AJ Institute of Engineering and Technology Mangaluru.

VTU Question Papers

BE-CSE, ISE & Allied Branches

[CSE-AIML, CSE-ICB, AIDS]

III to VIII Semester

Make-UP Exam

2022 SCHEME

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CBCS SCHEME - Make-Up Exam

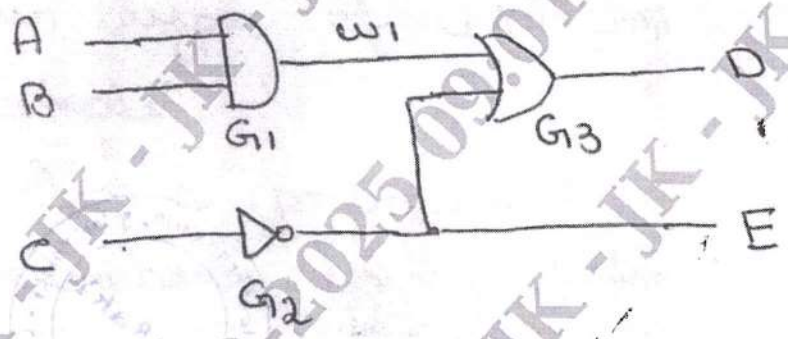
USN | | | | | | | | | | |

BCS302

Third Semester B.E/B.Tech. Degree Examination, June/July 2025
Digital Design and Computer Organization

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
1	a.	Apply the basic theorems and postulates of Boolean algebra to simplify the following expression to minimum number of literals and draw the original and simplified expressions with logic diagram. i) $xy + x^1z + yz$ ii) $x + x^1y$	10	L3	CO1
	b.	Apply k – map Technique to simplify the function F (w, x, y, z) = $\sum$ (1, 3, 7, 11, 15) and d (w, x, y, z) = $\sum$ (0, 2, 5) and also implement the simplified function with NAND gate.	10	L3	CO1
		OR			
2	a.	Describe Map Method for three variables.	7	L2	CO1
	b.	Explain Positive and Negative logic and prove that positive AND is equal to negative OR.	7	L2	CO1
	c.	Develop a verilog gate –level description of the circuit shown in Fig. Q. 2 (c)  Fig. Q. 2(c)	6	L3	CO1
		Module – 2			
3	a.	Design a combinational circuit that converts a four – bit BCD code to Excess 3 code.	10	L2	CO3
	b.	Design 3 to 8 decoder. Also implement full adder using 3 to 8 decoder.	10	L3	CO2
		OR			
4	a.	Describe 4 × 1 mox with block diagram and truth table. Also develop a behavioral model verilog code for 4 × 1 mux.	10	L3	CO2
	b.	What is flip flop? Explain positive edge triggered D type of flip flop.	10	L2	CO2
		Module – 3			
5	a.	With a neat block diagram explain the functional units of computer.	10	L2	CO3
	b.	Explain the Basic Instruction types with examples.	10	L2	CO3

		OR			
6	a.	Define addressing mode. Explain any four types of addressing modes with example.	10	L2	CO3
	b.	Develop a program to add list of N numbers using auto increment addressing mode and develop the program for the concept of branching with relevant memory diagram for both data and program.	10	L3	CO3
		Module – 4			
7	a.	With a neat diagram explain the concept of accessing I/O devices.	10	L2	CO4
	b.	What is bus arbitration? Explain centralized and distributed arbitration method with a neat diagram.	10	L2	CO4
		OR			
8	a.	With neat sketches, explain various method for handling multiple interrupt requests raised by multiple devices.	10	L2	CO4
	b.	What is cache memory? Explain any two mapping functions of cache memory.	10	L2	CO4
		Module – 5			
9	a.	Draw the single bus architecture and write the control sequence for execution of instruction ADD (R_3) , R_1	10	L3	CO5
	b.	With a suitable diagram explain the concept of register transfer and fetching of word from memory.	10	L2	CO5
		OR			
10	a.	With a neat diagram explain the flow of 4 – stage pipeline operation.	10	L2	CO5
	b.	Explain the role of cache memory and pipeline performance.	10	L2	CO5

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CBCS SCHEME - Make-Up Exam

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BCS303

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Operating Systems

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.	With neat diagram, Explain abstract view of the components of a computer system.	6	L3	CO1
	b.	With neat diagram, explain virtual, non virtual and VM ware architecture.	8	L3	CO1
	c.	Explain with neat diagram Dual-Mode operation.	6	L3	CO1
		OR			
Q.2	a.	Explain types of system calls provided by operating system.	6	L3	CO1
	b.	Explain with neat diagram simple structure of MS-DOS layer structure and unix system structure.	8	L3	CO1
	c.	Explain operating-system services.	6	L3	CO1
		Module – 2			
Q.3	a.	Explain process state with diagram.	5	L2	CO2
	b.	What do you mean by interprocess communication? Explain two model of interprocess communication.	9	L2	CO2
	c.	What are three types of multithreading models? Explain.	6	L2	CO2
		OR			
Q.4	a.	What do you mean by thread libraries? Discuss threading issues.	5	L2	CO2
	b.	Consider the following set of four process with length of CPU burst given in MS: Process | Burst time P_1 | 24 P_2 | 3 P_3 | 3 Compute the waiting time and average turn around time for the above process using FCFS scheduling algorithm.	10	L2	CO2
	c.	With diagram explain SMT architecture.	5	L2	CO2
		Module – 3			
Q.5	a.	What is critical section problem? Explain Peterson's solution and synchronization hardware solution for critical section problem.	10	L3	CO3
	b.	Write a code for readers-writers process.	6	L3	CO3
	c.	Discuss the structure of philosopher.	4	L3	CO3

OR

Q.6	**a.**	What are the four necessary condition for deadlock occurrence?	**4**	**L3**	**CO3**
	b.	Explain with neat diagram resource-allocation graph for deadlock avoidance.	**6**	**L3**	**CO3**
	c.	Consider the following snapshot of the system: Determine whether the system is safe using Banker's algorithm. If the request for P_1 arrives for (1, 0, 2) can the request be granted immediately.	**10**	**L3**	**CO4**

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	2	4	3	3			

Module – 4

Q.7	**a.**	Explain the following with respect to dynamic storage allocation: i) First fit ii) Best fit iii) Worst fit	**3**	**L3**	**CO4**
	b.	What is Paging? Explain with neat diagram paging hardware and paging model of logical and physical memory.	**10**	**L3**	**CO4**
	c.	With neat diagram, explain segmentation hardware.	**7**	**L3**	**CO4**

OR

Q.8	**a.**	With neat diagram, explain demand paging system.	**6**	**L3**	**CO4**
	b.	Consider the page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with 3 frames. Determine the number of page faults using FiFO, optimal and LRU replacement algorithms. Which algorithm is most efficient?	**9**	**L3**	**CO1**
	c.	Write a note on copy_on_write technique.	**5**	**L3**	**CO1**

Module – 5

Q.9	**a.**	Explain bit vector and linked free-space list on disc.	**6**	**L3**	**CO5** **CO6**
	b.	Explain with neat diagram contiguous allocation and indexed allocation.	**8**	**L3**	**CO5** **CO6**
	c.	With neat diagram single level and two level directory structure.	**6**	**L3**	**CO5** **CO6**

OR

Q.10	**a.**	Discuss network attached storage.	**5**	**L3**	**CO5** **CO6**
	b.	A disk drive has 200 cylinders 0 to 199. Head starts at 53 to serve the request queue: 98, 183, 37, 122, 14, 124, 65, 67. Draw disk head schedule diagram and explain for FCFS, SSTF, C-SCAN and C-LOCK.	**10**	**L3**	**CO5** **CO6**
	c.	Explain the concept of access matrix.	**5**	**L3**	**CO5** **CO6**

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CBCS SCHEME - Make-Up Exam

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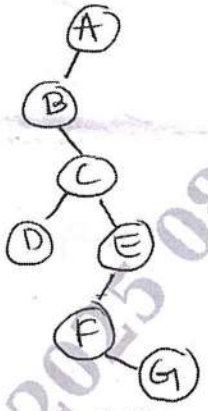
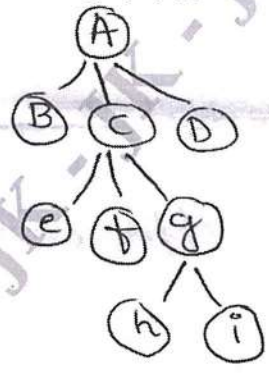
BCS304

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Data Structures and Applications

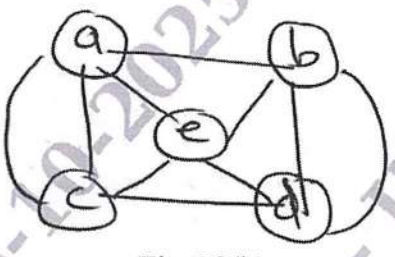
Time: 3 hrs. Max. Marks: 100

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.	Differentiate between static and dynamic memory allocation. Write syntax for malloc( ), calloc( ), realloc( ) and free( ) functions.	08	L2	CO1
	b.	Write KMP pattern matching algorithm and apply the same to search the pattern "abcdabcy" in the text "abcxabcdabxabcdabcdabcy".	08	L3	CO2
	c.	Differentiate between Structure and Union.	04	L1	CO1
		OR			
Q.2	a.	Write a C function to evaluate postfix expression. Evaluate 231 * + 9 – using the same.	08	L2	CO2
	b.	Implement push( ), pop( ) and display operations of stack using array.	08	L2	CO2
	c.	Write a C function to perform transpose of a given sparse matrix.	04	L3	CO1
		Module – 2			
Q.3	a.	Explain the need of Circular Queue. Implement Insert( ), delete( ) and display( ) operations on the circular queue.	10	L3	CO2
	b.	Implement following operations on Single Linked List: (i) Delete a node at the end of SLL. (ii) Insert a node at the beginning of SLL.	10	L3	CO3
		OR			
Q.4	a.	Explain and write a C function to implement Multiple Stack.	10	L3	CO2
	b.	Develop a C function to add two polynomials using Single Linked List.	10	L3	CO3
		Module – 3			
Q.5	a.	Give the diagrammatical representation of below sparse matrix using Linked List. $\begin{bmatrix} 0 & 0 & 7 & 0 \\ 0 & 0 & 0 & 10 \\ 3 & 1 & 0 & 4 \\ 0 & 0 & 0 & 0 \end{bmatrix}$	05	L2	CO3

Q.5	b.	Traverse given tree using Inorder, Preorder and Post order traversal. Also write C functions for Inorder, Preorder and Postorder. [Refer Fig.Q5(b)]  Fig.Q5(b)	08	L3	CO4
	c.	What are the advantages of threaded binary tree over a binary tree? Construct threaded binary tree for the following elements: A,B,C,D,E,F,G,H,I	07	L3	CO4
		OR			
Q.6	a.	Define Double Linked List. Create a C function for the following DLL operations: (i) Inserting a node at front (ii) Deleting a node at end	08	L3	CO3
	b.	Define Tree. Explain the representation of Tree with an example.	06	L2	CO4
	c.	Define the following with example : i) Complete Binary Tree (ii) Height of a Tree (iii) Full Binary Tree	06	L2	CO4
		Module – 4			
Q.7	a.	Write a iterative C function to perform following operations on Binary Search Tree : i) Search a key element ii) Insert a node	10	L3	CO4
	b.	Convert the following forest into Binary Tree and perform inorder, preorder and post order traversal. [Refer Fig.Q7(b)]  Fig.Q7(b)	10	L2	CO4

OR

Q.8	**a.**	Define Selection Tree. Construct first 4 winners from given runs below: 5 9 18 8 90 09 7 8 14 13 19 11 95 17 13 10 24 16 20 15 98 19 14 15	**10**	**L2**	**CO4**
	b.	Design the algorithm to traverse below graph using BFS and DFS technique. Traverse the below graph using BFS from source vertex. [Refer Fig.Q8(b)]  Fig.Q8(b)	**10**	**L3**	**CO4**

Module – 5

Q.9	**a.**	Write a note on Static and Dynamic Hashing.	**06**	**L2**	**CO5**
	b.	Construct the OBST for following items. Let n = 4 (a_1, a_2, a_3, a_4) = (do, if, int, while) Let $(p_1, p_2, p_3, p_4) = (3, 3, 1, 1)$ $(q_0, q_1, q_2, q_3, q_4) = (2, 3, 1, 1, 1)$	**10**	**L3**	**CO5**
	c.	Explain the following with an example : (i) HBLT (ii) WBLT	**04**	**L3**	**CO5**

OR

Q.10	**a.**	Define Collision. Explain the methods to resolve collision. Explain linear probing for the data 12, 13, 15, 16, 74, 75, 83, 42	**08**	**L2**	**CO5**
	b.	Explain Leftist tree with an example.	**08**	**L2**	**CO5**
	c.	Explain different Hash functions.	**04**	**L2**	**CO5**

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CBCS SCHEME - Make-Up Exam

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BCS306A

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Object Oriented Programming with 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.	Outline primitive data types in Java.	5	L1	CO1
	b.	Explain Java type conversion and casting with a code snippet.	5	L2	CO1
	c.	Develop java code to transpose a matrix.	10	L3	CO1
		OR			
Q.2	a.	Summarize Java Operators.	5	L2	CO1
	b.	Explain Java control statements.	5	L2	CO1
	c.	Develop Java code to add two matrices.	10	L3	CO1
		Module – 2			
Q.3	a.	Define class, object, new, constructor and garbage collection in Java.	5	L1	CO2
	b.	Explain the general form of a class in Java and with an example.	5	L2	CO2
	c.	Develop a stack class to hold a maximum of 10 integers with suitable methods. Develop a java main method to illustrate stack operations.	10	L3	CO2
		OR			
Q.4	a.	Define static, final, this keywords and access control in Java.	5	L1	CO2
	b.	Explain Java method overloading with a code snippet.	5	L2	CO2
	c.	Develop a class employee details with attributes ID, name and salary. Implement a method raise salary (percent) which raises salary of an employee for a given percent. Implement a class employee to demonstrate the employee details and his salary increase by the given percent.	10	L3	CO2
		Module – 3			
Q.5	a.	Define method overriding, dynamic method dispatch, abstract class and uses of super in Java.	5	L1	CO3
	b.	Explain with a java code snippet how inheritance can be prevented?	5	L2	CO3
	c.	Develop a Java program to create a class named shape. Create three sub-classes namely : circle, triangle and square, each class has two member functions named draw( ) and erase( ). Demonstrate polymorphism concepts by developing suitable methods, defining member data and main program.	10	L3	CO3

		OR			
Q.6	**a.**	Define interface, interface reference, variables in interfaces, nested interface and multiple inheritance in Java.	**5**	**L1**	**CO3**
	b.	Explain the general form of an interface and implementing interface with an example.	**5**	**L2**	**CO3**
	c.	Develop a Java program to create an interface resizable with methods resize width (int size) and resize height (int height) that allow an object to be resized. Create a class rectangle that implements the resizable interface and implements both resize methods.	**10**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	Define package, access protection, import packages, exception and exception types in Java.	**5**	**L1**	**CO4**
	b.	Summarize class member access in Java.	**5**	**L2**	**CO4**
	c.	Develop a Java program to create a package named my pack and import and implement it in a suitable class.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	Define try, catch, throw, throws and finally keywords in java exception handling.	**5**	**L1**	**CO4**
	b.	Explain the general form of an exception handling block and throws clause in Java exception handling.	**5**	**L2**	**CO4**
	c.	Develop a Java program to raise a custom exception (user defined exception) for division by zero using try, catch, throw and finally.	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Define multi-threaded programming, thread priorities, synchronization, messaging and the main thread in Java.	**5**	**L1**	**CO5**
	b.	Explain the different methods of creating threads in Java.	**5**	**L2**	**CO5**
	c.	Implement Java code to demonstrate auto-boxing and auto-unboxing of type wrappers.	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	Define inter-thread communication, enumeration, type wrappers, auto-boxing and auto-unboxing in Java.	**5**	**L1**	**CO5**
	b.	Explain with syntax values( ) and values of ( ) methods in Java.	**5**	**L2**	**CO5**
	c.	Develop a Java program to illustrate creation of threads using runnable interface (start method start each of the newly created thread. Inside the run method there is sleep( ) method for suspending the thread for 500 mill-seconds).	**10**	**L3**	**CO5**

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CBCS SCHEME - Make-Up Exam

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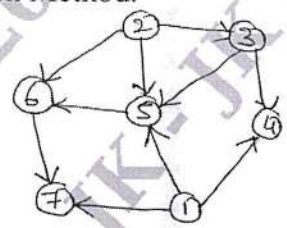
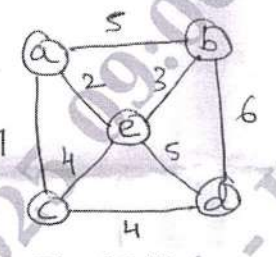
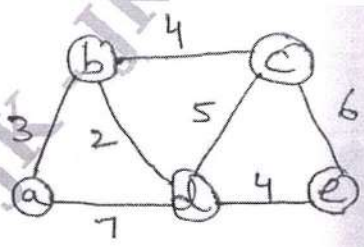
BCS401

Fourth Semester B.E/B.Tech. Degree Examination, June/July 2025
Analysis & Design of 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
1	a.	Explain the algorithm design and analysis process in detail.	10	L2	CO1
	b.	Define Algorithm. Explain the asymptotic notations with example.	10	L2	CO1
		OR			
2	a.	Design an algorithm to search an element in an array using sequential search. Discuss the best-case, worst-case and average-case efficiency of this algorithm.	10	L3	CO1
	b.	Give the general plan for analyzing time efficiency of recursive algorithms and also analyze the tower of Hanoi recursive algorithm.	10	L3	CO1
		Module – 2			
3	a.	Apply quick sort algorithm to sort the list : 5, 3, 1, 9, 8, 2, 4, 7. Draw the tree of recursive calls made while tracing.	10	L3	CO2
	b.	Write Merge Sort Algorithm. Find the efficiency of the algorithm.	10	L2	CO2
		OR			
4	a.	Obtain the topological sort for the graph Fig. Q4 (a) using (i) Source Removal Method. (ii) Depth first Search Method.  Fig. Q4 (a)	10	L3	CO2
	b.	Explain Strassen's Matrix Multiplication. Apply Strassen's matrix multiplication to multiply the following matrices: $\begin{bmatrix}1 & 2\\3 & 4\end{bmatrix} \times \begin{bmatrix}1 & 2\\3 & 4\end{bmatrix}$.	10	L3	CO2

		Module – 3			
5	a.	Define AVL tree with an example. Construct an AVL tree of the list of keys : 5, 6, 8, 3, 2, 4, 7 indicating each step of key insertion and rotation.	**10**	**L3**	**CO3**
	b.	Define Heap. Apply heap sort to sort the list of numbers : 2, 9, 7, 6, 5, 8 in ascending order using array representation.	**10**	**L3**	**CO3**
		OR			
6	a.	Define 2-3 Tree. Construct 2-3 tree for the list of keys : 9, 5, 8, 3, 2, 4, 7 by indicating each step of key insertion and node splits.	**10**	**L3**	**CO3**
	b.	Design Har'spool algorithm for string matching. Apply this algorithm to find the pattern BARBER in the text : JIM_SAW_ME_IN_A_BARBERSHOP	**10**	**L3**	**CO3**
		Module – 4			
7	a.	Apply Floyd's algorithm to find the all pair shortest path for the given adjacency matrix. Fig. Q7 (a). $W = \begin{bmatrix} 0 & 1 & \infty & 1 & 5 \\ 9 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & 0 \end{bmatrix}$ Fig. Q7 (a)	**10**	**L3**	**CO4**
	b.	Write Kruskal's algorithm to find minimum spanning tree. Illustrate with the following graph Fig. Q7 (b).  Fig. Q7 (b)	**10**	**L3**	**CO4**
		OR			
8	a.	Write Dijkstra's algorithm to find single source shortest path. Apply same for the given Fig. Q8 (a), a as the source vertex.  Fig. Q8 (a)	**10**	**L3**	**CO4**

Q. No.		Question	Marks	Level	CO
	b.	Construct a Huffman tree and resulting code word for the following : (see table below) Encode the text DAD. Decode the text 10011011011101.	10	L3	CO4

Symbol	A	B	C	D	-
Frequency	0.35	0.1	0.2	0.2	0.15

Module – 5

Q. No.		Question	Marks	Level	CO
9	a.	Construct a state space tree to solve force queen's problem using backtracking.	10	L3	CO5
	b.	Solve the following instance of the knapsack problem by using branch and bound method. (see table below) Capacity W = 10	10	L3	CO5

Item	1	2	3	4
Weight	4	7	5	3
Value	\$40	\$42	\$25	\$12

Capacity W = 10

OR

Q. No.		Question	Marks	Level	CO
10	a.	Construct a state space tree for subset sum problem using branch and bound for the set S = {3, 5, 6, 7} and d = 15	10	L3	CO5
	b.	Explain the following terms : (i) P – Problems (ii) NP – Problems (iii) NP – Complete Problems (iv) NP – Hard Problems.	10	L2	CO5

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CBCS SCHEME - Make-Up Exam

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BCS402

Fourth Semester B.E/B.Tech. Degree Examination, June/July 2025

Microcontrollers

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			
1	a.	Differentiate between RISC and CISC processors.	4	L2	CO1
	b.	Explain ARM core data flow model with neat diagram.	8	L2	CO1
	c.	Explain different processor modes provided by ARM7.	8	L2	CO1
		OR			
2	a.	Explain the architecture of a typical embedded device based in ARM core, with a neat diagram.	8	L2	CO1
	b.	Explain the various fields in the current program status register with a neat layout.	6	L2	CO1
	c.	What is pipeline in ARM? Explain the different pipeline stages of ARM9 processor.	6	L2	CO1
		Module – 2			
3	a.	Discuss the load-store instruction with respect to, (i) Single Register Transfer (ii) Multiple Register Transfer	8	L2	CO2
	b.	Explain different arithmetic instructions in ARM processor with an example.	8	L2	CO2
	c.	Explain the multiply instructions of ARM processor.	4	L2	CO2
		OR			
4	a.	Write a ALP to find the Sum of first 10 integer numbers.	6	L3	CO2
	b.	Explain the ARM single-Register and Multiple-Register load-store addressing modes with example.	8	L2	CO2
	c.	Explain the different branch instructions of ARM processor.	6	L2	CO2

		Module – 3			
5	a.	Write a program in C for ARM microcontroller to find factorial of a number.	**6**	**L3**	**CO3**
	b.	Explain why we should avoid using char data type for local variables, with suitable example.	**8**	**L3**	**CO3**
	c.	List and explain different portability issues.	**6**	**L2**	**CO3**
		OR			
6	a.	Discuss how registers are allocated to optimize the program.	**6**	**L3**	**CO3**
	b.	Explain the concept of Loop unrolling with suitable example.	**6**	**L3**	**CO3**
	c.	Explain four register rule used in function calls and also explain the benefits of using a structure pointer in code taking a suitable example.	**8**	**L3**	**CO3**
		Module – 4			
7	a.	With a neat diagram, explain ARM processor exceptions and modes.	**10**	**L2**	**CO4**
	b.	Explain assigning interrupts and interrupt latency.	**10**	**L2**	**CO4**
		OR			
8	a.	Briefly explain what happens when an IRQ and FIQ exception is raised, with an ARM processor.	**10**	**L2**	**CO4**
	b.	Explain firmware execution flow and explain Red Hat Red Boot.	**10**	**L2**	**CO4**
		Module – 5			
9	a.	Explain the basic architecture of cache memory.	**10**	**L2**	**CO5**
	b.	Explain how main memory maps to a cache memory.	**5**	**L2**	**CO5**
	c.	Explain the basic operation of a cache controller.	**5**	**L2**	**CO5**
		OR			
10	a.	Briefly explain Cache line replacement policies.	**8**	**L2**	**CO5**
	b.	Explain briefly the allocation policy on a Cache Miss.	**6**	**L2**	**CO5**
	c.	Explain the following : (i) Write Buffers (ii) Measuring Cache efficiency (iii) Write policy	**6**	**L2**	**CO5**

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CBCS SCHEME - Make-Up Exam

USN | | | | | | | | | | |

BCS403

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Database Management Systems

Time: 3 hrs. Max. Marks: 100

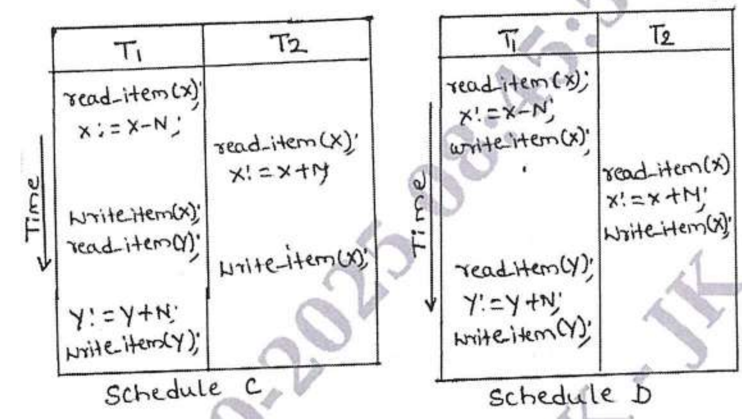
Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define DBMS. Discuss the main characteristics of the database approach and how does it differ from traditional file system.	10	L2	CO1
	b.	Discuss the different types of user-friendly interfaces and the types of users who typically use each.	10	L2	CO1
		OR			
Q.2	a.	Explain three-schema architecture. Why do we need mappings between schema levels?	10	L2	CO1
	b.	Construct an ER diagram for BANK database schema with atleast five entity types. Also specify primary key and structural constructs.	10	L3	CO1
		Module – 2			
Q.3	a.	Explain the characteristics of relations with an example for each.	8	L2	CO1
	b.	Explain entity integrity constraint and referential integrity constraint with an example for each.	8	L2	CO1
	c.	Explain the following unary operations with syntax and example: i) SELECT ii) PROJECT	4	L2	CO1
		OR			
Q.4	a.	Explain ER to relational mapping algorithm with suitable example for each step.	10	L2	CO1
	b.	Consider the following schema: EMP (Fname, Lname, ssn, Dno, Salary) DEPT (Dname, Dnum, Mgr_ssn) D_LOC (Dno, LOC) PROJECT (Pname, Pno, Dno, PLOC) WORKS_ON (Essn, Pno, Hours) Construct the query in relational algebra for the following: i) Display the ssn, firstname and last name of the employee working for department no 5. ii) Retrieve the location of the 'Accounts' department. iii) Select the tuples for all employees who either work in department 4 and make over $25000 per year , or work in department 5 and make over $30000. iv) Retrieve the names of the project controlled by department no 5. v) Retrieve the names of employees working on project no 8.	5	L3	CO1

	c.	Consider the two tables T_1 and T_2 T1 P | Q | R 10 | a | 5 15 | b | 8 25 | a | 6 T2 A | B | C 10 | b | 6 25 | c | 3 10 | b | 5 Identify the results of the following operations: i) $\sigma_{Q=a}(T_1)$ ii) $\pi_{A,C}(T_2)$ iii) $T_1 \bowtie_{T_{1.P}=T_{2.A}} T_2$ iv) $T_1 \bowtie_{T_{1.Q}=T_{2.B}} T_2$ v) $T_1 \cup T_2$.	5	L3	CO1
		Module – 3			
Q.5	a.	Make use of the relation schema in Fig.Q.5(a) to illustrate insertion, deletion and modification anomalies. EMP_DEPT Ename | ssn | Bdate | Address | Dname | Dno | Mgr ssn Fig.Q.5(a)	8	L3	CO4
	b.	Consider the relation schema LOTS which describes parcels of land for sale in various counties of a state. Suppose that there two candidate keys: Property Id and {County_name, Lot}; that is lot numbers are unique only within each county, but property_Id numbers are unique across counties for the entire state. LOTS (Property_Id, county_name, Lot, Area, Price, Tax_rate} The following FDs hold i) FD1 : Property_Id → (County_name, Lot, Area, Price, Tax_rate} ii) FD2 : {County_name, Lot} → {Property_Id, Area, Price, Tax_rate} iii) FD3 : County_name → Tax_rate iv) FD4 : Area → Price Construct a relational schema for this database application that are each in 3NF.	7	L3	CO4
	c.	For the given relation R(A, B, C, D, E) and its instance (Fig.Q.5(c)), check whether the FDs given hold or not. Give reasons i) A → B ii) B → C iii) D → E iv) CD → E v) AB → E R A | B | C | D | E a_1 | b_1 | c_1 | d_1 | e_1 a_1 | b_2 | c_1 | d_1 | e_1 a_2 | b_2 | c_1 | d_2 | e_3 a_2 | b_3 | c_3 | d_2 | e_2 Fig.Q.5(c)	5	L3	CO4

		OR			
Q.6	**a.**	Illustrate the structure of SQL retrieval query with syntax and example.	**8**	**L2**	**CO3**
	b.	Consider the following schema: Student (Usn, Name, Age, Branch) Course (Coursecode, Coursename, Credits) Enroll (Usn, Coursecode) Grade (Usn, Coursecode, Grade) Construct the SQL statements to perform the following operations: i) Creating the tables by specifying the primary key and foreign key constraints. ii) Insert a new student <'24CS001', 'Amith', 19, 'CSE'> iii) Change the credit of the course having coursecode 22CS402 from 2 to 3. iv) Delete a student record from the grade table having USN '22CS010'.	**7**	**L3**	**CO3**
	c.	Illustrate the following SQL commands with syntax and example for each : i) CREATE ii) INSERT iii) DELETE iv) UPDATE v) ALTER	**5**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Illustrate creation of triggers and assertions with syntax and example for each.	**10**	**L2**	**CO3**
	b.	Consider the following schema for a COMPANY database Employee (Fname, Lname, ssn, Address, Superssn, salary Dno) Department (Dname, Dnumber, Mgr_ssn, Mgr_stdt) Departmnent_Locs (Dnumber, Dlocation) Project (Pname, Pnumber, Plocation, Dnum) Works_On (Essn, Pno, Hrs) Dependent (Essn, Dependent_name, Sex, Bdate, Relationship) Construct the SQL query for the following: i) List the names of managers who have atleast one dependent. . ii) Retrieve the list of employees and the projects they are working on, ordered by department and within each department, ordered alphabetically by lastname, firstname. iii) For each project, retrieve the project number, the project name and the number of employees who work on that project. iv) For each project on which more than two employees work, retrieve the project number, the project name, and the number of employees who work on the project. v) For each project, retrieve the project number, the project name, and the numbers of employees from department 4 who work on the project.	**10**	**L3**	**CO3**
		OR			
Q.8	**a.**	Discuss ACID properties. With a neat diagram explain the different states a transaction goes through during its execution.	**10**	**L2**	**CO1**

	b.	Write an algorithm to test conflict serializability of a schedule S. Apply the same to test the serializability of the schedule C and D.	**10**	**L3**	**CO1**



Module – 5

Q.9	**a.**	Illustrate with an algorithm, the shared/exclusive locks.	**10**	**L2**	**CO1**
	b.	Discuss the problems that can occur when concurrent transactions are executed.	**10**	**L2**	**CO1**
		OR			
Q.10	**a.**	Explain the characteristics of NOSQL systems.	**10**	**L2**	**CO6**
	b.	Illustrate MongoDB CRUD operations with an example for each.	**10**	**L2**	**CO6**

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CBCS SCHEME - Make-Up Exam

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BIS402

Fourth Semester B.E/B.Tech. Degree Examination, June/July 2025
Advanced 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
1	a.	What is collection framework? Explain any four methods defined by the collection interface.	8	L1	CO1
	b.	Demonstrate ArrayList class for collection with an example.	6	L2	CO1
	c.	Write the syntax declaration of Queue interface and explain any four methods defined by Queue.	6	L2	CO1
		OR			
2	a.	Explain the constructors of Treeset with example.	6	L1	CO1
	b.	Explain Hashmap with example.	6	L2	CO1
	c.	What is Legacy classes? Explain the different legacy classes with a java program.	8	L2	CO1
		Module – 2			
3	a.	What is string in Java? Explain the different constructors of string class.	8	L2	CO2
	b.	Explain the difference between equals and = = with example.	4	L2	CO2
	c.	Explain the string comparision function with suitable example.	8	L2	CO2
		OR			
4	a.	Explain the following StringBuffer methods with an example : (i) append ( ) (ii) insert ( ) (iii) remove ( ) (iv) replace ( )	8	L2	CO2
	b.	Write a java program to sort names in bubble sort.	6	L3	CO2
	c.	Write a program to remove duplicate characters from a given string and display the resultant string.	6	L3	CO2
		Module – 3			
5	a.	What are the two key swing features? Explain.	4	L2	CO3
	b.	Write a simple swing application contains IFrame and ILabel and explain each line.	10	L2	CO3
	c.	Describe delegation event model. Write a program to demonstrate event handling in a swing.	6	L3	CO3

		OR			
6	a.	Describe the different types of swing buttons.	**10**	**L2**	**CO3**
	b.	What is difference between swing and AWT?	**4**	**L2**	**CO3**
	c.	Write a program to demonstrate a check boxes and Radio Button.	**6**	**L3**	**CO3**
		Module – 4			
7	a.	Explain the Life Cycle of Servlet.	**6**	**L2**	**CO4**
	b.	Write a Servlet program to accept parameter from HTML (username and password) and display.	**8**	**L3**	**CO4**
	c.	Describe the core interfaces that are provided in Jakarta.Servlet.http. package.	**6**	**L2**	**CO4**
		OR			
8	a.	What is JSP? Explain the various types of JSP tags with example.	**6**	**L2**	**CO4**
	b.	Describe the various steps in JDBC with code snippets.	**8**	**L2**	**CO4**
	c.	Explain sessions and cookies in JSP.	**6**	**L2**	**CO4**
		Module – 5			
9	a.	What is JDBC? Explain the different JDBC driver types.	**10**	**L2**	**CO5**
	b.	What is statement object in JDBC? Explain the following statement objects with example : (i) Prepared statement (ii) Callablestatement	**10**	**L2**	**CO5**
		OR			
10	a.	What is Connetion pooling? Explain connection pooling with neat diagrams with code snippets.	**10**	**L2**	**CO5**
	b.	Write a note on : (i) Transaction Processing in JDBC. (ii) Types of Exceptions occurred in JDBC.	**10**	**L2**	**CO5**

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CBCS SCHEME - Make-Up Exam

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BCS501

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Software Engineering and Project Management

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 Software Engineering. Briefly explain the seven broad categories of software application domains.	8	L2	CO1
	b.	Define software process. Explain five generic process framework activities.	6	L2	CO1
	c.	Explain any six principles that focus on software engineering practice as a whole.	6	L2	CO1
		OR			
Q.2	a.	Explain two common evolutionary process model with neat diagrams.	10	L2	CO1
	b.	Explain the different phases of the unified process model.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the seven distinct tasks of requirements engineering process.	10	L2	CO2
	b.	Develop a use case model for Safe Home system by considering home owner as a primary actor.	10	L3	CO2
		OR			
Q.4	a.	Develop an activity diagram for eliciting requirements.	6	L3	CO2
	b.	Explain the different requirement modeling approaches.	10	L2	CO2
	c.	How does analysis clauses manifest themselves as elements of the solution spaces. Mention its different ways.	4	L2	CO2
		Module – 3			
Q.5	a.	Explain the by activities of Xp process with a neat diagram.	10	L2	CO3
	b.	Explain the following agile process models. i) Adaptive Software Development (ASD) ii) Scrum.	10	L2	CO3
		OR			
Q.6	a.	Explain any five principles i) That guide process ii) That guide practice.	10	L2	CO3
	b.	Explain the ten different planning principles.	10	L2	CO3
		Module – 4			
Q.7	a.	Explain the sequence of software development activities recommended by ISO12207 with a neat diagram.	10	L2	CO4
	b.	Make a list of different activities that management involves. Also explain the principal project management processes along with a list of different activities that management involves.	10	L2	CO4

		OR			
Q.8	**a.**	Explain the traditional versus modern project management practices.	**10**	**L2**	**CO4**
	b.	Explain the different aspects of evaluation of individual projects.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the following software quality models. i) Garvin's quality dimensions ii) McCall's Model.	**10**	**L2**	**CO5**
	b.	Explain the place of software quality step wise frame work in project planning.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Write a short note on : i) Software siting Approaches ii) Problem based estimation.	**10**	**L2**	**CO5**
	b.	Write a short note on : i) Dromey's Model ii) Boehm's Model.	**10**	**L2**	**CO5**

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CBCS SCHEME - Make-Up Exam

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BCS502

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Computer Networks

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 different data flow (simplex, half-duplex, and full-duplex) modes with suitable examples.	10	L4	CO1
	b.	With a neat diagram explain functionalities of TCP/IP reference model architecture.	10	L2	CO1
		OR			
Q.2	a.	Briefly explain types of Guided Media (Twisted pair, Coaxial cable, and Fiber optics) with suitable applications.	10	L2	CO1
	b.	Explain datagram networks with suitable diagrams.	10	L2	CO1
		Module – 2			
Q.3	a.	What are the types of errors, explain Hamming distance and minimum hamming with suitable examples.	10	L2	CO2
	b.	Define linear block coding and CRC algorithm with suitable examples.	10	L2	CO2
		OR			
Q.4	a.	Example HDLC protocol with suitable diagrams.	10	L2	CO2
	b.	Explain flow diagram for the CSMA/CD protocol.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain virtual-circuit packet switched network with suitable diagram.	10	L2	CO3
	b.	Explain DHCP message format and option format with suitable diagrams.	10	L2	CO3
		OR			
Q.6	a.	Describe open-loop congestion control (prevention) and closed-loop congestion control (removal) in detail.	10	L2	CO3
	b.	Explain message format of RIP and its performance.	10	L2	CO3
		Module – 4			
Q.7	a.	Discuss difference between Go-Back-N and selective repeat protocols.	10	L2	CO4
	b.	Explain TCP three - way Handshaking process with suitable diagram.	10	L2	CO4
		OR			
Q.8	a.	Explain TCP segment format with suitable diagrams.	10	L2	CO4
	b.	Explain congestion avoidance additive increase with suitable diagram.	10	L2	CO4
		Module – 5			
Q.9	a.	Explain types of network application architectures with a suitable diagrams.	10	L2	CO5
	b.	Explain HTTP protocol formats of the request and response messages.	10	L2	CO5
		OR			
Q.10	a.	Write short notes on cookies.	10	L2	CO5
	b.	Explain components of SSH and its packet format with suitable diagram.	10	L2	CO5

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CBCS SCHEME - Make-Up Exam

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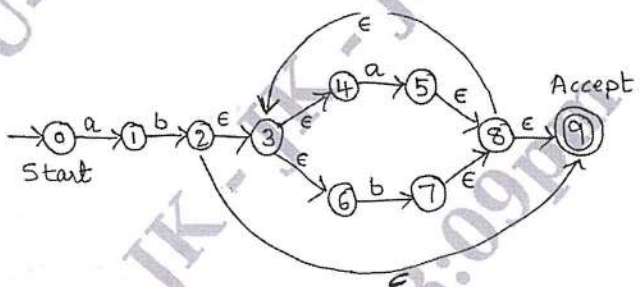
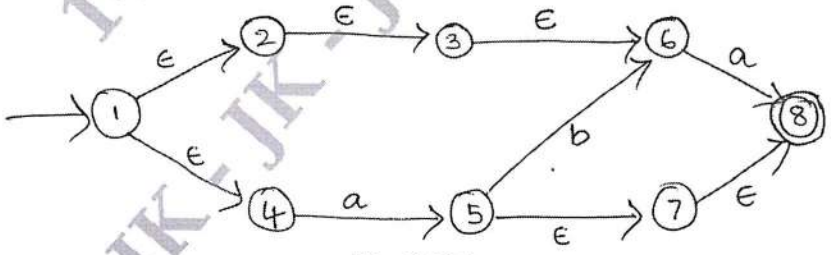
BCS503

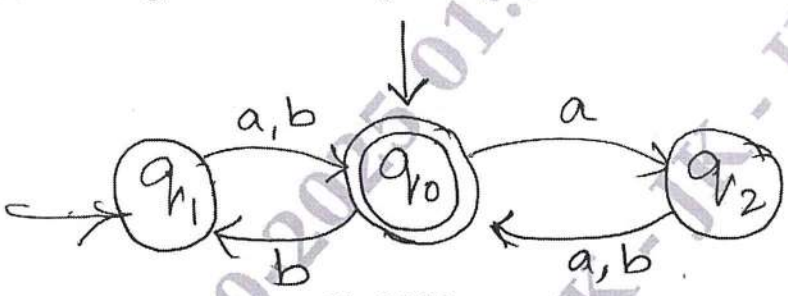
Fifth Semester B.E/B.Tech. Degree Examination, June/July 2025
Theory of Computation

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
1	a.	With a neat diagram, explain a hierarchy of language in automata theory.	5	L2	CO1
	b.	Draw a DFA to accept string of a's and b's ending with ab or ba. Write a transition table for the same.	5	L3	CO1
	c.	Convert the following $\in$– NFA to it's equivalent DFA.  Fig.Q1(c)	10	L3	CO1
		OR			
2	a.	Draw a DFA to accept the languages : i) $L=\{w : n_a(w) \geq 1, n_b(w)=2\}, \Sigma=\{a,b\}$ ii) $L=\{w : \lvert w \rvert \bmod 5 \neq 0\}$ on $\Sigma=\{a,b\}$ iii) $L=\{a^p b^q c^r / p \geq o, q > o, r \geq o\}$ on $\Sigma=\{a,b,c\}$.	12	L3	CO1
	b.	Write differences between DFA, NFA and $\in$ – NFA.	4	L2	CO1
	c.	Compute $\in$ – CLOSURE of each state for the following transition diagram.  Fig.Q2(c)	4	L1	CO1

Module – 2

3	a.	Write regular expression for the following languages : i) $L=\{a^n b^m / n \geq 0, m \geq o, m+n \text{ is even}\}$ ii) $L=\{a^n b^m / n \geq 1, m > 0, nm \geq 3\}$ iii) $L=\{a^n b^m / n \geq 4, m \leq 3\}$.	9	L3	CO1
	b.	Convert the following automata to a regular expression.  Fig.Q3(b)	3	L2	CO2
	c.	Show that $L=\{a^n b^n / n \geq 0\}$ is not regular.	8	L2	CO2

OR

4	a.	Show that regular languages are closed under complementation and intersection.	6	L2	CO2
	b.	Minimize the following DFA and draw the transition diagram of minimized DFA. | δ | a | b | |---|---|---| | →A | B | F | | B | G | C | | * C | A | C | | D | C | G | | E | H | F | | F | C | G | | G | G | E | | H | G | C |	8	L3	CO1
	c.	Define Regular Expressions. What are it's applications?	6	L2	CO2

Module – 3

5	a.	Write a grammar for the following languages. i) $L=\{w / n_a(w)=n_b(w)\}$ ii) $L=\{0^i 1^j / i \neq j, i \geq 0, j \geq 0\}$ iii) $L=\{a^{n+2} b^m / n \geq 0, m > n\}$ iv) $L=\{0^m 1^m 2^n / m \geq 1, n \geq 0\}$.	12	L2	CO2
	b.	What is ambiguous grammar? Show that the following grammar is ambiguous. $E \rightarrow E + E / E * E / id$	8	L1	CO2

		OR			
6	a.	Explain the following terms : i) Pushdown automata (PDA) ii) Languages of PDA iii) Instantaneous description of a PDA.	**6**	**L1**	**CO2**
	b.	Obtain a PDA to accept $L=\{a^n b^n / n \geq 0\}$, Draw the transition diagram for the constructed PDA.	**8**	**L3**	**CO3**
	c.	What is the difference between deterministic and non-deterministic pushdown automata? Explain with an example.	**6**	**L1**	**CO3**
		Module – 4			
7	a.	Consider the grammar S→ OA / 1B A→OAA /1S /1 B→1BB /OS/O Obtain the grammar in CNF.	**10**	**L3**	**CO3**
	b.	Show that $L=\{a^n b^n c^n / n \geq 0\}$ is not context free.	**10**	**L2**	**CO3**
		OR			
8	a.	State and prove pumping lemma for context free languages.	**10**	**L2**	**CO3**
	b.	Prove that CFL are not closed under complementation and intersection.	**10**	**L2**	**CO3**
		Module – 5			
9	a.	Design a Turing Machine to accept the following languages. $L=\{0^n 1^n 2^n / n \geq 1\}$.	**10**	**L3**	**CO3**
	b.	Write a short notes on i) Multi – tape Turing Machine ii) Non- deterministic TM.	**10**	**L1**	**CO4**
		OR			
10		Write a short notes on i) Post correspondence Problem ii) Halting Problem of TM iii) Recursively enumerable language iv) Linear Bounded Automata.	**20**	**L1**	**CO4**

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CBCS SCHEME - Make-Up Exam

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BCS515B

Fifth Semester B.E./B.Tech. Degree Examination, June/July 2025
Artificial Intelligence

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 term Artificial Intelligence. Describe the four categories of artificial intelligence.	10	L1	CO2
	b.	For each of the following agents, develop a PEAS description of the task environment. i) Robot soccer player ii) Internet book–shopping agent iii) Autonomous mars rover.	10	L1	CO2
		OR			
Q.2	a.	Explain the agents interact with environments through sensors and actuators with an example.	10	L2	CO1
	b.	For each of the following agents, characteristics the environment according to the properties. i. Robot soccer player ii. Internet book–shopping agent iii. Autonomous mars rover.	10	L3	CO1
		Module – 2			
Q.3	a.	Illustrate the components of well-defined problems by formulating "Vacuum world" toy problem.	10	L2	CO2
	b.	Compare/Tabulate the uninformed search strategies such as breadth first, uniform cost, depth first and depth limited in terms of complete, time, space and optimal criteria.	10	L2	CO
		OR			
Q.4	a.	Explain simple-problem-solving-agent with an algorithm. Also state the assumptions done in the process of agent design.	10	L2	CO2
	b.	Discuss Breadth-First Search (BFS) strategy and choose evaluation criteria, describe the BFS.	10	L3	CO3

Module – 3

Q.5	**a.**	The road map and heuristic values are given n the Fig.Q5(a).	**12**	**L3**	**CO2**

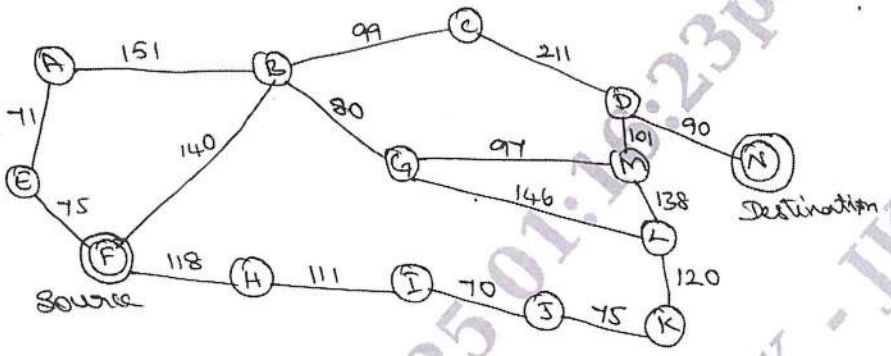

Fig.Q5(a)

Values of h(heuristic)

A	366	B	253
C	176	D	0
E	374	F	366
G	193	H	329
I	244	J	241
K	242	L	160
M	100	N	77

Explain A* search and show the stages (atleast 5 to 6 stages).

	b.	Describe explain the knowledge-based agent.	**8**	**L3**	**CO3**

OR

Q.6	**a.**	Explain Wumpus World with PEAS description.	**5**	**L2**	**CO3**
	b.	Illustrate the BNF grammar of sentences in proposition logics, along with operator precedences, form highest to lowest.	**10**	**L2**	**CO3**
	c.	Explain reasoning patterns in propositional logic.	**5**	**L2**	**CO3**

Module – 4

Q.7	**a.**	List and explain the steps involved in knowledge engineering process in first order logic.	**10**	**L2**	**CO4**
	b.	Write the syntax of first–order logic in BNF and explain it.	**10**	**L2**	**CO4**

OR

Q.8	**a.**	Write the unification algorithm and explain it.	**10**	**L2**	**CO4**
	b.	Define the following terms with respect to first order predicate logic and given example each. i) Term ii) Atomic sentences iii) Universal and existential quantifier iv) Nested quantifier v) Equality.	**10**	**L2**	**CO4**

Module – 5					
Q.9	**a.**	Write and explain backward chaining algorithm.	**8**	**L2**	**CO5**
	b.	What is Conjunctive Normal Form (CNF) write the CNF for the problem given below : i) Everyone who loves all animals is loved by someone ii) Anyone who kills an animal is loved by no one iii) Either Jack or curiosity killed the cats who is named Tuna iv) Did curiosity kill the cat?	**12**	**L3**	**CO5**
OR					
Q.10	**a.**	Explain in detail the planning as a state space search.	**10**	**L2**	**CO5**
	b.	Describe the process of planning graph for heuristic estimation. Write GRAPHPLAN algorithm.	**10**	**L2**	**CO5**

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CBCS SCHEME - Make-Up Exam

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Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Cloud Computing

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.	Discuss the evolution and applications of high performance and high throughput system.	10	L2	CO1
	b.	Explain multithreading technology with respect to five micro architecture in modern CPU processors.	10	L2	CO1
		OR			
Q.2	a.	Discuss the fundamental components and working principles of modern multicover processor with a neat diagram.	10	L2	CO1
	b.	Compare different virtual machine architecture : Native VM, hosted VM and dual mode VM with physical machine model also discuss VM primitive operations.	10	L2	CO1
		Module – 2			
Q.3	a.	Define Virtualization. Explain five obstruction levels of virtualization with a neat diagram.	10	L2	CO2
	b.	Define Hypervisor. With a neat diagram, explain Xen architecture.	10	L2	CO2
		OR			
Q.4	a.	Explain in detail Virtualization in multicover processors with a neat diagram.	10	L2	CO2
	b.	Define Live Migration. Explain live migration steps and performance effects.	10	L2	CO2
		Module – 3			
Q.5	a.	Discuss Public, Private and Hybrid clouds. Explain the classification of cloud based on the types of services offered.	10	L2	CO3
	b.	With a neat diagram, explain generic cloud architecture.	10	L2	CO3
		OR			
Q.6	a.	Explain different types of architectural design challenges.	10	L2	CO3
	b.	With a neat diagram, explain any two public cloud platforms.	10	L2	CO3

		Module – 4			
Q.7	**a.**	Discuss Top Security Concerns and Security risks faced by cloud users.	**10**	**L2**	**CO4**
	b.	Explain different types of cloud data encryption method.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	With a neat diagram, explain virtual security services provided by hypervisor.	**10**	**L2**	**CO4**
	b.	With a neat diagram, explain the corresponding security measures taken at each cloud service models.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Summarize different features of cloud and grid platforms.	**10**	**L2**	**CO5**
	b.	With a neat diagram, explain map reduce framework and overall structure of map reduce program.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Design a program using map reduce functions to count number of occurrences of each word in a sentence i) Most-people ignore most poetry ii) Most poetry ignores most people	**10**	**L3**	**CO5**
	b.	With a neat diagram, explain the architecture and data mutation sequence in Google File System (GFS).	**10**	**L2**	**CO5**

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BCS/BIS602

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Machine Learning

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.	Illustrate the knowledge pyramid and distinguish between the terms: Data, Information, Knowledge and Intelligence.	10	L2	CO1
	b.	Discuss descriptive statistics with the explanation of fundamental concepts of data types. List the types of data based on variables.	10	L2	CO1
		OR			
Q.2	a.	Why is machine learning needed for business organization? List out and explain the types of machine learning.	10	L2	CO1
	b.	Define Central Tendency. What are the measures of central endencies? Why are central tendency and dispersion measures important for data miners?	10	L2	CO1
		Module – 2			
Q.3	a.	Discuss the raw operation required to facilitate the application of Gaussian Elimination method. Solve the following set of equations using Gaussian Elimination method: $2x_1 + 4x_2 = 6$ $4x_1 + 3x_2 = 7$	10	L3	CO2
	b.	Consider the training dataset of 4 instances shown in following Table -1 . It contains the details of the performance of students and their likelihood of getting a job offer or not in the final semester. Apply the Find- s Algorithm to generate the final hypothesis.	10	L3	CO2
		OR			
Q.4	a.	Consider the same set of instances from the training dataset shown in Table -1 and generate version space as consistent hypothesis.	10	L3	CO2
	b.	What are the four basic steps in the Machine Learning Process? Discuss Model performance and Model complexity in Model selection. List out some of the approaches used for selecting a Machine Learning Model.	10	L2	CO2

Table : 1

CGPA	Interaction	Knowledge	Skill	Thinking	Interest	Job Offer
≥9	Yes	Excellent	Good	Fast	Yes	Yes
≥9	Yes	Good	Good	Fast	Yes	Yes
≥8	No	Good	Good	Fast	No	No
≥9	Yes	Good	Good	Slow	No	Yes

Module – 3

Q.5	**a.**	Consider the student performance training dataset of 8 instances shown in Table – 2 which describes the performance of individual students in a course and their CGPA obtained in the previous semester. Independent attributes are – CGPA, Assessment and Project, Target variable is 'Result' that takes two values 'pass' of Fail'. Based on the performance of a student, classify whether a student (6.1, 40, 5) will pass or Fail. Assign K = 3	**10**	**L3**	**CO3**

Table : 2

Sl.NO.	CGPA	Assessment	Project	Result
1	9.2	85	8	Pass
2	8	80	7	Pass
3	8.5	81	8	Pass
4	6	45	5	Fail
5	6.5	50	4	Fail
6	8.2	72	7	Pass
7	5.8	38	5	Fail
8	8.9	91	9	Pass

	b.	List and explain various types of regression methods. What are the limitation of regression methods?	**10**	**L2**	**CO3**
		OR			
Q.6	**a.**	Consider the same training data set given in Table -2. Use weighted K-NN and determine the class of Test Instance (7.6, 60,8), Assign k = 3.	**10**	**L3**	**CO3**
	b.	How does the structure of a decision tree help in classifying a data instance? Discuss the advantages and disadvantages of decision tree.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Compare biological neuron and artificial neuron. Illustrate Mc Culloch and Pitts mathematical model of an artificial neuron.	**10**	**L2**	**CO3**
	b.	What is meant by Probabilistic based learning? Explain Maximum A Posteriori (MAP) h_{MAP} and Maximum likelihood (ML), h_{ML}.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Define activation function. List some of the linear and non linear activation function and explain any two.	**10**	**L2**	**CO4**
	b.	Illustrate Artificial Neural Network structure. List and explain types of Artificial Neural Networks.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Define and distinguish between classification and clustering. List out the application and challenges of clustering Algorithms.	**10**	**L2**	**CO5**
	b.	Consider the following set of data given in Table – 3. Cluster it using K – means algorithm with the initial value of object 2 and 5 with the coordinate values (4,6) and (12,4) as initial seeds.	**10**	**L3**	**CO5**

Objects	X-Coordinate	Y- Coordinate
1	2	4
2	4	6
3	6	8
4	10	4
5	12	4

Table - 3

		OR			
Q.10	**a.**	How is reinforced Learning different from supervised and unsupervised Learning methods? What are the components of reinforced Learning? Explain.	**10**	**L2**	**CO5**
	b.	Elucidate Q-Learning algorithm. How Q- Learning is different for SARSA Learning? Explain.	**10**	**L2**	**CO5**

CBCS SCHEME - Make-Up Exam

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BCS613B

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Computer Vision

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 computer vision. Explain how computer vision mimics human perception. Why is it considered challenging in AI?	6	L2	CO1
	b.	Summarize the evolution of computer vision from 1970 to 2020 with focus on key milestones.	8	L2	CO1
	c.	How are computer vision applications utilized in healthcare and autonomous systems?	6	L2	CO1
		OR			
Q.2	a.	Explain the concept of reflectance and shading in the context of image formation. List different models used discuss how they influence surface appearance with reference to BRDF Bidirectional reflectance distribution Funch and Phong shading.	10	L2	CO1
	b.	Differentiate between convolution and correlation in linear filtering. Explain the convolution operation using impulse response function.	10	L2	CO1
		Module – 2			
Q.3	a.	Define the Discrete Fourier Transform (DFT). How does it differ from the continuous Fourier transform?	6	L2	CO2
	b.	What is the difference between linear and non-linear filtering? Also explain the concept of median filtering in the context of non-linear filtering techniques.	6	L2	CO2
	c.	Describe how 2D wavelet decomposition is performed, including the roles of LH, HL and HH components. Illustrate the answer with an explanation of the separable filtering process.	8	L3	CO2
		OR			
Q.4	a.	List and explain different types of 2D parametric transformations used in computer vision. Differentiate between forward warping and inverse warping in image transformation.	10	L2	CO2
	b.	Explain the roles of interpolation and decision in constructing multi resolution representations using pyramids and wavelets. How do these operations differ between Gaussian/Laplacian pyramids and wavelet transforms?	10	L2	CO2

		Module – 3			
Q.5	**a.**	Explain the concept of linear filtering in image processing. Apply a linear filter to 3 × 3 grayscale image using convolution.	**10**	**L3**	**CO3**
	b.	Illustrate the understanding of segmentation by describing how point, line and edge detection techniques are employed to identify local intensity changes in images.	**10**	**L3**	**CO3**
		OR			
Q.6	**a.**	Apply harmonic and contra-harmonic filter under spatial domain filtering techniques to enhance a degraded 3 × 3 image. Also explain how the filters help in noise reduction.	**10**	**L3**	**CO3**
	b.	Explain the principles and steps involved in image segmentation using i) Region growing ii) Region splitting and merging Explain with suitable example.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Describe the key differences between chromatic and achromatic light. Discuss the relevance of this distinction in color image processing.	**10**	**L2**	**CO4**
	b.	Explain the process of converting an image from RGB to HSI color space and vice versa. Discuss the advantages of using HSI color space in image analysis.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Describe the techniques used smoothening and sharpening color images. Support your explanation with appropriate mathematical equations and discuss the impact of these techniques on image quality.	**10**	**L2**	**CO4**
	b.	What is pseudocolor image processing and explain the same.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain morphological operations: i) erosion and dilation	**10**	**L2**	**CO5**
	b.	List and explain any three basic morphological algorithms. Include their purpose and basic working principle.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Describe the concept of chain codes in boundary representation. How are they generated, what are their advantages and limitations?	**10**	**L2**	**CO5**
	b.	Define and explain the concept of pattern vectors and structural patterns in the context of pattern recognition.	**10**	**L2**	**CO5**

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BIS601

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Full Stack 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 different data types in JavaScript with examples. Why is JavaScript called a dynamically typed language? Write a JavaScript program to add two numbers.	10	L3	CO1
	b.	What are functions in JavaScript? Explain different ways to declare functions with examples.	10	L2	CO1
		OR			
Q.2	a.	What are arrays in JavaScript? Explain how to declare access, modify and iterate through arrays with suitable examples. Also, list and explain any four array methods.	10	L2	CO1
	b.	Define objects in JavaScript. List the different way of creating objects in JS. Create a JavaScript object called "Car" with properties brand, model and year. Write JavaScript statements that : i) Accesses the model and year properties and prints them ii) Updates the year property iii) Adds a new property color iv) Delete the brand property	10	L3	CO1
		Module – 2			
Q.3	a.	What is the Document Object Model (DOM) in JavaScript? Explain with suitable the different methods used to select HTML elements.	10	L2	CO1
	b.	Write a JS program to perform the following DOM operations on an unordered list. i) Add a new list items at the end of the list ii) Add a new list item at the beginning of the list Use appropriate DOM methods to create and insert new elements dynamically. Also write the required HTML code to create the unordered list with atleast 4 items.	10	L3	CO2
		OR			
Q.4	a.	What is Event Binding in JavaScript? Differentiate between inline event handling and addEventListener( ) method with examples.	5	L3	CO2
	b.	Write HTML and JS code using addEventlistner( ) to demonstrate handling the two types of events. i) When the button is clicked, display an alert with a message "Button clicked" ii) When the user interacts with the text input field (e.g, clicks or tabs into it) changes its background color)	5	L3	CO2

	c.	Differentiate between directly attaching events listeners to multiple child elements and using event delegation. List the benefits of using event delegation.	10	L3	CO2
		Module – 3			
Q.5	a.	List and briefly explain any 3 properties and 2 methods specific to the <select> element in JavaScript. Also, write JS code to add a new item to a select box and remove an item from it using these methods.	10	L3	CO3
	b.	Describe the components of the MERN stack and explain how they work together to build full stack applications.	5	L2	CO3
	c.	Demonstrate how to create a basic "Hello world" severless web app using MERN stack.	5	L3	CO3
		OR			
Q.6	a.	Illustrate how component composition is used in React to build the UI of the Issue Tracker applications.	10	L3	CO3
	b.	Explain how props and children can be used in React to pass data between components. Illustrate how it is applied in the Issue Tracker example.	10	L3	CO3
		Module – 4			
Q.7	a.	Explain how to add an issue interactively to a list when a button is clicked in a React application.	5	L3	CO4
	b.	Describe the role of this.props in accessing parent methods in child components. Provide an example of how it is used it call a parent method.	10	L2	CO4
	c.	Differentiate between state and props in React.	5	L2	CO4
		OR			
Q.8	a.	Explain HTTP methods and how they correspond to CRUD operations in a REST API. Differentiate between idempotent and safe HTTP methods with examples.	10	L3	CO4
	b.	Explain the role of the request object and response object in express.js. List and describe atleast 5 important properties or methods of each them.	10	L2	CO4
		Module – 5			
Q.9	a.	Demonstrate how to Switch Databases. List database and collections, insert documents (including multiple at once) and query with find( ) and find( ).pretty.	10	L3	CO5
	b.	Explain what a projection is in MongoDB queries. Give an example using find( ) that filters employees with age ≥ 44 and returns only their first name and age.	4	L3	CO5
	c.	Show with shell commands, how to update a single documents field (using $set), perform an upsert and delete a document by its – id.	6	L3	CO5
		OR			
Q.10	a.	Explain how to configure webpack to both transform JSX via Babel and bundle modulus.	10	L2	CO5
	b.	What is ESLint? How can it be configured in a project using the Airbnb rule set? Explain with relevant commands and .eslintrc configuration.	10	L2	CO5

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BIS613D

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Cloud Computing and Security

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 scalable computing over the internet.	10	L2	CO1
	b.	Discuss internet of things and cyber-physical systems.	10	L2	CO1
		OR			
Q.2	a.	Discuss system models for distributed and cloud computing.	10	L2	CO1
	b.	Explain performance, security and energy efficiency.	10	L2	CO1
		Module – 2			
Q.3	a.	Discuss levels of virtualization implementation.	10	L2	CO2
	b.	Discuss full virtualization and para virtualization.	6	L2	CO2
	c.	Explain CPV and memory virtualization.	4	L2	CO2
		OR			
Q.4	a.	Explain virtualization structure/tools and mechanisms.	10	L2	CO2
	b.	Discuss virtualization for data center automation.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain cloud computing and service models with neat diagram.	10	L2	CO3
	b.	Discuss Data Center Networking Structure with neat diagram.	10	L2	CO3
		OR			
Q.6	a.	Explain Data-center construction requirements.	10	L2	CO3
	b.	Explain the following: i) GAE ii) AWS	10	L2	CO3
		Module – 4			
Q.7	a.	Explain cloud security risks and discuss types of attacks in a cloud computing environment.	10	L2	CO4
	b.	Explain privacy impact assessment in cloud computing.	10	L2	CO4

		OR			
Q.8	**a.**	Discuss security risks posed by shared images and management OS.	**10**	**L3**	**CO4**
	b.	Explain data and software protection techniques.	**10**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Explain programming support for Google App Engine.	**10**	**L3**	**CO5**
	b.	Discuss features of cloud and grid.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Discuss parallel computing and programming paradigms.	**10**	**L3**	**CO5**
	b.	Explain programming on Amazon AWS and Microsoft azure.	**10**	**L3**	**CO5**

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