4**
11.	**Write** short notes on Ethereum transactions.	**U**	**CO2**
12.	**Distinguish** between private and public chain.	**An**	**CO1**

CSE21971	**Cyber Security and Cryptography**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	**Computer Network**				
Co-requisite	**NIL**				

Course Objectives:

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

Course Outcomes:

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

CO1. **Define** the basics of Cyber security and types of existing malware.
CO2. **Understand** and identify the cyber security breaches and cyber attacks.
CO3. **Explain** the preventive measures for cyber fraud
CO4. **Examine** the basics concept of Social Network Security and Web Security.
CO5. **Appraise** the recent threats and attacks against the technical world and design some effective prevention scheme.

Course Description:

Effective network communication is an integral part of technical life. Cyber Security and Cryptography is a process of securing the data communication, all the algorithms, messages etc. In this course you will learn the basics of cyber security and how to prevent and detect any sort of cyber attacks. The course begins with a detailed discussion of different types of malware, cyber security breaches and cyber attacks. Throughout the course participants will be exposed to many exciting open problems in the field and work on fun (optional) programming projects. In the course cyber security we will cover more advanced security tasks such as zero-day vulnerability, privacy mechanisms, and other forms of defense against hackers.

Course Content:

Unit-I	**09 Lecture Hours**
Cyber security fundamentals: Definition of cyber space, cyber security, importance of cyber security, hacker, related case studies Different encryption technique,DES,AES,S and P block **Types of malware:**Worm, virus, spyware, Trojan, related case studies	
Unit-II	**09 Lecture Hours**
Cyber security breaches: Phishing, identity theft, harassment, cyber stalking, related case studies **Types of cyber attacks:** Password attacks, Denial of service attacks, Passive attack, Penetration testing, related case studies	
Unit-III	**09 Lecture Hours**
Prevention tips: Design a strong password, Two-step verification, Question validity of web-sites, related case studies **Mobile protection:** No credit card numbers, place lock on phone, don’t save passwords, related case studies	
Unit-IV	**09 Lecture Hours**
Social network security: Security measures like not revealing location, keeping birth-date hidden, having private profile, not linking accounts, related case study **Prevention software:** Firewalls, Virtual private network, Anti-virus & anti-spyware, Routine updates, related case study	
Unit-V	**09 Lecture Hours**
Critical cyber threats: Critical cyber threats, cyber terrorism, cyber-warfare, cyber-espionage, Cyber laws,Cyber forensic **Defense against hackers:** Cryptography, digital forensics, intrusion detection, legal recourse, related course study	
Text Books: 1. “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	**Mid Term**	**Class Assessment**	**End Term**
Weightage (%)	**20**	**30**	**50**

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Define** the basics of Cyber security and types of existing malware.	PO1, PO2,PO12,PO3
CO2	**Understand** and identify the cyber security breaches and cyber attacks.	PO2,PO3
CO3	**Explain** the preventive measures for cyber fraud	PO1, PO5,PSO1
CO4	**Examine** the basics concept of Social Network Security and Web Security.	PO1, PO2, PO3,PO12
CO5	**Appraise** the recent threats and attacks against the technical world and design some effective prevention scheme.	PO5, PSO3,PO12,PSO2

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning newprogramming environments, analyse and	The ability to understand the evolutionary changes in computing, apply standard	Ability to analyse the impact of Computer Science and Engineering solutions in the
Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE21971	Cyber Security and Cryptography	3	3	3	-	3	-	-	-	-	-	-	**3**	1	1	-

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

MODEL QUESTION PAPER

ADAMAS UNIVERSITY
END SEMESTER EXAMINATION
(Academic Session: 2022 – 23)

Name of the Program:	MCA	**Semester:**	V
Paper Title:	Cyber Security and Cryptography	**Paper Code:**	CSE21971
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:	**17**	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)	• 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.		

Ques No.	Question	Knowledge Level	Course Outcome
	Group A : Answer ALL the questions (5 x 1 = 5)		
1	**Define** cyber security.	U	CO1
2	**Explain** briefly about phishing.	An	CO2
3	**Define** cyberspace.	U	CO3
4	**Elucidate** VPN?	U	CO4
5	**What** is cyber espionage?	R	CO5
	Group B : Answer ALL the questions (5 x 2 = 10)		
6	**a)** Explain global perspective on cyber crime.	U	CO1
	(OR)		
	b) Explain about different types of malware.		
7	**a)** Explain a use case scenario about identity theft.	An	CO2
	(OR)		
	a) Explain a use case scenario about denial of service attack.		
8	**a)** Discuss about the significance of two-step verification.	U	CO3
	(OR)		
	b) Explain how you will protect a mobile's security with basic precautionary steps.		
9	**a)** Discuss the various social network security measures to protect a social media account from getting compromised.	An	CO4

	(OR)		
	b) Compare and contrast anti-virus and anti-spyware.		
10	**a)** Write short notes on cyber warfare.	**U**	**CO5**
	(OR)		
	b) Elucidate about the problem of intrusion detection.		
Group C : Answer ALL the questions (7 x 5 =35)			
11	**a)** Explain password sniffing with an example.	**U**	**CO1**
	(OR)		
	b) Explain the classification of cyber crimes.		
12	**a)** Define attack and explain it with the help of an example.	**U**	**CO2**
	(OR)		
	b) Discuss cyber stalking and how it impacts the security of an individual.		
13	**a)** Mention the tips for safety and security measures to be followed in a cyber cafe.	**U**	**CO3**
	(OR)		
	b) What are the threats through lost and stolen devices?		
14	**a)** What are the steps to be followed for protection against Trojan horse and backdoors?	**An**	**CO4**
	(OR)		
	b) How does tunnelling take place in VPN? Explain the advantages of VPN.		
15	**a)** How can Firewall be used as an effective security measure in an organization?	**Ap**	**CO4**
	(OR)		
	b) Discuss about the benefits of having a private profile in social media.		
16	**a)** Write short notes on cyber espionage.	**U**	**CO5**
	(OR)		
	b) Discuss the significance of digital forensics.		
17	**a)** Elucidate the characteristics of cryptography.	**U**	**CO5**
	(OR)		
	b) Explain the importance of Intrusion detection system in cyber security.		

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

iii) If the COs are higher in numbers that can be managed by equating sub-divisional questions
iv) If the COs are lower in numbers, the questions can be increased by equating the number of COs

OBH21404	**HSS-VI (Basics of Organizational Behaviours)**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -45**	**3**	**0**	**0**	**3**
Pre-requisites/Exposure	**Organization evolution at basic level of social study**				
Co-requisites	**--**				

Course

Objectives:

- To help the student to acquire knowledge of organization evolution process.
- To enable students modelling organization project with appropriate metric and precision at workplace.
- To give the students a perspective to organization design process variables by exposing them to organization specification document.
- To enable students, acquire testing and quality assessment of organization model required for their profession.

Course Outcomes:

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

CO1. **Understand** the impact of organizational behaviour.
CO2. **Communicate** with proper organizational model paradigm to pupils.
CO3. **Enhancement** of organizational metric engineering application in industry.
CO4. **Effectively** analyse organization and maintenance of project.
CO5. **Illustrate** organizational metric analysis for an effective model.

Catalog Description:

There is a growing need for talented organizational developers across every industry. As technology advances, the ability to build quality organisation while considering design, development, security, and maintenance is sought after amongst all kinds of companies, from finance and banking to healthcare and national security.
Organisational behaviour applies the knowledge and theoretical understanding gained through behavioural science to building high-quality products in organisation. As a maturing discipline, Organisational behaviour is becoming more and more important in our everyday lives.

Course Content:

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5 Lecture Hour

Module 1: Introduction: Historical development; concept of organization; elements of organizational structure; scope of organizational behaviour.

8 Lecture Hour

Module 2: Motivation and job satisfaction: Major theories; content and process; (Adams, Maslow, Vroom, Herzberg). Intrinsic and extrinsic motivation; incentive systems - Job satisfaction; concept and determinants.

8 Lecture Hour

Module 3: Leadership: Functions and approaches; trait, behavioural and contingency models; characteristics of successful leaders; role of power in leadership.

8 Lecture Hour

Module 4: Communication: Communication process- types of communication; communication channels and networks; barriers to communication.

8 Lecture Hour

Module 5: Group behavior and conflict: Defining and classifying groups; stages of group development; concept, causes and consequences of conflicts; methods of conflict-resolution.

8 Lecture Hour

Module 6: Behavior in organizations: Human perception and motivation, human learning and problem solving, people are unique, groups in organizations, leader and group effectiveness

Text Books:

1. Aamodt, M. G. (2001). Industrial/organizational psychology. New Delhi: Cengage
2. Muchincky. (2009). Psychology applied to work. New Delhi: Cengage.

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

Examination Scheme:

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

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the impact of organizational behaviour.	**PO1,PO4,PO6,PO10,PO11,PSO1, PSO2,PO8,PO9**
CO2	**Communicate** with proper organizational model paradigm to pupils.	**PO1,PO4,PO6,PO10,PO11,PSO1, PSO2,PO8,PO9**
CO3	**Enhancement** of organizational metric engineering application in industry.	**PO1,PO4,PO6,PO10,PO11,PSO1, PSO2**
CO4	**Effectively** analyse organization and maintenance of project	**PO1, PO6, PO7, PO8, PO9, PO12, PSO3**
CO5	**Illustrate** organizational metric analysis for an effective model.	**PO1, PO6, PO7,PO8, PO9, PO12, PSO2,PO12**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
OBH 21404	HSS-IV(Basics of Organizational Behaviours)	3	-	-	3	-	-	2	2	2	3	3	-	-	3	3

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

Model Question Paper

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

Name of the Program: MCA Semester: IV Stream: CSE
PAPER TITLE: HSS –IV (Basics of Organizational Behaviours) PAPER CODE: OBH21404
Maximum Marks: 50 Time duration: 3 hours
Total No of questions: 12 Total No of Pages: 01

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, 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 organizational structure? Write a note on it.	**U**	**CO1**
2.	**Enumerate** the basic elements of organizational behaviour requirement specification.	**U**	**CO2**
3.	**Define** leader ship strategy.	**R**	**CO3**
4.	**What** is group behavior?	**R**	**CO4**
5.	**Give** the principles of conflict management.	**U**	**CO4**
	SECTION B (Attempt any **Three Questions) (3 x 5 = 15)**		
6.	**Describe** the stages of evolutionary organization model?	**U**	**CO1**
7.	**Examine** the essential phases of communication channels and networks?	**Ap**	**CO2**
8.	**Elucidate** the barriers to communication with suitable example.	**Ap**	**CO3**
9.	**Explain** incentive system with proper example?	**Evaluate**	**CO4 /CO2**
	SECTION C (Answer Any Two Questions) (2 x 12.5 = 25)		
10.	**Explain** in detail about Intrinsic and extrinsic motivation	**U**	**CO4**
11.	**Write** a Project estimation technique and estimation issues in project progress line.? Explain with a Case Study	**Create**	**CO4**
12.	**Distinguish** features of the factors i) behavioral and contingency models, ii)Leadership strategy?	**An**	**CO5**

CSE21972	**Compiler Design**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 45 Hours**	**3**	**0**	**0**	**3**
Pre-requisite/Exposure	Finite Automata, Data structures, Computer Organization.				
Co-requisite	**NIL**				

Course Objectives:

- To understand students how the process of language translation process.
- To interpret students the theory and practice of compiler implementation.
- To enhance the skills of student to implement lexical analysis, a variety of parsing techniques and semantic analysis of a programming language, along with error detection and recovery.
- To allow the students to identify the various storage allocation, code optimization techniques and code generation.
- To understand students the use of object code generation process

Course Outcomes:

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

CO1: Understand the major phases of compilation, particularly lexical analysis.

CO2: Understand the basic concepts of parsing and Design parser for a given language using top down and Bottom-up parser.

CO3: Demonstrate the use of formal attributed grammars for specifying the syntax and semantics of Programming languages.

CO4: Apply various optimization techniques for the design of a compiler.

CO5: Understand the concepts of symbol tables and implement code generation techniques.

Course Description:

This course will teach students the fundamental concepts and techniques used for building a simple compiler. It will also discuss the major ideas used today in the implementation of programming language compilers, including lexical analysis, parsing, syntax-directed translation, abstract syntax trees, types and type checking, intermediate languages, dataflow analysis, program optimization, code generation, and runtime systems. As a result, you will learn how a program written in a high-level language designed for humans is systematically translated into a program written in low-level assembly more suited to machines.

Along the way we will also touch on how programming languages are designed, programming language semantics, and why there are so many different kinds of programming languages.

Course Content:

Unit-I	**09 Lecture Hours**
Introduction of Compilers and Lexical Analysis and Lex/Flex: Overview of language processing – pre-processors – compiler – assembler – interpreters, pre-processors, – linkers & loaders - structure of a compiler – phases of a compiler. Lexical Analysis – Role of Lexical Analysis – Lexical Analysis Vs Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.	
Unit-II	**09 Lecture Hours**
Syntax Analysis and Yacc/Bison: Syntax Analysis – discussion on CFG, LMD,RMD, parse trees, Role of a parser – classification of parsing techniques – Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non-Recursive predictive parsing – Error recovery in predictive parsing. Bottom up parsing, Types of Bottom up approaches. Introduction to simple LR – Why LR Parsers – Model of an LR Parsers – Operator Precedence- Shift Reduce Parsing – Difference between LR and LL Parsers, Construction of SLR Tables. More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing, Comparison of all bottoms up approaches with all top down approaches.	
Unit-III	**09 Lecture Hours**
Intermediate Code Generation: Semantic analysis, SDT Schemes, evaluation of semantic rules. Intermediate Code Generation: Intermediate languages, three address code, quadruples, triples, abstract syntax trees. Types and declarations, Assignment statements, Boolean expressions, Case statements, Back Patching, Procedure calls type Checking.	
Unit-IV	**09 Lecture Hours**
Code Optimization: Code Optimization: Introduction, The Principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data-flow analysis, Iterative solution of data-flow equations, Code improving transformations, Dealing with aliases, Data-flow analysis of structured flow graphs, Efficient data-flow algorithms, A tool for data-flow analysis, Estimation of types, Symbolic debugging of optimized code.	
Unit-V	**10 Lecture Hours**
Run-Time Environment and Code Generation: Symbol tables: use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms, introduction to garbage collection, Reference counting garbage collectors. Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.	

Text Books:

1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2ndEdition, Pearson,2007.
2. Compiler construction, Principles and Practice, Kenneth C Louden, 1st Edition, CENGAGE

Reference Books:

1. Compiler Design, K. Muneeswaran, Oxford. 2012
2. Engineering a compiler, Keith D.Cooper& Linda Torczon, Morgan Kaufman, 2nd edition. MK publishers, 2012.
3. Principles of compiler design, V. Raghavan, 2nd Edition, Tata Mcgraw Hill, 2011.

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Understand** the major phases of compilation, particularly lexical analysis.	PO1,PO3,PSO1
CO2	**Understand** the basic concepts of parsing and Design parser for a given language using top down and Bottom-up parser.	PO2,PO3,PSO3
CO3	**Demonstrate** the use of formal attributed grammars for specifying the syntax and semantics of Programming languages.	PO2,PO3,,PSO1
CO4	**Apply** various optimization techniques for the design of a compiler.	PO1,PO5,PSO1
CO5	**Understand** the concepts of symbol tables and implement code generation techniques.	PO2,PO3,PO5,PSO3

		Computational knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and design algorithms for	The ability to understand the evolutionary changes in computing, apply standard practices and strategies in	Ability to analyse the impact of Computer Science and Engineering solutions in the societal and human
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
CSE21972	Compiler Design	2	3	3	-	2	-	-	-	-	-	-	-	3	-	2

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

MODEL QUESTION PAPER

	ADAMAS UNIVERSITY **END SEMESTER EXAMINATION** (Academic Session: 2022 – 23)		
Name of the Program:	MCA	**Semester:**	IV
Paper Title:	COMPILER DESIGN	**Paper Code:**	CSE21972
Maximum Marks:	50	**Time Duration:**	3 Hrs
Total No. of Questions:		**Total No of Pages:**	
(Any other information for the student may be mentioned here)	- At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam. - All parts of a Question should be answered consecutively. Each Answer should start from a fresh page. - Assumptions made if any, should be stated clearly at the beginning of your answer.		

Ques No.	**Question**	**Knowledge Level**	**Course Outcome**
Group A : Answer ALL the questions (5 x 1 = 5)			
1			**CO1**
2			**CO2**
3			**CO3**
4			**CO4**
5			**CO5**
Group B : Answer ALL the questions (5 x 2 = 10)			
6	**a) i)** **ii)**		**CO1**
	(OR)		
	b) i) **ii)**		
7	**a)**		**CO2**
	(OR)		
	b)		
8	**a)**		**CO3**
	(OR)		
	b)		
9	**a)**		**CO4**
	(OR)		
	b)		
10	**a)**		**CO5**

	(OR)		
	b)		
Group C : Answer ALL the questions (7 x 5 =35)			
11	**a) i)** **ii)**		**CO1**
	(OR)		
	b) i) **ii)**		
12	**a)**		**CO2**
	(OR)		
	b)		
13	**a)**		**CO3**
	(OR)		
	b)		
14	**a)**		**CO4**
	(OR)		
	b)		
15	**a)**		**CO4**
	(OR)		
	b)		
16	**a)**		**CO5**
	(OR)		
	b)		
17	**a)**		**CO5**
	(OR)		
	b)		

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.

v) If the COs are higher in numbers that can be managed by equating sub-divisional questions
vi) If the COs are lower in numbers, the questions can be increased by equating the number of COs

CSE22973	**Pattern Recognition Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours – 30**	**0**	**0**	**3**	**2**
Pre-requisite/Exposure	**Algebra, Probability, and Statistics**				
Co-requisite	**Basics of Machine Learning**				

Course Objectives:

- To equip students with basic mathematical and statistical techniques commonly used in pattern recognition.
- To introduce students to a variety of pattern recognition algorithms.
- Enable students to apply machine learning concepts in real life problems.
- To enable students, acquire structure and written expression required for their profession.

Course Outcomes:

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

CO1: **Explain** a variety of pattern classification, structural pattern recognition, and pattern classifier combination technique
CO2: **Compare** and parameterize different learning algorithms.
CO3: **Summarize** research in the pattern recognition area verbally and in writing.
CO4: **Apply** performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature
CO5: **Implement** simple pattern classifiers, classifier combinations, and structural pattern recognizers.

Course Description:

Pattern recognition is the process of recognizing patterns by using machine learning algorithm. Pattern recognition can be defined as the classification of data based on knowledge already gained or on statistical information extracted from patterns and/or their representation. One of the important aspects of the pattern recognition is its application potential. For example, Speech recognition, speaker identification, multimedia document recognition (MDR), automatic medical diagnosis. In a typical pattern recognition application, the raw data is processed and converted into a form that is amenable for a machine to use. Pattern recognition involves classification and cluster of patterns.

Course Content:

Unit-I

Simulation of various Statistical measurements using Python.

Unit-II

Implementation of vector and tensor representation of data and classes using Python.

Unit-III

Unsupervised feature extraction – PCA, LDA, SVD, EVD.

Unit-IV

Clustering – K-Means, Fuzzy C-Means, K-Medoids, Agglomerative, Spectral Clustering, DBScan, Cluster validity index

Unit-V

Expectation maximization.

Unit-VI

Supervised – K-NN, Artificial Neural Network, Simulated Annealing, Genetic Algorithm, Particle Swarm Optimization.

Text Books:

1. Pattern Recognition Principles, Julius T. Tou, Rafael C. González, Addison-Wesley Pub. Co., 1974.

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

Examination Scheme:

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

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

Mapping between COs and POs		
Course Outcomes (COs)		**Mapped Program Outcomes**
CO1	**Explain** a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.	**PO1, PSO1**
CO2	**Compare** and parameterize different learning algorithms.	**PO1, PO2**
CO3	**Summarize** research in the pattern recognition area verbally and in writing.	**PO2, PO4,PSO3**
CO4	**Apply** performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature.	**PO1, PO5, PSO2**
CO5	**Implement** simple pattern classifiers, classifier combinations, and structural pattern recognizers.	**PO1, PO3**

		Engineering knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Life-long learning	Adequate strong skills in learning new programming environments, analyse and design algorithms for efficient computer-based systems of	The ability to understand the evolutionary changes in computing, apply standard practices and strategies in software project development using	Ability to analyse the impact of Computer Science and Engineering solutions in the societal and human context, design, model, develop, test
Course Code	**Course Title**	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE22973	Pattern Recognition Lab	3	2	2	2	3	-	-	-	-	-	-	-	3	2	3

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

CSE22974	**Public Blockchain Lab**	**L**	**T**	**P**	**C**

MODEL QUESTION PAPER

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

Name of the Program: MCA Semester: IV Stream: CSE
PAPER TITLE: Pattern Recognition Lab PAPER CODE: CSE22973
Maximum Marks: 50 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 10 = 50)			
1.	WAP for substitution cipher	**AP**	**CO1**
2.	WAP for rail fence cipher	**AP**	**CO2**
3.	WAP for hill cipher	**AP**	**CO2**
4.	**Develop** A DES program to demonstrate the creation of an event.	**AP**	**CO4**
5.	**Develop** AES program to demonstrate security	**AP**	**CO5**

Note: The Sample prepared by assuming 5 COs in a course, considering one CO for one Module.
vii) If the COs are higher in numbers that can be managed by equating sub-divisional questions
viii) If the COs are lower in numbers, the questions can be increased by equating the number of COs

Version 1.0	**Contact Hours -30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**Crypto currency and computer security basics**				
Co-requisites	**--**				

Course Objectives:

- To gain knowledge about the building blocks of blockchain ethereum.
- To enable students to install and configure Mist browser,
- To give the students a perspective to learn the basics of EVM and Solidity programming.
- To enable students acquire knowledge about smart contract and tokens..

Course Outcomes:

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

CO1**. Understand** the basics of Solidity programming.
CO2**. Apply** the decision making constructs and loops to perform conditional execution.
CO3**. Apply** the various types of inheritance in Solidity programming.
CO4**. Distinguish** between function and contract polymorphism.
CO5**. Explain** and apply error handling use cases.

Catalog Description:

This course is the definitive introduction to permissioned blockchain for the students. Beyond the technology, this course will introduce you to some of the philosophy behind decentralization and why there is so much excitement around it.
During the tenure of the course, the students will be introduced to blockchain and the technology behind it. In the later modules, the topics beyond bitcoin will be taken up and delve deeper into a next-generation blockchain called Ethereum to introduce students to what modern blockchains can do.

Course Content:

Experiments:

1	Write a Solidity program to create a smart contract.
2	Solidity program to demonstrate the use of decision making statements.
3	Solidity program to demonstrate the use of loops.
4	Solidity program to demonstrate the creation of an event.
5	Solidity program to demonstrate the use of pure and view functions.
6	Solidity program to demonstrate the use of different types of inheritance.
7	Solidity program to demonstrate the use of abstract contract.
8	Solidity program to demonstrate the use of Function polymorphism.
9	Solidity program to demonstrate the use of contract polymorphism.
10	Solidity program to demonstrate the error handling.

Text Books:

1. Mayukh Mukhopadhyay - Ethereum smart contract development_ build blockchain-based decentralized applications using Solidity-Packt Publishing (2018)
2. Chris Dannen (auth.) - Introducing Ethereum and Solidity_ Foundations of Cryptocurrency and Blockchain Programming for Beginners-Apress (2017)
3. Mastering Bitcoin: Programming The Open Blockchain, Andreas M. Antonopoulos, O'Reilly, ISBN: 9789352135745.

Reference Books:

1. Ethereum for Architects and Developers: With Case Studies and Code Samples in Solidity by Debajani Mohanty

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

Components	**Internal Assessment**	**ETE**
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the basics of Solidity programming.	**PO1,PO4,PO10,PO11,PSO2,PSO3**
CO2	**Apply** the decision making constructs and loops to perform conditional execution.	**PO1,PO4,PO10,PO11,PSO2,PSO3**
CO3	**Apply** the various types of inheritance in Solidity programming.	**PO1,PO4,PO10,PO11,PSO2,PSO3**
CO4	**Distinguish** between function and contract polymorphism	**PO7,PO8,PO9**
CO5	**Explain** and apply error handling use cases.	**PO7,PO8,PO9**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE22974	Public Blockchain-Lab (Elective – III Lab)	3	-	-	3	-	-	2	2	2	3	3	-	-	3	3

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

Model Question Paper

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

Name of the Program: MCA Semester: IV Stream: CSE
PAPER TITLE: Public Blockchain Lab PAPER CODE: CSE22974
Maximum Marks: 50 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 10 = 50)			
1.	**Develop** a Solidity program to create a smart contract.	**AP**	**CO1**
2.	**Develop** Solidity program to demonstrate the use of decision making statements.	**AP**	**CO2**
3.	**Develop** Solidity program to demonstrate the use of loops.	**AP**	**CO2**
4.	**Develop** Solidity program to demonstrate the creation of an event.	**AP**	**CO4**
5.	**Develop** Solidity program to demonstrate the error handling.	**AP**	**CO5**

CSE22975	**Cyber Security and Cryptography Lab**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours-30**	**0**	**0**	**3**	**2**
Pre-requisites/Exposure	**computer security basics**				
Co-requisites	**--**				

Course Objectives:

- To gain knowledge about the building blocks of CRYPTHOGRAPHY
- To enable students to install and configure different scanning tool
- To give the students a perspective to learn the basics of security in programming.
- To enable students acquire knowledge about cryptography technique..

Course Outcomes:

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

CO1**. Understand** the basics of CRYPTHOGRAPHY.
CO2**. Explain** the procedure of installation configure different scanning tool.
CO3**. Explain** the role of encryption in real life.
CO4**. Understand** the basics of Security programming primer.
CO5**. Understand** the utility of encryption in real life.
CO6**. Evaluate** the ancestry of cryptography technique...

Catalog Description:

This course is the definitive introduction to permissioned blockchain for the students. Beyond the technology, this course will introduce you to some of the philosophy behind decentralization and why there is so much excitement around it.

During the tenure of the course, the students will be introduced to blockchain and the technology behind it. In the later modules, the topics beyond bitcoin will be taken up and delve deeper into a next-generation blockchain called Ethereum to introduce students to what modern blockchains can do.

Course Content:

Experiments:

1	Write a Security program to create a ceaser cipher
2	WAP for substitution cipher
3	WAP for rail fence cipher
4	WAP for hill cipher
5	WAP for additive cipher
6	WAP for multiplicative cipher
7	WAP for DES
8	WAP for AES
9	WAP for message digest
10	Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w

Text Books:

1. Mayukh Mukhopadhyay - Ethereum smart contract development_ build blockchain-based decentralized applications using Solidity-Packt Publishing (2018)
2. Chris Dannen (auth.) - Introducing Ethereum and Solidity_ Foundations of Cryptocurrency and Blockchain Programming for Beginners-Apress (2017)
3. Mastering Bitcoin: Programming The Open Blockchain, Andreas M. Antonopoulos, O'Reilly, ISBN: 9789352135745.

Reference Books:

1. Ethereum for Architects and Developers: With Case Studies and Code Samples in Solidity by Debajani Mohanty

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

Components	Internal Assessment	ETE
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Understand** the basics of Solidity programming.	**PO1,PO4,PO10,PO11,PSO2,PSO3**
CO2	**Apply** the decision making constructs and loops to perform conditional execution.	**PO1,PO4,PO10,PO11,PSO2,PSO3**
CO3	**Apply** the various types of inheritance in Solidity programming.	**PO1,PO4,PO10,PO11,PSO2,PSO3**
CO4	**Distinguish** between function and contract polymorphism	**PO7,PO8,PO9**
CO5	**Explain** and apply error handling use cases.	**PO7,PO8,PO9**

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE22975	Cyber Security and Cryptography Lab	3	-	-	3	-	-	2	2	2	3	3	-	-	3	3

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

Model Question Paper

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

Name of the Program: MCA	Semester: IV	Stream: CSE
PAPER TITLE: Cyber security and Cryptography Lab		PAPER CODE: CSE22975
Maximum Marks: 50		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 10 = 50)			
1.	WAP for substitution cipher	**AP**	**CO1**
2.	WAP for rail fence cipher	**AP**	**CO2**
3.	WAP for hill cipher	**AP**	**CO2**
4.	**Develop** A DES program to demonstrate the creation of an event.	**AP**	**CO4**
5.	**Develop** AES program to demonstrate security	**AP**	**CO5**

CSE25976	**Seminar**	**L**	**T**	**P**	**C**
Version 1.0	**Contact hour -30**	**0**	**2**	**0**	**2**
Pre-requisites/Exposure	**Knowledge on Computer domain**				
Co-requisites	**--**				

Course Objectives:

- To **develop** skills in doing literature survey, technical presentation and report preparation.
- To **enable** project identification and execution of preliminary works on final semester project

Course Outcomes:

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

CO1. **Identify** the advanced technologies and globalization
CO2. **Develop** communication and representation skills towards becoming a good team leader and manager
CO3. **Plan** for lifelong learning towards industry readiness
CO4. **Build** the ability to identify an engineering problem, analyze it and propose a work plan to solve it.

Catalog Description:

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

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

Components	**Internal Assessment**	**ETE**
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Identify** the advanced technologies and globalization	**PO1,PO4, PO7,PO8,PO9,PO10,PO11,PSO2,PSO3**
CO2	**Develop** communication and representation skills towards becoming a good team leader and manager	**PO1,PO4,PO10,PO11,PSO2,PSO3**
CO3	**Plan** for lifelong learning towards industry readiness	**PO7,PO8,PO9,PO12, PSO3**
CO4	**Build** the ability to identify an engineering problem, analyze it and propose a work plan to solve it.	**PO1,PO4,PO10,PO11,PSO2,PSO3**

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

		Computational Knowledge	Problem analysis	Design/development of solutions	Conduct investigations of complex computing problems	Modern tool usage	Professional Ethics	Life-long Learning	Project Management and Finance:	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE25976	Seminar	3	-	-	3	-	2	2	2	2	3	3	-	-	3	3

CSE24977	**PROJECT -II**	**L**	**T**	**P**	**C**
Version 1.0	**Contact Hours -60**	**0**	**0**	**6**	**4**
Pre-requisites/Exposure	**Basic idea of the required subjects**				
Co-requisites					

Course Objectives:

- To be able to design, develop, document, and test software using current techniques.
- To understand the fundamentals of computer architecture and computing theory.
- To be able to solve problems working in group settings.
- To demonstrate the ability to give presentations and write technical reports.
- 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**	**ETE**
Weightage (%)	**50**	**50**

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

Mapping between COs and POs		
	Course Outcomes (COs)	**Mapped Program Outcomes**
CO1	**Investigate** a real world problem	**PO1,PO4,PO10,PO11,PSO3**
CO2	**Utilize** the modern tools to solve the problems	**PO1,PO4,PO7,PO10,PO11,PSO3**
CO3	**Discuss** in a group to promote team spirit and leadership quality among the students	**PO1,PO4,PO7,PO10,PO11,PSO3**
CO4	**Plan** a projects involving both technological aspects and finance	**PO3,PO7,PO9,PO10, PSO1**
CO5	**Identify** newer areas of in depth study and research and lifelong learning	**PO6,PO9,PO8,PO12,PSO2**

		Computational Knowledge	Problem Analysis	Design / Development of Solutions	Conduct Investigations of Complex Computing Problems	Modern Tool Usage	Professional Ethics	Life-long Learning	Project Management and Finance	Communication Efficacy	Societal & Environmental Concern:	Individual & Team Work	Innovation and Entrepreneurship	Globally expertise the technological planning and development of software applications in the usage of the modern era.	Expertise to communicate in both oral and written forms, demonstrating the practice of professional ethics and the concerns for social welfare.	Ability to enhance and develop techniques for independent and lifelong learning in computer application.
Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CSE24977	Project -II	3	-	-	3	-	2	-	2	2	3	3	3	-	-	3

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: Master of Computer Application (MCA)

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**
CSE21941	Introduction to Programming	3	3	3	3	2	-	-	-	-	-	1	3	-	-	3
MTH21201	Numerical & Statistical Methods	3	3	-	2	-	-	-	-	-	-	-	-	-	-	2
CSE21942	Computer Organization & Architecture	3	2	3	-	2	3	-	-	-	-	-	3	3	1	3
CSE21943	Software Engineering	3	2	3	-	2	3	-	-	-	-	-	3	3	1	3
ENG21112	HSSM– I (English Communication)	3	2	3	-	2	3	-	-	-	-	-	3	3	1	3
CSE21944	Operating System	3	3	2	-	-	-	-	-	-	-	-	3	3	-	
CSE22945	Introduction to Programming Lab	2	3	3	-	-	-	-	-	-	-	-	-	-	-	3
MTH22201	Numerical & Statistical Methods Lab.	3	3	2	-	-	-	-	-	-	-	-	3	3	-	
CSE22946	Computer Organization & Architecture Lab.	3	3	2	-	-	-	-	-	-	-	-	3	3	-	
CSE22947	Operating System Lab	3	3	3	2	-	-	-	-	-	-	-	-	3	3	3

CSE21948	Switching Circuits and Logic Design	3	3	3	3	2	-	-	-	-	-	1	3	-	-	3
CSE21949	Object Oriented Programming with Java	3	3	-	2	-	-	-	-	-	-	-	-	-	-	2
CSE21950	Data Structures	3	3	3	-	2	-	-	-	-	-	-	-	2	-	2
CSE21951	Database Management System	3	3	3	-	3	-	-	-	-	-	-	-	2	-	2
MTH21519	Discrete Mathematics	2	2	3	2	3	-	-	-	-	-	-	-	-	-	3
CSE22952	Python Programming Lab	2	2	3	2	3	-		-	-	-	-			-	3
CSE22953	Object Oriented Programming with Java Lab	3	3	-	-		-	3	3	3	-	-	-	2	3	-
CSE22954	Data Structures Lab	3	3	-	-		-	3	3	3	-	-	-	2	3	-
CSE22955	Database Management System Lab	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
CSE21956	Design and Analysis of Algorithms	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
ECE21601	Data Communication & Computer Network	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
CSE21957	Graph Theory	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
CSE21958	Formal Language and Automata Theory	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
CSE21959	Artificial Intelligence and Machine Learning	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
CSE21960	Fundamentals of Cloud Computing	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
CSE21961	Natural Language Processing and Its Application	3	3	-	3	-	-	-	2	-	-	-	-	3	-	3
CSE21962	Cloud Storage			-	3	-	2	-	2	2	3	3	-		3	3
CSE21963	Data Warehousing & Data Analytics			-	3	-	2	-	2	2	3	3	-		3	3
CSE22964	Web Technology Lab			-	3	-	2	-	2	2	3	3	-		3	3

CSE22965	Mobile Applications using Android/IOS Lab			-	3	-	2	-	2	2	3	3	-		3	3
CSE22966	Artificial Intelligence and Machine Learning Lab			-	3	-	2	-	2	2	3	3	-		3	3
CSE22967	Fundamentals of Cloud Computing Lab			-	3	-	2	-	2	2	3	3	-		3	3
CSE24968	Project - I			-	3	-	2	-	2	2	3	3	-		3	3
CSE21969	Pattern Recognition			-	3	-	2	-	2	2	3	3	-		3	3
CSE21970	Public Blockchain			-	3	-	3	-	2	2	3	3	-		3	3
CSE21971	Cyber Security and Cryptography			-	3	-	3	-	2	2	3	3	-		3	3
OBH21404	HSS-VI (Basics of Organizational Behaviours)			-	3	-	2	-	2	2	3	3	-		3	3
CSE21972	Compiler Design			-	3	-	3	-	2	2	3	3	-		3	3
CSE22973	Pattern Recognition Lab	3		-	3	-	3	-	2	2	3	3	-		3	3
CSE22974	Public Blockchain Lab	3		-	3	-	2	-	2	2	3	3	-		3	3
CSE22975	Cyber Security and Cryptography Lab	3		-	3	-	-	-	2	2	3	3	-		3	3
CSE25976	Seminar	3		-	3	-	-	-	2	2	3	3	-		3	3
CSE24977	Project – II			-	3	-	3	-	2	2	3	3	-		3	3
Average of CO-PO Mapping		**2.96**	**2.17**	**2.12**	**2.87**	**2.71**	**1.91**	**1.85**	**2.14**	**2.33**	**2.80**	**2.70**	**2.8**	**2.04**	**2.00**	**2.89**