AJ Institute of Engineering and Technology Mangaluru.

VTU Question Papers

Master of Computer and Application (MCA)

I and II Semester
2024 SCHEME

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AJ Institute of Engineering and Technology, Mangaluru.

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Dec.2024/Jan.2025[First Semester]

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CBCS SCHEME

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MMC101

First Semester MCA Degree Examination, Dec.2024/Jan.2025
Programming and Problem Solving in C

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L:Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	a.	Explain the characteristics of C programming language	8	L2	CO1
	b.	Explain the structure of C program	5	L2	CO1
	c.	List the uses of C Language.	7	L2	CO1
		OR			
Q.2	a.	Explain the various forms of if statement with examples	12	L2	CO1
	b.	With example explain while,do-while,for loops	8	L2	CO1
		Module – 2			
Q.3	a.	Define array. Give syntax of 1-D array.Explain the operations on array.	10	L2	CO2
	b.	Give 2-D array syntax. Write C program to multiply two matrices.	10	L2	CO3
		OR			
Q.4	a.	Define string with example. Explain the string taxonomy	08	L2	CO3
	b.	Explain the various string operations	05	L2	CO3
	c.	Write a C program search element in an array using linear search.	07	L2	CO3
		Module – 3			
Q.5	a.	Define a Function. Differentiate between call by value and call by reference.	8	L3	CO4
	b.	Define recursive function .write a C program to find the factorial of function using recursive function.	7	L3	CO4
	c.	Write a C program to swap a two numbers by call by value.	5	L3	CO4
		OR			
Q.6	a.	Write a C program to find the mean of N numbers using arrays and pointers	10	L3	CO3
	b.	Write a C program to add two matrices using pointers.	10	L3	CO3
		Module – 4			
Q.7	a.	Define Structure. Give syntax of Structure.	5	L2	CO5
	b.	Write a C program using structure to read and display student information.	10	L2	CO5
	c.	Explain nested structure with example.	5	L2	CO5
		OR			
Q.8	a.	Define Union. Give the syntax of Union.	5	L2	CO5
	b.	Explain the various storage classes	10	L2	CO5
	c.	Write a short note typedef.	5	L2	CO5

		Module – 5			
Q.9	a.	Define a File. List and explain the operations on file	10	L2	CO1
	b.	Write a note on **1. fscanf() 3.fgetc()** **2. fgets() 4. fread()**	10	L2	CO1
		OR			
Q.10	a.	Write a note on : 1. Fprintf() 2. Fputs() 3. Fputc() 4. Fwrite()	10	L2	CO1
	b	Write a note on : 1. Fseek() 2. Ftell() 3. Fgetpos() 4. Fsetpos()	10	L2	CO1

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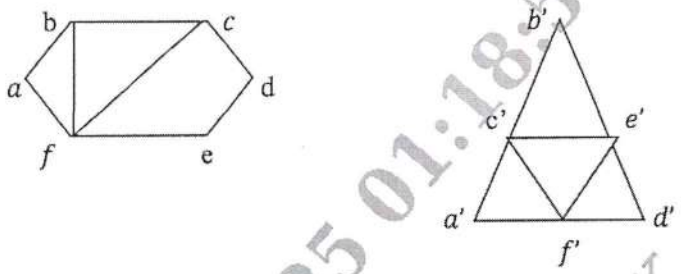
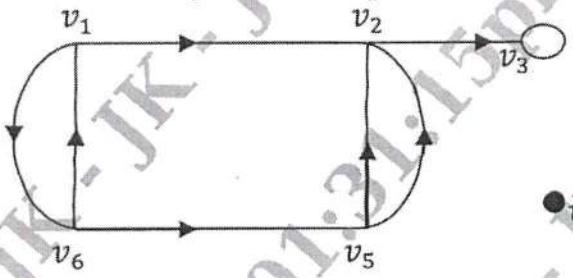
MMC102

First Semester MCA Degree Examination, Dec.2024/Jan.2025
Discrete Mathematics and Graph Theory

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

			M	L	C
		Module – 1			
Q.1	**a.**	If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{1,2,3,7\}$, $B = \{4,5,6,7\}$ and $C = \{1,3,6\}$. Compute the following: (i) $\overline{A \cup C}$ (ii) $\bar{A} \cap \bar{B}$ (iii) $A \cap B \cap C$ (iv) $B - A$ (v) $A - B$	6	L1	CO1
	b.	Let $A = \{1,2,3,4,5,6\}$, $B = \{6,7,8,9,10\}$ and $f: A \to B$ be a function defined by $f = \{(1,7)(2,7)(3,8)(4,6)(5,9)(6,9)\}$. Determine $f^{-1}(6)$ and $f^{-1}(9)$. Also if $B_1 = \{7,8\}$, $B_2 = \{8,9,10\}$ then find $f^{-1}(B_1)$ and $f^{-1}(B_2)$.	7	L2	CO1
	c.	Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 7 & 3 \\ 3 & -1 \end{bmatrix}$.	7	L2	CO1
		OR			
Q.2	**a.**	For any two sets A and B, prove the Demorgan's laws.	6	L1	CO1
	b.	State pigeon-hole principle. Show that if 50 books in a library contain a total of 27551 pages, one of the books must have atleast 552 pages.	7	L2	CO1
	c.	In a class of 52 students, 30 are studying C++, 28 are studying pascal and 13 are studying both languages. How many in this class are studying at least one of these languages? How many are studying neither of these languages?	7	L2	CO1
		Module – 2			
Q.3	**a.**	Define tautology. Show that $[(p \vee q) \wedge (p \to r) \wedge (q \to r)] \to r$ is a tautology	7	L2	CO2
	b.	Write the converse, inverse and the contra positive of the conditional statement: "If oxygen is a gas then Gold is compound".	6	L2	CO2
	c.	Prove the following is valid argument : $p \to r$; $\sim p \to q$; $q \to s$; $\therefore \sim r \to s$	7	L2	CO2
		OR			
Q.4	**a.**	Prove the following using the laws of logic: $p \to (q \to r) \Leftrightarrow (p \wedge q) \to r$	7	L2	CO2
	b.	Negate and simplify: (i) $\forall x, [p(x) \wedge \sim q(x)]$. $\exists x, [\{p(x) \vee q(x)\} \to r(x)]$.	6	L2	CO2
	c.	Give the direct proof of the following statement "*If n is an odd integer, then n^2 is odd.*"	7	L2	CO2
		Module – 3			
Q.5	**a.**	Define graph and explain the types of graph.	8	L1	CO3

	b.	Prove that the number of vertices of odd degree in a graph is always even.	6	L2	CO3
	c.	Define isomorphic graph and verify the following graphs are isomorphic or not. 	6	L2	CO3
		OR			
Q.6	a.	Explain the following graphs: (i) Bi- partite graph (ii) Sub graphs (iii) Walk (iv) Path	10	L1	CO3
	b.	Prove that a simple graph with n vertices and K components can have at most (n-k)(n-k+1)/2 edges.	10	L2	CO3
		Module – 4			
Q.7	a.	State and prove necessary condition of a graph to be a Euler graph.	10	L2	CO4
	b.	List and explain the different operations on graph.	10	L2	CO4
		OR			
Q.8	a.	Define digraph. Find the indegree and outdegree of the following graph: 	8	L2	CO4
	b.	Illustrate the travelling salesman problem using a graph.	6	L2	CO4
	c.	List and explain different digraphs and binary relations.	6	L2	CO4
		Module – 5			
Q.9	a.	Prove that every tree with two or more vertices is 2- Chromatic	10	L2	CO5
	b.	Explain the following for chromatic polynomial: (i) Finding a maximal independent set. (ii) Finding all maximal independent set.	10	L2	CO5
		OR			
Q.10	a.	Prove that the vertices of every planar graph can be properly colored with five colors.	10	L2	CO5
	b.	Explain the Greedy coloring algorithm.	10	L2	CO5

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MMC103

First Semester MCA Degree Examination, Dec.2024/Jan.2025
Database Management Systems (DBMS)

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define the following terms: i. DBMS ii. Entity & Attribute iii. Relational data model iv. Schema and Schema Diagram v. Primary key and Foreign key	10	L1	CO1
	b.	Discuss the different applications of DBMS.	5	L2	CO1
	c.	Explain three schema architecture with neat diagram.	5	L2	CO1
		OR			
Q.2	a.	Explain components of DBMS.	10	L2	CO1
	b.	Discuss the different types of Relationship types.	5	L2	CO1
	c.	Draw ER-Diagram for Company database which contains entity type Employee, Department, Project and Dependent.	5	L3	CO1
		Module – 2			
Q.3	a.	Explain the following relational algebra operations i. Selection ii. Projection	10	L2	CO2
	b.	Describe the following DDL and DML commands. i. Create ii. Insert iii. Delete iv. Update v. Drop	10	L2	CO2
		OR			
Q.4	a.	Explain the following clauses i. select ...From…Where clause ii. Group by and Having clause	10	L2	CO3
	b.	Elaborate the importance of views.	5	L2	CO3
	c.	Discuss about Procedures.	5	L2	CO3
		Module – 3			
Q.5	a.	Explain 1NF and 2NF with an example.	10	L2	CO3
	b.	Discuss 3NF and Boyce codd with an example.	10	L2	CO3
		OR			
Q.6	a.	Explain 4NF and 5NF with an example.	10	L2	CO3
	b.	Discuss the following with an Example. i. Functional dependency ii. Dependency Preservation Property	10	L2	CO3
		Module – 4			
Q.7	a.	Describe the following i. ACID Properties of transaction ii. Different states for transaction execution	10	L2	CO2
	b.	Discuss two-phase locking system with an example.	10	L2	CO2
		OR			
Q.8	a.	Explain the implementation of Isolation level.	10	L2	CO2
	b.	Discuss Multiple Granularity with an example.	10	L2	CO2
		Module – 5			
Q.9	a.	How the log can be used to recover from a system crash and to roll back transactions during normal operation?	10	L1	CO2
	b.	Illustrate Checkpoints and Fuzzy Check pointing with an example.	10	L3	CO2
		OR			

Q.10	**a.**	Describe the Buffer Management with an example.	**10**	**L2**	**CO2**
	b.	Define Undo and Redo options. The log states are mentioned below. Determine the use of Undo and Redo options to ensure the atomicity in below mentioned examples.	**10**	**L3**	**CO2**

(i)	(ii)	(iii)
<T_o start>	<T_o start>	<T_o start>
< T_o , A, 1000, 950>	< T_o , A, 1000, 950>	< T_o , A, 1000, 950>
< T_o , B, 2000, 2050>	< T_o , B, 2000, 2050>	< T_o , B, 2000, 2050>
	<T_o commit>	<T_o commit>
	<T_1 start>	<T_1 start>
	< T_1 , C, 700, 600>	< T_1 , C, 700, 600>
		<T_1 commit>

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MMC104

First Semester MCA Degree Examination, Dec.2024/Jan.2025
Operating System

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What is the significance of Operating System? Illustrate various services provided by the Operating System.	10	L2	CO1
	b.	What is the purpose of system calls? Describe different types of system calls used in Operating system with examples.	10	L2	CO1
		OR			
Q.2	a.	Illustrate the following operating system architectures with a neat diagram: (i) Microkernel (ii) Layered	10	L2	CO1
	b.	Illustrate with a neat diagram various states of process. Also discuss the significance of process control block (PCB).	10	L2	CO1
		Module – 2			
Q.3	a.	"CPU scheduling ensures proper execution of processes". Justify. Illustrate different scheduling criteria used by CPU scheduling algorithms.	10	L2	CO1
	b.	Discuss how dining philosophers problem is solved using semaphores.	10	L3	CO1
		OR			
Q.4	a.	What do you mean by Critical Section Problem? Explain the solution to the critical-section problem using mutex locks.	10	L2	CO1
	b.	Consider the set of processes with Arrival Time, CPU burst time (in milliseconds) and priority as shown below. (Lower number represents higher priority).	10	L3	CO1

Process	Arrival Time	Burst Time	Priority
P1	0	10	3
P2	1	1	1
P3	2	2	4
P4	3	1	5
P5	4	5	2

Draw the Gantt Chart and calculate the Average waiting time and Average Turnaround time using
1) SJF Scheduling (Non Pre-emptive)
2) Priority Scheduling (Non Pre-emptive)

(Note: Consider Arrival Time for both algorithms.)

Module – 3

Q.5	**a.**	Illustrate deadlocks with their necessary conditions.	**10**	**L2**	**CO2**
	b.	Describe the working principles of Banker's algorithm for the following snapshot and find either the system is in safe state or not.	**10**	**L2**	**CO2**

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

OR

Q.6	**a.**	Discuss deadlock detection with a neat diagram.	**10**	**L2**	**CO2**
	b.	Explain different methods used for recovering from a deadlock in an operating system.	**10**	**L2**	**CO2**

Module – 4

Q.7	**a.**	Describe in detail the concept of Paging with a neat diagram.	**10**	**L3**	**CO3**
	b.	Differentiate between internal and external fragmentation.	**10**	**L2**	**CO3**

OR

Q.8	**a.**	Consider the page reference string: 1,0,7,1,0,2,1,2,3,0,3,2,4,0,3,6,2,1 for a memory with three frames. Determine the number of page faults using the FIFO, Optimal, and LRU replacement algorithms. Which algorithm is most efficient?	**10**	**L3**	**CO3**
	b.	Interpret the concepts of demand paging with neat diagram.	**10**	**L2**	**CO3**

Module – 5

Q.9	**a.**	Illustrate the following access methods. i) Sequential access ii) Direct access	**08**	**L2**	**CO3**
	b.	Illustrate in detail the various operations performed on a file.	**08**	**L2**	**CO3**
	c.	Explain the following: i) Bit vector ii) Linked list	**04**	**L2**	**CO3**

OR

Q.10	**a.**	Illustrate various levels of directory structures.	**10**	**L2**	**CO3**
	b.	List the different file allocation methods and explain any two methods in detail.	**10**	**L2**	**CO3**

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MMC105

First Semester MCA Degree Examination, Dec.2024/Jan.2025
Web Technologies

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define HTTP. Explain the different Phases of HTTP.	10	L2	CO1
	b.	Discuss the basic structure of XHTML document. Also explain the rules to be followed to make use of HTML elements in XHTML document.	10	L2	CO1
		OR			
Q.2	a.	Briefly explain the following: 1. URL 2. MIME 3. web server 4. web browser	10	L2	CO1
	b.	Explain the following tags with examples 1. Heading tag 2. Hypertext link tag 3. Image tag 4. Progress tag	10	L2	CO1
		Module – 2			
Q.3	a.	Discuss on the different ways of including CSS style information to a HTML document.	10	L2	CO2
	b.	Name any five CSS selectors and explain their uses with a suitable example.	10	L3	CO2
		OR			
Q.4	a.	Explain the various ways of creating arrays in javascript. Mention any 5 array methods and explain their use.	10	L2	CO2
	b.	Write javascript program that accepts. 1. Input : A number n Output : The first n Fibonacci numbers 2. Input : A number n Output : A table of numbers from 1 to n and their squares	10	L3	CO2
		Module – 3			
Q.5	a.	Explain Document object model (DOM) with an example.	10	L2	CO3
	b.	Write a javascript program to show handling of events from textbox and password elements.	10	L3	CO3
		OR			
Q.6	a.	Briefly describe Window object's properties and methods.	10	L2	CO3
	b.	Discuss Event handling. Explain it with an example.	10	L2	CO3

		Module – 4			
Q.7	**a.**	Briefly explain the following with examples: 1. AngularJS Numbers 2. AngularJS Strings 3. AngularJS Objects 4. AngularJS Arrays	**10**	**L2**	**CO4**
	b.	Discuss the use of filters in Angular JS with an example.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	What is Angular JS? Explain the following Angular JS directives: (i) ng_app (ii) ng_model (iii) ng_bind	**10**	**L2**	**CO4**
	b.	Explain AngularJS expressions. Write an Angular JS program to use expressions.	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	What is Angular JS Services? Explain them with examples.	**10**	**L2**	**CO4**
	b.	Write an Angular JS program to demonstrate client-side form validation.	**10**	**L3**	**CO4**
		OR			
Q.10	**a.**	Briefly explain about AngularJS Events with an example.	**10**	**L3**	**CO4**
	b.	Explain AngularJS Forms and its elements.	**10**	**L3**	**CO4**

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MMC101

First Semester MCA Degree Examination, June/July 2025
Programming and Problem Solving in C

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L:Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Write the structure of C program and explain with an example program	6	L1	CO1
	b.	List the different operators in C and explain any two with an example program	6	L2	CO1
	c.	List out four conditional branching statements in C program and explain any two of them with an example program	8	L1	CO1
		OR			
Q.2	a.	List out three iterative statements in C program and explain any two of them with an example program	10	L1	CO1
	b.	Write short note on the following i. Input /output statements ii. Preprocessor directives	10	L2	CO1
		Module – 2			
Q.3	a.	What are arrays? How to declare and initialize an array in C? How to access the elements of an array? Explain in detail along with example program	6	L2	CO3
	b.	List the operations on Arrays and explain any two of them with an example program	8	L2	CO3
	c	Write a C program to sort the given set of n numbers using selection sort	6	L3	CO3
		OR			
Q.4	a.	What is a string? Explain any four string handling functions with an example each	10	L2	CO4
	b.	How to declare and initialize two dimensional arrays in C? How to access the elements of two dimensional array? Explain in detail along with an example program	10	L2	CO3
		Module – 3			
Q.5	a.	What is a function? What is the need for user defined function? how to declare, define and call a function in C explain along with syntax and an example program	10	L2	CO4

	b.	Write a C program to search the key in the given set of n numbers using recursive binary search	10	L3	CO4
		OR			
Q.6	a.	What is pointer? How do you declare pointer variable? Write a program to implement pointer expressions and pointer arithmetic	10	L2	CO3
	b.	Explain the following with example program i. Call by value ii. Call by reference	10	L2	CO3
		Module – 4			
Q.7	a.	What is Structures and Union in C programming Language? Write the syntax for defining structure and union in C. Explain how the individual members are accessed in each? Explain with example	10	L2	CO3
	b.	List out the four different types of storage classes in C. Explain in detail	10	L2	CO4
		OR			
Q.8	a.	What is linked list? Write a C function for i. Inserting a node at the beginning ii. Delete the last node from the list	10	L3	CO3
	b.	Define dynamic memory allocation? Discuss the four dynamic memory allocation functions along with example	10	L3	CO4
		Module – 5			
Q.9	a.	What are files in C? Explain the sequential access and random access of files	10	L2	CO4
	b.	List the different functions to read the data from files and explain them in detail	10	L2	CO4
		OR			
Q.10	a.	List the different functions to write the data to files and explain them in detail	10	L2	CO4
	b.	What are Command Line Arguments? Write a program to demonstrate command line argument	10	L2	CO3

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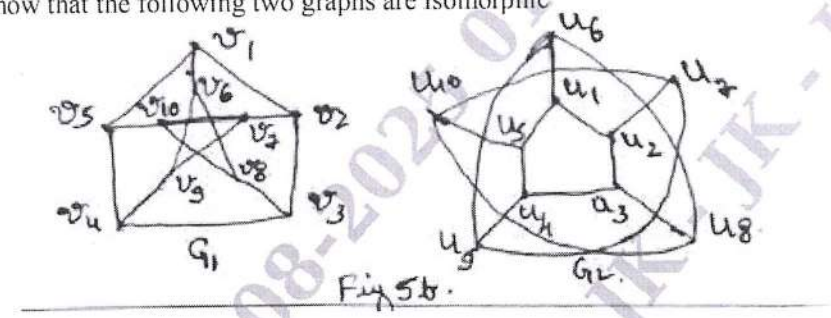
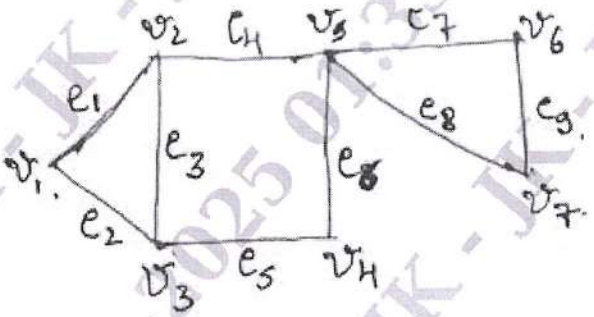
MMC102

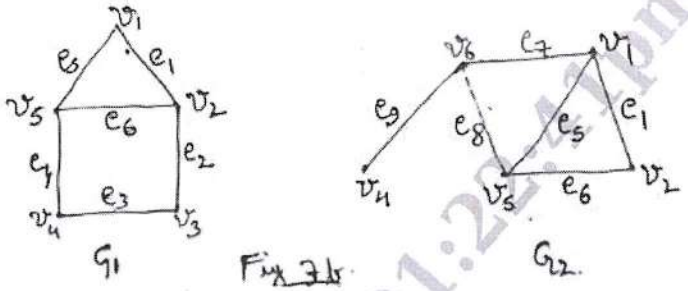
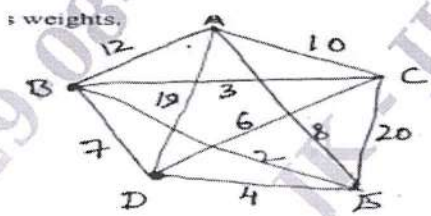
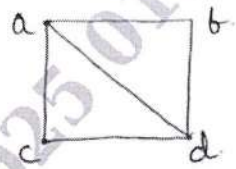
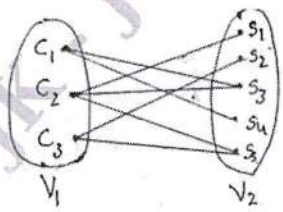
First Semester MCA Degree Examination, June/July 2025
Discrete Mathematics & Graph Theory

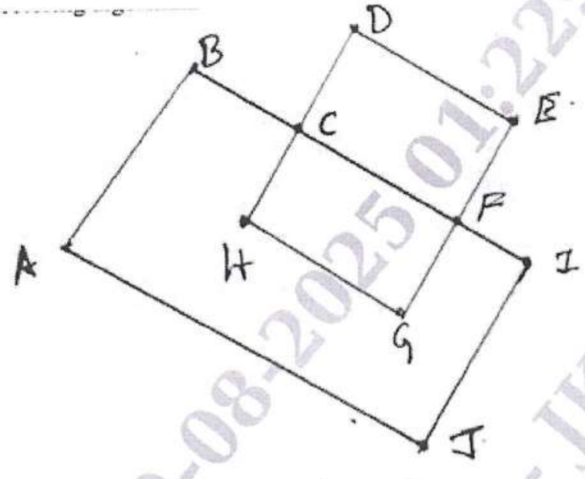
Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L:Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define cardinality of a set, union and intersection of two sets with examples.	6	L1	CO1
	b.	In a class of 52 students, 30 are studying C++, 28 are studying python and 13 are studying both languages. (i) How many are studying at least one of these languages? (ii) How many are studying neither of these languages?	8	L3	CO1
	c.	If $A = \begin{bmatrix} 1 & 3 \\ 2 & 1 \end{bmatrix}$ $and B = \begin{bmatrix} 2 & 1 \\ 3 & 1 \end{bmatrix}$ then verify that $(A+B)^T = A^T + B^T$	6	L2	CO1
		OR			
Q.2	a.	A drawer contains 6 black socks and 6 brown socks. A man takes out socks randomly in the dark. (i) How many socks must he take out to be sure that he has at least 2 socks of the same color? (ii) How many socks must he take out to be sure that he has at least 2black socks?	7	L3	CO1
	b.	State and prove D'Morgan laws for sets	5	L2	CO1
	c.	Find the eigen values and corresponding eigen vectors of the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$	8	L2	CO1
		Module – 2			
Q.3	a.	Define a Tautology. Determine whether the following compound statement is a tautology or not. $\{(p \vee q) \rightarrow r\} \leftrightarrow \{\neg r \rightarrow \neg(p \vee q)\}$	7	L2	CO1
	b.	Test if the following argument is valid or not. If I study, then I will not fail in the examination. If I do not watch TV in the evenings, then I will study. I failed in the examination. ∴ I must have watched TV in the evenings.	7	L3	CO1
	c.	Write the converse, Inverse and Contrapositive of the statement "If it is raining then home team wins".	6	L2	CO1
		OR			
Q.4	a.	Using the laws of logic, prove the following logical equivalence: $[(\neg p \vee \neg q) \wedge (F0 \vee p) \wedge p] \Leftrightarrow p \wedge \neg q$.	8	L2	CO1
	b.	Write symbolically and obtain the negation of the statement " All integers are rational numbers and some rational numbers are not integers".	6	L2	CO1

	c.	Prove the following argument by direct and Indirect methods. "If m is an even integer, then m + 9 is odd".	6	L3	CO1
		Module – 3			
Q.5	a.	Define the following with suitable examples (i) Regular graph (ii) Bipartite graph (iii) Degree of a vertex (iv) Pendant vertex and (v) Disconnected graph.	10	L1	CO2
	b.	Show that the following two graphs are Isomorphic  Fig 5b.	10	L2	CO2
		OR			
Q.6	a.	Determine $\|V\|$ for the graph $G = (V, E)$ in the following cases: (i) G is a cubic graph with 9 edges (ii) G has 10 edges with two vertices of degree 4 and the others of degree 3. (iii) G is a regular graph with 15 edges (iv) 16 edges and all vertices of degree 4	10	L2	CO2
	b.	From the graph shown below, find (i) a walk from v2 to v4 which is not a trail (ii) a trail from v2 to v4 which is not a path (iii) a closed walk from v2 to v2 which is not a circuit (iv) a circuit from v2 to v2 which is not a cycle  Fig 6b.	10	L2	CO2
		Module – 4			
Q.7	a.	Exhibit the following: (i) A graph which has both an Euler circuit and a Hamilton cycle (ii) A graph which has an Euler circuit but no Hamilton cycle. (iii) A graph which has a Hamilton cycle but no Euler circuit. (iv) A graph which has neither an Euler circuit nor a Hamilton cycle	10	L2	CO2

	b.	Find the ring sum of the graphs G1 and G2 shown below  Fig 7b	6	L2	CO2
	c.	Define complement of a graph with an example.	4	L1	CO2
		OR			
Q.8	a.	Find the shortest possible route, so that salesman covers all the cities starting from city A and returns to A. Cities are denoted by vertices in the following graph and distances are given as weights. 	10	L3	CO4
	b.	Let $A = \{1,2,3,4,5,6\}$ be a set and a binary relation on A is defined as xRy iff y=2x. (i) Write down R as a set of ordered pairs (ii) Draw the directed graph of R (iii) Determine the in-degrees and out-degrees of each vertex.	10	L2	CO2
		Module – 5			
Q.9	a.	Define Chromatic number of a graph. Find the chromatic polynomial and hence obtain the chromatic number of the following graph.  Fig 9a	10	L2	CO3
	b.	Five senators s1 , s2 , s3 , s4 , and s5 are members of three committees, c1 , c2 , and c3 . The membership is shown in the following figure. One member from each committee is to be represented in a super-committee. Is it possible to send one distinct representative from each of the committees? If so, give an example.  Fig 9b	10	L3	CO4

		OR			
Q.10	a.	Show that every planar map can be properly colored with five colors	10	L2	CO4
	b.	Explain Greedy coloring algorithm. Color the below graph using the Greedy coloring algorithm.  Fig 10b.	10	L3	CO3

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MMC103

First Semester MCA Degree Examination, June/July 2025
Database Management Systems (DBMS)

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L:Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Describe the three schema architecture for database system.	10	L2	CO1
	b.	Illustrate the characteristics of database approach.	5	L2	CO1
	c.	Explain any 5 various symbols and its representation used in ER Models with diagram.	5	L2	CO1
		OR			
Q.2	a.	Define the following terms, with an example for each : i) key Attribute ii) Composite Attribute	10	L2	CO1
	b.	Differentiate between Strong entity and Weak entity with an example.	5	L2	CO1
	c.	Construct ER Diagram for college database Management System.	5	L3	CO1
		Module – 2			
Q.3	a.	Explain selection and projection set operations.	5	L2	CO2
	b.	With a suitable example, explain join and division operation in relational algebra	5	L2	CO2
	c.	Explain Tuple Relational Calculus and Domain Relational Calculus.	10	L2	CO2
		OR			
Q.4	a.	Explain DDL, DML with examples.	5	L2	CO2
	b.	Define Views in SQL? Explain how to create a view.	5	L2	CO2
	c.	Create the following tables with properly specifying primary keys, foreign keys, and solve the following queries. BRANCH (Branch_id, Branch_name, HOD) STUDENT (USN, Name, Address, Branch_id, Sem) BOOK (Book_id, Book_name, Author_id, Publisher, Branch_id) BOOK (Book_id, Book_name, Author_id, Publisher, Branch_id) AUTHOR (Author_id, Author_name, Country, Age) BORROW (USN, Book-id, Borrowed_date) **Execute the following queries:** 1. List the details of All students who are all studying in II sem MCA. 2. List the students who are not borrowed any books. 3. Display the USN, Student_name, Branch_name, Book_name, Author_name, Books_borrowed_date of II sem MCA Students who borrowed books. 4. Display the student details who borrowed more than two books. 5. Display the student details who borrowed books from more than one author.	10	L3	CO2

		Module – 3			
Q.5	**a.**	Define Normalization. Explain about 1NF, 2NF with examples.	**12**	**L2**	**CO3**
	b.	Discuss Multi-Valued dependencies and Join dependencies.	**08**	**L2**	**CO3**
		OR			
Q.6	**a.**	Discuss Non Loss decomposition and functional dependencies.	**10**	**L2**	**CO3**
	b.	Explain 4NF and 5NF with examples.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Briefly explain ACID Properties with examples.	**8**	**L2**	**CO3**
	b.	Discuss Recoverability in detail with an example.	**6**	**L2**	**CO3**
	d.	Illustrate Validation based protocols with example.	**6**	**L3**	**CO3**
		OR			
Q.8	**a.**	Discuss Concurrent executions with example.	**8**	**L2**	**CO3**
	b.	Define Serializability. Discusses Test for Serializability.	**6**	**L2**	**CO3**
	c.	Illustrate Timestamp based protocols with example.	**6**	**L3**	**CO3**
		Module – 5			
Q.9	**a.**	Discuss Log Based Recovery with a neat diagram.	**8**	**L2**	**CO3**
	b.	Define Check point. Explain different types of Checkpoints with examples.	**6**	**L2**	**CO3**
	c.	Illustrate Timestamp Based Protocol with an example.	**6**	**L3**	**CO3**
		OR			
Q.10	**a.**	Discuss a lock-based concurrency control issue in DBMS transaction processing.	**8**	**L2**	**CO3**
	b.	Define Buffer Management. Explain methods of Buffer Management with examples.	**6**	**L2**	**CO3**
	c.	Illustrate the concept of the Failure with loss of nonvolatile storage	**6**	**L3**	**CO3**

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MMC105

First Semester MCA Degree Examination, June/July 2025
Web Technologies

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	What are web browsers and web servers? Explain their roles in web technologies.	4	L2	CO1
	b.	List the different types of HTML5 form elements and their uses.	10	L2	CO2
	c.	Explain the and tags in brief.	6	L2	CO2
		OR			
Q.2	a.	Explain the types of lists with suitable example	10	L2	CO1
	b.	Discuss the usage of rowspan and colspan properties in tables	5	L2	CO2
	c.	Demonstrate the use of HTML5 media tags for embedding audio and video.	5	L3	CO2
		Module – 2			
Q.3	a.	With an example, explain the different levels of CSS.	7	L2	CO2
	b.	Write a XHTML and CSS document to illustrate different font properties.	8	L3	CO2
	c.	Write a JavaScript program to check whether a number is prime or not using conditional statements.	5	L3	CO2
		OR			
Q.4	a.	List the types of Selectors in CSS. Explain any four in detail with suitable example.	10	L2	CO2
	b.	How arrays are declared in JavaScript? Write a JavaScript program to find the maximum element of an array using function.	10	L3	CO2
		Module – 3			
Q.5	a.	Describe the Document Object Model (DOM) and its significance in JavaScript.	10	L2	CO3
	b.	Discuss the event handling in JavaScript with examples.	10	L3	CO3
		OR			
Q.6	a.	Explain how to manipulate strings using JavaScript functions.	10	L2	CO3
	b.	Write a JavaScript program to show handling events from textbox and password elements.	10	L3	CO3
		Module – 4			
Q.7	a.	What is AngularJS? Explain AngularJS MVC architecture with a neat diagram	10	L2	CO4
	b.	What are AngularJS directives? List and explain thedirectives defined in AngularJS with example.	10	L2	CO4

		OR			
Q.8	**a.**	Explain AngularJS controller with example	**10**	**L2**	**CO4**
	b.	Briefly discuss the use of filters in Angular JS with an example.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain AngularJS forms with relevant code snippets and describe their significance in web applications.	**10**	**L2**	**CO4**
	b.	List the events associated with AngularJS. Explain any 4 in detail.	**10**	**L3**	**CO4**
		OR			
Q.10	**a.**	What are AngularJS Services? Explain any three of them by using code snippet.	**10**	**L2**	**CO4**
	b.	Write an AngularJS program to demonstrate client-side form validation, including validation for required fields and email format	**10**	**L3**	**CO4**

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MMC201

Second Semester MCA Degree Examination, June/July 2025
Machine Learning & Data Analytics using Python

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Machine Learning. Describe its types with examples.	10	L2	CO1
	b.	Illustrate the data visualization using matplotlib with three different charts.	10	L3	CO1
		OR			
Q.2	a.	Demonstrate the use of NumPy and Pandas for reading a csv file and manipulate the data with appropriate examples.	10	L3	CO1
	b.	Explain the steps involved in Data Preprocessing. Mention the techniques used for handling missing values and outliers.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain Linear and Polynomial Regression. Provide code examples using sklearn.	10	L2	CO2
	b.	Describe model evaluation metrics like MAE, MSE, and RMSE.	5	L2	CO2
	c.	Write a short note on overfitting and underfitting with visual explanation.	5	L2	CO2
		OR			
Q.4	a.	Describe the working of K-Nearest Neighbors (KNN) algorithm. Write code for classification using KNN.	10	L2	CO2
	b.	List and explain any four classification algorithms and their use cases.	10	L2	CO2
		Module – 3			
Q.5	a.	Discuss K-Means clustering algorithm and its implementation in Python.	10	L2	CO3
	b.	Illustrate Principal Component Analysis (PCA) and its use in dimensionality reduction.	10	L3	CO3

OR					
Q.6	**a.**	Develop a Python program to perform Hierarchical clustering and visualize using a dendrogram.	**10**	**L3**	**CO3**
	b.	Explain Apriori algorithm and its use in market basket analysis.	**10**	**L2**	**CO3**
Module – 4					
Q.7	**a.**	Differentiate Bagging and Boosting with suitable examples.	**6**	**L2**	**CO4**
	b.	Describe the XGBoost algorithm and provide a working Python example.	**8**	**L2**	**CO4**
	c.	Define Support Vector Machine. Explain kernel trick with a diagram.	**6**	**L2**	**CO4**
OR					
Q.8	**a.**	What are CNNs? Discuss their architecture and applications.	**10**	**L2**	**CO4**
	b.	Write a Python code to build and train a simple neural network using Keras.	**10**	**L2**	**CO4**
Module – 5					
Q.9	**a.**	Explain steps in Exploratory Data Analysis (EDA) with examples.	**10**	**L2**	**CO5**
	b.	Describe the ARIMA model and its use in time series forecasting.	**10**	**L2**	**CO5**
OR					
Q.10	**a.**	With an example, explain building a web application with Django for ML model integration.	**10**	**L2**	**CO5**
	b.	Explain model deployment using Flask. Provide a deployment flow diagram.	**10**	**L2**	**CO5**

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MMC202

Second Semester MCA Degree Examination, June/July 2025
Object Oriented Programming using Java

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	List and explain the features of java.	10	L2	CO1
	b.	Explain narrowing and widening type casting with example.	7	L2	CO1
	c.	Write short note on Garbage collector.	3	L1	CO1
		OR			
Q.2	a.	Explain ***this*** keyword with example program.	6	L3	CO1
	b.	Describe object as parameter with example.	6	L2	CO1
	c.	Explain the following : i) Access specifier ii) command-line -argument	8	L2	CO1
		Module – 2			
Q.3	a.	What is inheritance? Explain single inheritance with suitable example program	7	L3	CO2
	b.	Write a note on final with inheritance	6	L1	CO2
	c.	Describe the role of the **super** keyword in Java. Provide a suitable Java program to demonstrate its functionality.	7	L2	CO2
		OR			
Q.4	a.	What is a String in Java? List the different constructors of the String class can be used to create string objects. Explain any two.	6	L2	CO2
	b.	Explain how to modify a string by using following methods with syntax i) substring( ) ii) concat( ) iii) replace( ) iv) trim( )	8	L2	CO2
	c.	Define generics in Java. Write a Java program to demonstrate how generics enhance type safety and eliminate the need for explicit type casting.	6	L2	CO2
		Module – 3			
Q.5	a.	Define package. Explain how to create and import a user defined package in java with an example.	10	L3	CO3
	b.	Explain the concept of interfaces in Java. How do interfaces support multiple inheritance? Write a Java program to demonstrate the implementation of an interface.	10	L3	CO3
		OR			
Q.6	a.	What is the use of multiple catch statement in Exception handling? Discuss with a java program	10	L2	CO3
	b.	Write a java program which uses throws keyword for handling Exception.	10	L3	CO3

		Module – 4			
Q.7	**a.**	Define a Thread. Explain the different ways of creating threads.	**7**	**L2**	**CO4**
	b.	What is the need of synchronization? Explain with an example how synchronization is implemented in java.	**7**	**L3**	**CO4**
	c.	Write short note on, i) isAlive( ) ii) join( )	**6**	**L1**	**CO4**
		OR			
Q.8	**a.**	Write a program to create multiple threads in Java	**8**	**L3**	**CO4**
	b.	Explain the concept of thread priorities in Java. How do they affect thread execution?	**6**	**L2**	**CO4**
	c.	What do you understand by Byte Streams in Java? Describe their working and importance in handling binary data.	**6**	**L1**	**CO4**
		Module – 5			
Q.9	**a.**	Write a Java program to handle mouse events using the MouseListener interface.	**10**	**L3**	**CO5**
	b.	Explain the following methods of Graphics class with example i) drawRect( ) ii) drawOval( )	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	Explain the fundamental components of a window in a graphical user interface	**10**	**L2**	**CO5**
	b.	Explain how to create and display a Frame window in Java AWT. Provide a sample program to demonstrate this.	**10**	**L2**	**CO5**

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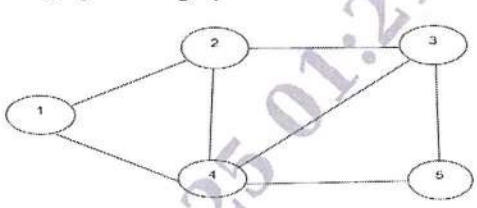
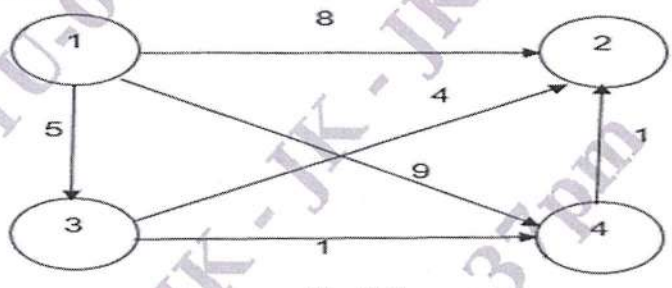
MMC203

Second Semester MCA Degree Examination, June/July 2025
Data Structure & Algorithms

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain data structures and its classification with a neat diagram.	6	L2	CO1
	b.	Write functions in C to demonstrate the following operations on a singly linked list: 1. Insert an element from front 2. Insert a node at end 3. Display all the elements	8	L4	CO2
	c.	Show that : If $t1(n) \in O(g1(n))$ and $t2(n) \in O(g2(n))$ then $t1(n)+t2(n) \in O(\max(g1(n),g2(n)))$	6	L4	CO2
		OR			
Q.2	a.	Explain Asymptotic notations with examples.	6	L2	CO1
	b.	Write C functions to insert and delete an element in an array.	8	L4	CO2
	c.	Explain abstract data types with examples.	6	L2	CO1
		Module – 2			
Q.3	a.	What is a Stack? Write functions in C to implement push and pop operations in a Stack.	6	L4	CO2
	b.	Write a program to implement tower of Hanoi using recursion and trace the output for 3 disks.	8	L4	CO2
	c.	What is a Queue? Write a C program to implement queue of integers using arrays.	6	L4	CO2
		OR			
Q.4	a.	What is a Circular Queue? Write functions in C to implement Insert and delete operations in a Circular Queue.	6	L4	CO2
	b.	Evaluate the following postfix expression: 6 8 3 * + 5 4 2 / + * by showing the contents of stack.	8	L4	CO2
	c.	Write the General Plan for Analyzing the Time Efficiency of Recursive Algorithms.	6	L4	CO2
		Module – 3			
Q.5	a.	What is a binary Tree? Write a note on array and linked list representation of a binary tree.	6	L4	CO2

	b.	Construct a Binary Search Tree for the following numbers and traverse in Preorder, Inorder and Post order. 14, 15,4,9,7,18,3,5,16,20,17.	8	L4	CO2
	c.	What is a graph? Give the adjacency list and adjacency matrix representation of the graph in Fig Q5c.  Fig Q5c	6	L4	CO2
		OR			
Q.6	a.	What is an AVL tree? Explain the different rotations of an AVL tree with an example.	6	L4	CO2
	b.	Apply dijkastras algorithm to find single source shortest path assuming 1 as the source vertex.  Fig Q6b	8	L4	CO2
	c.	Explain BFS and DFS traversal of a graph. List the differences between them.	6	L4	CO2
		Module – 4			
Q.7	a.	Write a C program to implement bubble sort. Obtain its time complexity.	6	L2	CO4
	b.	Implement the hash function h(k)= k%11 on the numbers 25,46,10,36,18,29 and 43. Show the hash table. Resolve the clashes using linear probing.	8	L2	CO3
	c.	Write an algorithm for insertion sort. Sort the following numbers using insertion sort. 35,10,15,45,25,20 and 40. Obtain its time complexity.	6	L2	CO4
		OR			
Q.8	a.	Sort the following numbers using radix sort and show the table of various passes of radix sort. 338,249,112,589,699,478,728,246,532.	6	L2	CO3
	b.	Write a C program to implement linear search. Obtain Best case, Worst case and Average case efficiency.	8	L2	CO3
	c.	What is hash Collision? Explain linear probing and separate chaining methods.	6	L2	CO3

		Module – 5			
Q. 9	a.	Write Short notes on i) Greedy Technique ii) Divide and Conquer	10	L4	CO5
	b.	What is a heap? Explain the construction of max heap by taking the following numbers : 13, 86, 43, 38, 54, 23, 8, 63 using bottom-up approach.	10	L4	CO5
		OR			
Q.10	a.	Write Short notes on: i) Dynamic Programming ii) Trie	10	L4	CO5
	b.	Explain Segment and Fenwick tree with an example.	10	L4	CO5

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MMC204

Second Semester MCA Degree Examination, June/July 2025
Software Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the need and importance of software engineering in modern systems development.	10	L2	C1
	b.	Discuss the various attributes of software quality. Why are they essential for successful software delivery?	10	L2	C1
		OR			
Q.2	a.	Explain specialized process models such as Component-Based Development and Concurrent Model.	10	L2	C2
	b.	Describe the advantages and challenges of adopting agile methodology.	5	L2	C2
	c.	Explain the differences between Scrum and Extreme Programming.	5	L2	C1
		Module – 2			
Q.3	a.	Explain the need for requirement analysis and specification in software development.	10	L3	C1
	b.	Describe the process of requirements gathering and analysis.	10	L3	C2
		OR			
Q.4	a.	Define formal system specification and discuss its advantages	5	L2	C1
	b.	How are FSMs used in software modeling and system design?	5	L2	C2
	c.	What are CASE tools? Describe their types and applications.	10	L2	C1
		Module – 3			
Q.5	a.	Explain the importance of software design in the software development life cycle. Describe the various activities involved in the design process.	10	L3	C2
	b.	Describe the Model-View-Controller (MVC) design pattern. How does MVC promote separation of concerns?	10	L3	C3
		OR			
Q.6	a.	Describe the Client-Server architecture. Discuss how it is different from a Tiered architecture.	10	L3	C4
	b.	Discuss the challenges in designing user interfaces. How can UI design impact user experience?	10	L3	C4

		Module – 4			
Q.7	a.	Describe various black box testing techniques. How are equivalence partitioning and boundary value analysis used in black box testing?	10	L3	C3
	b.	Explain the difference between integration testing and system testing with real-world examples.	10	L2	C2
		OR			
Q.8	a.	Describe the challenges of regression testing in large software projects. How can automated tools help?	10	L3	C2
	b.	Discuss common debugging techniques and tools used by software developers.	10	L3	C3
		Module – 5			
Q.9	a.	Explain the importance of Software Project Management in the development life cycle of a software product. Discuss the key responsibilities of a project manager.	10	L2	C2
	b.	Discuss the Critical Path Method (CPM) and its significance in determining the project duration and key tasks.	10	L3	C3
		OR			
Q.10	a.	Discuss the role of the cloud as a platform in implementing DevOps. How does it enhance scalability, availability, and automation?	10	L3	C3
	b.	Present a case study that demonstrates the challenges faced in project scheduling and how those challenges were addressed using software project management principles.	10	L3	C3

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MMC205

Second Semester MCA Degree Examination, June/July 2025
Web Application Development

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain the concept of client-server architecture with an example.	6	L2	CO1
	b.	Differentiate between front-end and back-end development.	4	L2	CO1
	c.	List any five HTML5 elements and explain their purpose.	5	L2	CO1
	d.	Explain how to embed an audio file in a web page using HTML5.	5	L2	CO1
		OR			
Q.2	a.	Explain the use of the `<canvas>` element in HTML5. How is it different from SVG? Illustrate with examples.	10	L2	CO1
	b.	List any three HTML5 APIs and explain their functionality briefly.	10	L2	CO1
		Module – 2			
Q.3	a.	What are CSS3 properties? List any five properties with their use. answer	7	L2	CO2
	b.	What is responsive web design? Why is it important?	6	L2	CO2
	c.	Write a CSS rule to change the background color of all `<h1>` elements to blue. Explain the selector and property used.	7	L3	CO2
		OR			
Q.4	a.	What is Bootstrap? Mention two benefits of using it in web development.	4	L2	CO2
	b.	Describe how you would implement a mobile-first design using CSS.	6	L2	CO2
	c.	Show the effect **of** flexible images with an example HTML and CSS code snippet.	5	L2	CO2
	d.	Write a CSS snippet using class selectors and apply it to an HTML element.	5	L3	CO2
		Module – 3			
Q.5	a.	Write a JavaScript program to find the largest of three numbers using `if-else` and explain the logic.	10	L3	CO3
	b.	Describe various JavaScript operators with at least two examples for each type.	10	L2	CO3
		OR			
Q.6	a.	What is the Document Object Model (DOM)? Explain its structure and purpose.	10	L2	CO3
	b.	What is AJAX? Explain how it helps in loading data without reloading the page.	10	L3	CO3
		Module – 4			
Q.7	a.	List any three popular front-end frameworks and describe their key features.	6	L2	CO4
	b.	Explain the concept of scope in AngularJS with a simple example.	7	L3	CO4
	c.	What are AngularJS expressions? How are they different from JavaScript expressions?	7	L2	CO4
		OR			
Q.8	a.	Compare React, Angular, and Vue based on their structure and features.	8	L2	CO4
	b.	List the steps to create a simple AngularJS application.	5	L3	CO4
	c.	Compare Angular and React in terms of architecture and usage.	7	L2	CO4

		Module – 5			
Q.9	a.	Differentiate between SQL and NoSQL databases with examples.	7	L2	CO5
	b.	Mention any two server-side languages and list the advantages of each.	7	L2	CO5
	c.	Define authentication and authorization in web applications.	6	L3	CO5
		OR			
Q.10	a.	Describe the concept of full-stack development with a real-time example.	10	L3	CO5
	b.	How would you deploy a web application on a cloud hosting platform?	10	L3	CO5

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