

Enrol. No.

S	R	H	U											
---	---	---	---	--	--	--	--	--	--	--	--	--	--	--

Regn. No.

D	D													
---	---	--	--	--	--	--	--	--	--	--	--	--	--	--

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (Hons.) CSE in AI/DS & ML Semester - IV****Course Name: Data Communication and Computer Networks****Course Code: CS402T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q.1. Attempt all.****(10×2=20)**

a.	What is the function of physical layer in OSI model?	CO1	PO1,PO3
b.	What is the use of two dimensional parity in error detection?	CO2	PO1,PO2
c.	What is the key difference between TCP and UDP?	CO4	PO1,PO2
d.	Explain the role of a modem in data communication.	CO1	PO1,PO3
e.	Briefly explain the concept of error detection in networking.	CO2	PO1,PO2
f.	What is meant by congestion?	CO3	PO1,PO12
g.	What are the five important components of a communication?	CO1	PO1,PO3
h.	Define logical addressing.	CO3	PO1,PO12
i.	What is unicast and multicast?	CO1	PO1,PO3
j.	What is meant by burst error? Give example.	CO2	PO1,PO2

Q.2. Short notes / Short Answer Type (Attempt any five out of Seven)**(5×4=20)**

a.	Discuss link state routing.	CO3	PO1,PO12
b.	Discuss OSI Model.	CO1	PO1,PO3
c.	What is CSMA/CD? What is the need of back-off in CSMA/CD?	CO2	PO1,PO2,PO4
d.	Differentiate between Circuit switching and Packet switching.	CO1	PO1,PO3
e.	What are the advantages and disadvantages of ring topology?	CO1	PO1,PO3
f.	What is the difference between a hub and a switch in networking?	CO3	PO1,PO12
g.	Define Error detection and correction.	CO2	PO1,PO2,PO4

Q.3. Structured Question (Attempt any three out of four)**(3×10=30)**

a.	Explain DES algorithm with an example.	CO5	PO1,PO2,PO5
b.	Explain the CRC error detection technique using generator polynomial $x^4 + x^3 + 1$ and data 11100011.	CO2	PO1,PO2,PO4
c.	Explain any two routing algorithm with flow diagram.	CO3	PO1,PO12
d.	Explain the categories of networks (LAN,MAN,WAN).	CO1	PO1,PO3

Q.4. Long Answer / Essay type (Attempt any two out of three)**(2×15=30)**

a.	Explain about HDLC configurations, Transfer modes and different types of frames.	CO2	PO1,PO2,PO4
b.	Explain the error control and flow control used in transport layer.	CO4	PO1,PO2
c.	Explain the steps involved in selecting the private and public keys using RSA algorithm.	CO5	PO1,PO2,PO5

Enrol. No.

S	R	H	U								
---	---	---	---	--	--	--	--	--	--	--	--

Regn. No.

D	D										
---	---	--	--	--	--	--	--	--	--	--	--

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (CSE) Semester – IV****Course Name: Software Engineering****Course Code: CCS244****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Section (A)****Q. 1. Attempt all questions.****(10 x 2 = 20)**

- a. Distinguish between error and failure.
- b. Explain different levels of software testing.
- c. Discuss ISO 9001 standard.
- d. Differentiate between functional requirement and non-functional requirements.
- e. Explain regression testing.
- f. Explain stress testing.
- g. Explain Activity Network.
- h. Name a few well-established object-oriented software design techniques.
- i. Define Cyclomatic complexity.
- j. Write the procedure to calculate function points metric.

Section (B)**Q. 2. Attempt any 5 questions.****(5 x 7 = 35)**

- a. Distinguish between software verification and software validation. Can one be used in place of the other?
- b. Discuss Code Reviews. Explain Code Inspection and list out some classical programming errors which can be checked during Code Inspections.
- c. Write down the important shortcoming of LOC for use as a software size metric.
- d. Differentiate between function- oriented design and object-oriented design.
- e. Explain basic COCOMO model and also, estimate development effort and development time for organic, Semi-detached, and Embedded types of software development projects.
- f. Discuss about term system testing. Write and explain different kinds of system testing that are usually performed on a large software products.
- g. Explain why the spiral life cycle model is considered to be a meta model.

Section (C)**Attempt any 3 questions.****(03x15 = 45)**

- Q.3.**
 - a. Discuss the term software reverse engineering. Why is it required? 8
 - b. Define risk. Discuss the main steps that would follow to manage risks in software project. 7
- Q.4.**
 - a. Explain software reliability. Compare software vs. hardware reliability. 7
 - b. Explain different levels of SEI Capability Maturity Model (CMM). 8
- Q.5.**
 - a. Discuss SA/SD methodology. 7
 - b. Write the main shortcomings of Data Flow Diagram (DFD) as a tool for performing structured analysis. 8
- Q.6.**
 - a. Explain cohesion with a suitable example. 8
 - b. Categorize and explain different types of coupling that might exist between two modules. 7
- Q.7.** Explain about the following terms:
 - a. Project Monitoring and Control. 8
 - b. Staffing level estimation. 7

Enrol. No.

S	R	H	U												
---	---	---	---	--	--	--	--	--	--	--	--	--	--	--	--

Regn. No.

D	D														
---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (Hons.) CSE in AI/DS & ML Semester - IV****Course Name: Design and Analysis of Algorithms****Course Code: CS403T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q.1. Objectives Type****(Very short/ Short Answer, MCQ, One-liners, Fill in the Blank, True/ False) Attempt all. (10×2=20)**

	CO	PO
a. If an optimal solution can be created for a problem by constructing optimal solutions for its subproblems, the problem possesses _____ property. a) Overlapping subproblems b) Optimal substructure c) Memorization d) Greedy	2	1
b. A greedy algorithm can be used to solve all the dynamic programming problems. a) True b) False	2	1
c. The 0-1 Knapsack problem can be solved using Greedy algorithm. a) True b) False	2	1
d. Which of the following methods can be used to solve the matrix chain multiplication problem? a) Dynamic programming b) Brute force c) Recursion d) Dynamic Programming, Brute force, Recursion	3	1
e. Consider the matrices P, Q and R which are 10 x 20, 20 x 30 and 30 x 40 matrices respectively. What is the minimum number of multiplications required to multiply the three matrices?	3	2
f. Fractional knapsack problem can be solved in time O(n). a) True b) False	2	1
g. In what manner is a state-space tree for a backtracking algorithm constructed?	4	1
h. We can solve any recurrence by using Master's theorem. a) true b) false	1	2
i. _____ is the class of decision problems that can be solved by non-deterministic polynomial algorithms.	5	1
j. Problems that can be solved in polynomial time are known as? a) intractable b) tractable c) decision d) complete	5	1

Q.2. Short notes / Short Answer Type (Attempt any five out of Seven)**(5×4=20)**

a. Define disjoint sets. Explain Union and Find operations performed on disjoint sets.	1	1
b. Explain Matrix Chain Multiplication problem with an example.	3	1
c. Discuss Hamiltonian cycle problem with an example.	2	2
d. Explain Binary Search algorithm. How is it better than Linear Search?	1	1
e. Explain Branch and Bound search. Give an example.	4	2
f. Distinguish between Kruskal's algorithm and Prim's algorithm.	3	1
g. Write a short note on NP-Completeness.	5	2

P.T.O/-

Q.3. Structured Question (Attempt any three out of four)

(3×10=30)

a.	(i) Write a recursive algorithm to generate Fibonacci sequence. (ii) Define recursion. Compare direct vs. indirect recursion.	1	
b.	(i) Explain traveling salesperson problem. (ii) Write short note on lower bound theory.	1	
c.	(i) Sort the following array of 10 elements in increasing order using Merge sort technique- (310, 285, 179, 220, 992, 800, 54, 184, 66, 94) (ii) Evaluate the time complexity of Merge sort.	1	1
d.	(i) Write the general characteristics of Greedy algorithm. (ii) Obtain a set of optimal Huffman codes for the 7- messages ($m_1, m_2, \dots, m_7$) with relative frequencies ($f_1, f_2, \dots, f_7$) = (4, 5, 7, 8, 10, 12, 20). Draw the decode tree for this set of codes.	2	1

Q.4. Long Answer / Essay type (Attempt any two out of three)

(2×15=30)

a.	Given the jobs, their deadlines and associated profits as shown- <table><tr><td>Jobs</td><td>J1</td><td>J2</td><td>J3</td><td>J4</td><td>J5</td><td>J6</td></tr><tr><td>Deadlines</td><td>5</td><td>3</td><td>3</td><td>2</td><td>4</td><td>2</td></tr><tr><td>Profits</td><td>200</td><td>180</td><td>190</td><td>300</td><td>120</td><td>100</td></tr></table> Answer the following questions- (i) Write the optimal schedule that gives maximum profit. (ii) Are all the jobs completed in the optimal schedule? (iii) What is the maximum earned profit?	Jobs	J1	J2	J3	J4	J5	J6	Deadlines	5	3	3	2	4	2	Profits	200	180	190	300	120	100	2	2
Jobs	J1	J2	J3	J4	J5	J6																		
Deadlines	5	3	3	2	4	2																		
Profits	200	180	190	300	120	100																		
b.	Solve the following recurrence relations- (i) $T(n) = 2T\left(\frac{n}{2}\right) + C, T(1) = 1$ (ii) $T(n) = T\left(\frac{n}{3}\right) + C, T(1) = 1$	1	2																					
c.	(i) Explain Cook's theorem. (ii) Write an algorithm of Rabin-Karp used for string matching.	5	1																					

11/6/24

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (Hons.) CSE in AI/DS & ML Semester - IV****Course Name: Operating System****Course Code: CS404T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q. 1. Attempt all questions. All carry equal marks.****(10x2 = 20)**

S.No	Questions	CO	PO
a.	What is meant by Demand Paging	2	1
b.	Define Locality of reference?	1	1
c.	Explain Page Fault?	2	1
d.	What are Swapping?	3	2
e.	What is meant by Memory Compaction	1	2
f.	What is Thrashing?	1	1
g.	Define Starvation in deadlock?	1	1
h.	Define semaphores	2	1
i.	What are the four necessary condition for deadlock?	2	2
j.	Define 'Safe State'	2	1

Q.2. Short notes / Short Answer Type (Attempt any five out of Seven)**(5x4=20)**

S.No	Questions	CO	PO
a.	Name and draw five different process states with proper definition.	1	1
b.	Explain the process state transition diagram used in multiprogramming environment. Describe the fields in a process control block (PCB).	1	1
c.	Distinguish between CPU bounded and I/O bounded processes.	1	1
d.	Why is IPC needed? Name the two fundamental models of IPC	1	1
e.	Name any two differences between logical and physical addresses.	2	1
f.	How message passing is used in IPC	4	3
g.	What is the role of scheduler and dispatcher?	4	1

P.T.O./-

Q.3. Structured Question (Attempt any three out of four)

(3×10=30)

S.No	Questions	CO	PO
a.	Consider the following reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. Assume there are three frames. Apply LRU replacement algorithm to the reference string above. (i) Find out how many page faults are produced. (ii) Illustrate the LRU page replacement algorithm in detail and also two feasible implementations of the LRU algorithm. (iii) Why page fault occur?	1	1
b.	(i) What do you mean by cooperating process? (ii) Explain the concept of virtual memory. (iii) What is multiprocessor system? Give some advantages.	4	2
c.	(i) Explain solution to producer-consumer problem using semaphores. (ii) Explain the difference between long term and short term and medium-term schedulers (iii) Explain three main functions of operating system	5	2
d.	(i) What is CIA? (ii) Define swap-out and swap-in. (iii) List the major difference between thread and process.	3	3

Q.4. Long Answer / Essay type (Attempt any two out of three)

(2×15=30)

S.No	Questions	CO	PO																																																																																											
a.	Consider the following <table border="1"> <thead> <tr> <th></th> <th colspan="4">Allocated</th> <th colspan="4">Max</th> <th colspan="4">Available</th> </tr> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> </tr> </thead> <tbody> <tr> <td>P0</td> <td>0</td> <td>0</td> <td>1</td> <td>2</td> <td>0</td> <td>0</td> <td>1</td> <td>2</td> <td>1</td> <td>5</td> <td>2</td> <td>0</td> </tr> <tr> <td>P1</td> <td>1</td> <td>0</td> <td>0</td> <td>0</td> <td>1</td> <td>7</td> <td>5</td> <td>0</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P2</td> <td>1</td> <td>3</td> <td>5</td> <td>4</td> <td>2</td> <td>3</td> <td>5</td> <td>6</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P3</td> <td>0</td> <td>6</td> <td>3</td> <td>2</td> <td>0</td> <td>6</td> <td>5</td> <td>2</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>P4</td> <td>0</td> <td>0</td> <td>1</td> <td>4</td> <td>0</td> <td>6</td> <td>5</td> <td>6</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> Answer the following questions using banker's algorithm: (i) What are contents of matrix end? (ii) Is the system in safe state? ,If request for process p1 arrives for (0,4,2,0) .Can the request be granted immediately?		Allocated				Max				Available					A	B	C	D	A	B	C	D	A	B	C	D	P0	0	0	1	2	0	0	1	2	1	5	2	0	P1	1	0	0	0	1	7	5	0					P2	1	3	5	4	2	3	5	6					P3	0	6	3	2	0	6	5	2					P4	0	0	1	4	0	6	5	6					1	1
	Allocated				Max				Available																																																																																					
	A	B	C	D	A	B	C	D	A	B	C	D																																																																																		
P0	0	0	1	2	0	0	1	2	1	5	2	0																																																																																		
P1	1	0	0	0	1	7	5	0																																																																																						
P2	1	3	5	4	2	3	5	6																																																																																						
P3	0	6	3	2	0	6	5	2																																																																																						
P4	0	0	1	4	0	6	5	6																																																																																						
b	(i) Memory partitions of 100kb,500 kb,200 kb,300kb,600 kb is available how would best, worst, first fit algorithm to place processes 212,417,112,426 in order. Which is the best algorithm? (ii) Briefly explain the various kinds of program threats and system threats.	5	1																																																																																											
c.	All processes arrived in order p1, p2, p3, p4, p5 all at time zero. <table border="1"> <thead> <tr> <th>Process</th> <th>Burst time</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>10</td> <td>3</td> </tr> <tr> <td>P2</td> <td>1</td> <td>1</td> </tr> <tr> <td>P3</td> <td>2</td> <td>3</td> </tr> <tr> <td>P4</td> <td>1</td> <td>4</td> </tr> <tr> <td>P5</td> <td>5</td> <td>2</td> </tr> </tbody> </table> Draw Gant charts illustrating execution of these processes for SJF, non-preemptive priority (smaller priority number implies a higher priority) & round robin(quantum=1) (i) Calculate turnaround time for each process for scheduling algorithm in part (1) (ii) Calculate waiting time for each scheduling algorithm in part (1)	Process	Burst time	Priority	P1	10	3	P2	1	1	P3	2	3	P4	1	4	P5	5	2	2	2																																																																									
Process	Burst time	Priority																																																																																												
P1	10	3																																																																																												
P2	1	1																																																																																												
P3	2	3																																																																																												
P4	1	4																																																																																												
P5	5	2																																																																																												

Enrol. No.

S	R	H	U																
---	---	---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Regn. No.

D	D																		
---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

END SEMESTER EXAMINATION, JUNE- 2024

B. Tech. (CSE) Semester – IV

Course Name: Computer Organization and Architecture

Course Code: CCS241

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(10 x 2 = 20)

- a. What is the difference between Logical and circular shift?
- b. What is the interrupt vector table?
- c. What is the reason behind the invention of cache memory?
- d. What is LRU?
- e. Explain "is empty of" & "is full of" functions?
- f. What is hit ratio?
- g. What is Time-Space diagram of Pipeline concept?
- h. List all four representation systems.
- i. Why do we need I/O processor?
- j. Explain the function of ISZ?

Section (B)

Q.2. Attempt any 5 questions.

(5 x 7 = 35)

- a. Explain the instruction cycle with the help of its flowchart?
- b. Write about the micro programmed control organization.
- c. Write an assembly language program using sub-routine?
- d. Describe the stack organization.
- e. Write short notes on address sequencer?
- f. Show the DMA transfer connections in computer system?
- g. Draw and explain the flowchart of Booth multiplier.

Section (C)

Attempt any 3 questions.

(3 x 15 = 45)

Q.3.

- a. Write about the input-output reference instructions with an example. (6)
- b. What is a Multiplexer? Show how it could be used to build common bus. (9)

Q.4.

- a. Explain the 16-bit instruction format with an example. (6)
- b. Draw and explain the flowchart of division of fixed-point signed-magnitude numbers. (9)

Q.5.

- a. Explain how any sequential process could be decomposed into Suboperations and executed in dedicated segments with an example. (9)
- b. Write the Branching instructions with an example. (6)

Q.6.

- a. Draw and explain the Input-Output interface unit? (9)
- b. Explain the function of Bus grant, Bus request, DMA request and DMA ACK? (6)

Q.7.

- a. Explain the Set-Associative mapping using neat diagrams. (9)
- b. Draw the memory table for mapping a virtual address? (6)

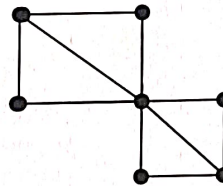
15/6/24

Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (CSE) Semester – IV****Course Name: Discrete Mathematical Structures****Course Code: AMA241****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Attempt all Sections & Questions.****Section (A)****Q1. Attempt all questions.****(10 x 2 = 20)**

- If $A = \{1, 2, 3, 4\}$ and $B = \{1, 3, 5, 6, 7\}$. Then find $A \oplus B$.
- The structure (real numbers, $+$, $*$, $\sqrt{\quad}$) satisfies the De Morgan's laws. (True/False)
- Consider the statement $P(x) : x$ is even. Then determine the truth value of $\forall x P(x)$.
- Let $R = \{(2, 1), (3, 4), (5, 2), (6, 5), (6, 3)\}$ be a relation defined on the set $A = \{1, 2, 3, 4, 5, 6\}$. Determine if R is a tree, if it is, find the root.
- If 30 dictionaries in a library contain a total of 31,327 pages. Find at least how many pages should be there in one of the dictionary.
- Find the number of distinct words that can be formed from the letters of MISSISSIPPI.
- Define a Monoid.
- Determine whether the following graph has an Euler circuit, an Euler path but no Euler circuit, or neither. Give reasons for your answer



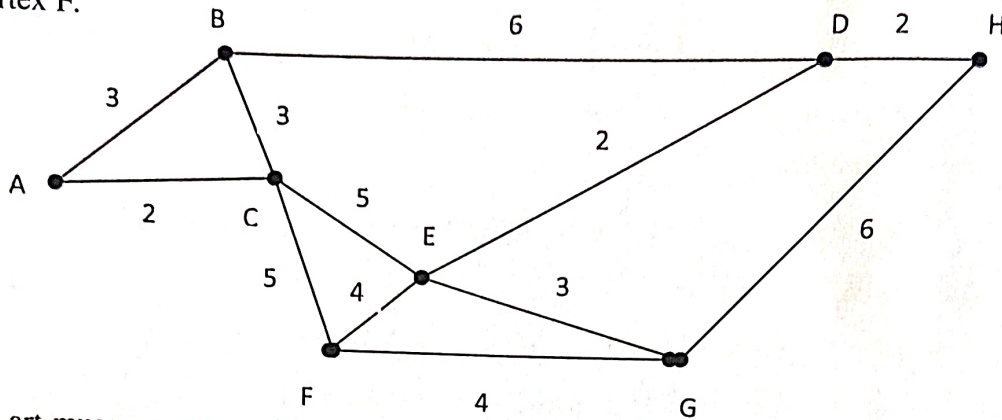
- The matrix of relation R given as $M_R = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ is
 (i) asymmetric (ii) antisymmetric (iii) both asymmetric and antisymmetric (iv) neither asymmetric nor antisymmetric
- A nonempty finite poset has a greatest element. (give justification) (True/False)

Section (B)**Q2. Attempt any 5 questions.****(7 x 5 = 35)**

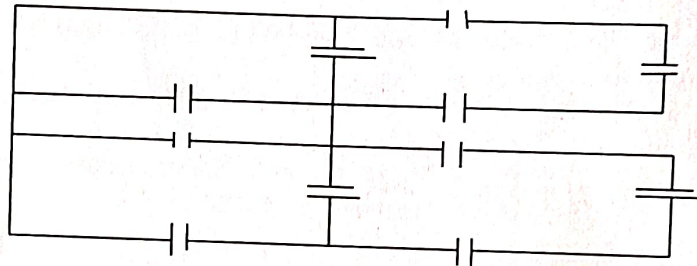
- If 60 fans who attended the home formula 1 game bought up all the paraphernalia for the cars. Altogether 20 stickers, 36 car decals and 12 key chains were sold. We know that 52 fans bought at least one items. Also, 6 fans bought both decals and key chains, 9 bought both decals and stickers and 5 bought both key chains and stickers.
 (i) Find that how many fans bought all the three items;
 (ii) Find the number of fans who bought exactly one item;
 (iii) Fill in the corresponding correct numbers in every regions of the Venn diagram
- Prove that, for every positive integer n , $9^n - 2^n$ is divisible by 7.

P.T.O./-

- c. Let $A = \{1, 2, 4, 8\}$ and let $\leq$ be the partial order of divisibility on A . Let $A' = \{0, 1, 2, 3\}$ and $\leq'$ usual relation "less than equal to" on integers. Show that $(A, \leq)$ and $(A', \leq')$ are isomorphic posets.
- d. Use Prim's algorithm to calculate the minimum spanning tree of the following graph by starting at vertex F.



- e. An art museum arranged its current exhibit in the five rooms shown in the following figure. Is there a way to tour the exhibit so that one can pass through each door exactly once? If so, give sketch of your tour. Explain your reasoning properly.



- f. Suppose that an urn contains 15 balls, of which eight are red and seven are black. In how many ways can five balls be chosen so that
- all five are black,
 - two are red and three are black,
 - at least two are red.
- g. Construct the labeled tree that represents the Huffman code
- | | | | | |
|------|-----|------|-------|-------|
| A000 | B01 | C001 | D1100 | E1101 |
|------|-----|------|-------|-------|
- and use it
- To find the string corresponding to the word **CAES, ESAR**
 - To decode the messages 1111101110 and 1101111101110.

Section (C)

Attempt any 3 questions.

(15 x 3 = 45)

- Q3. (a) Let $A = \{1, 2, 3, 4\}$ and R be a relation on A defined as $R = \{(1, 2), (2, 3), (3, 4), (2, 1)\}$. Compute the transit closure of R using Warshall's algorithm. (7)
- (b) State whether the following argument is valid or not. If it is valid, identify the tautology or tautologies on which it is based. (8)
- If the house is next to a lake, then the treasure is not in the kitchen.

If the tree in front yard is a mango tree, then the treasure is in the kitchen.

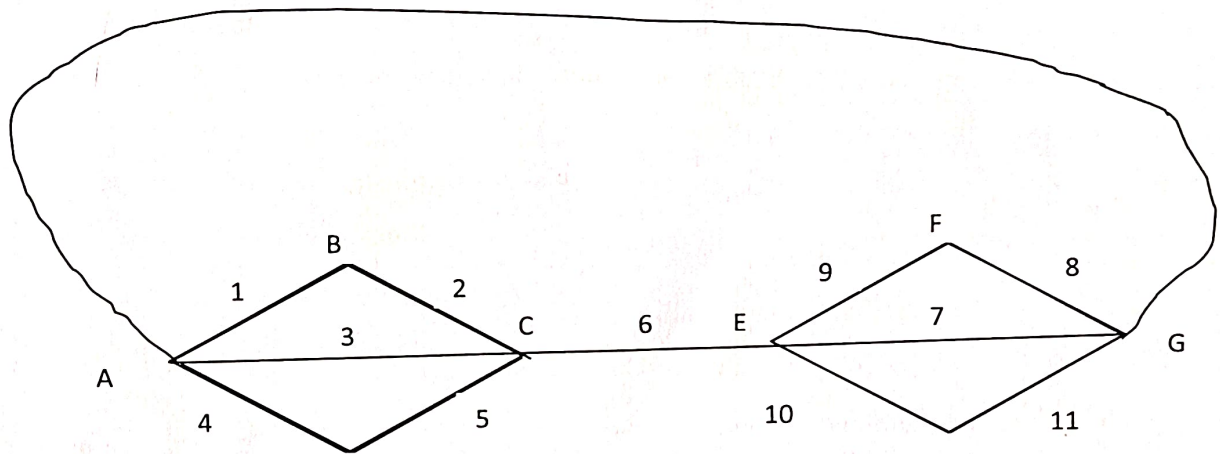
The house is next to a lake.

The tree in front yard is a mango tree or the treasure is placed behind the mirror in the wall of the study room.

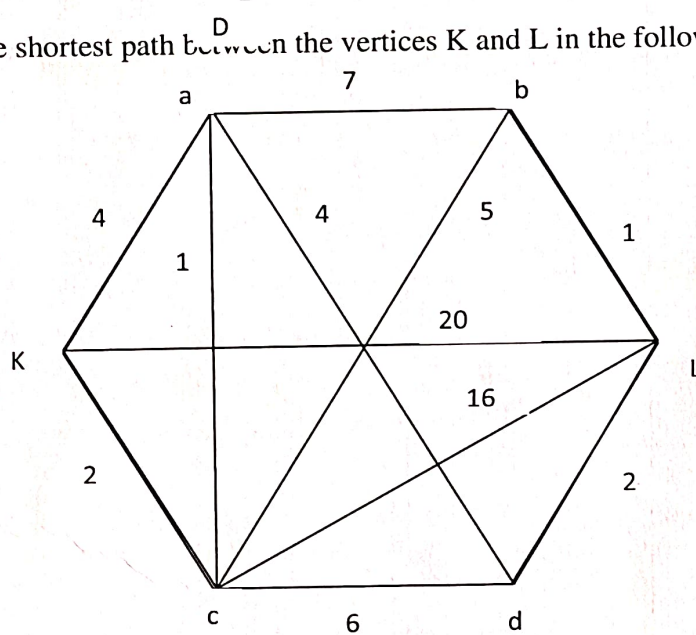
If the tree in the backyard is an oak tree, then the treasure is in the drawing room.

∴ The treasure is placed behind the mirror in the wall of the study room.

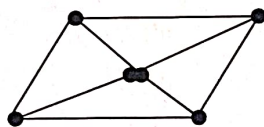
Q4. (a) Apply Fleury's algorithm, beginning with vertex A, to find an Eulerian Circuit in the following graph. (7)



(b) Find the shortest path between the vertices K and L in the following graph, applying Dijkstra's algorithm. (8)



Q5. (a) Define Chromatic polynomial $P_G(x)$ and Chromatic number $\chi(G)$ then determine $\chi(G)$ for the following graph. (5)

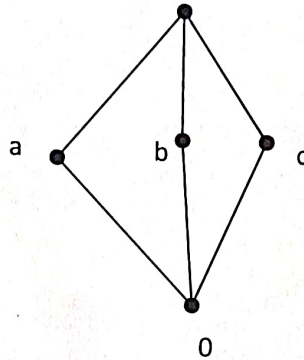


P.T.O./-

(b) Let $S = \{1, 2, 3, 4\}$ and $A = S \times S$. Define the following relation R on A as $(a, b) R (c, d)$ if and only if $a + b = c + d$. Check whether R is an equivalence relation. (5)

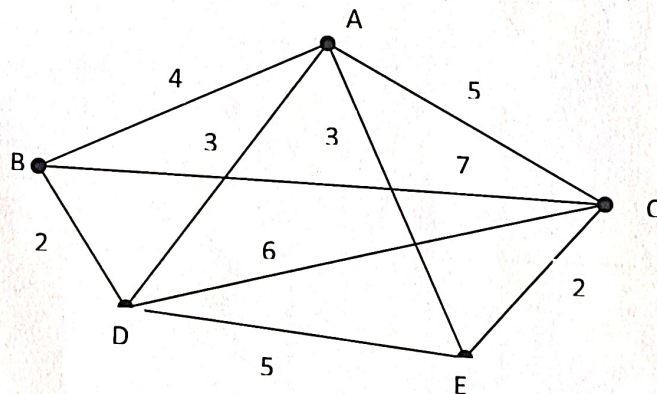
(c) Consider a poset $A = \{2, 3, 6, 12, 24, 36, 72\}$ under the relation of divisibility. Make the Hasse diagram of the given poset. Further, check whether it represents a lattice. Give proper reasoning in support of your answer (5)

Q.6 (a) Define a complemented lattice and determine whether the following lattice is distributive or complemented or both or none give proper justification. (1+8)

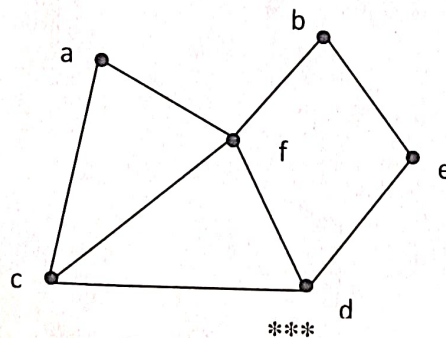


(b) Solve the recurrence relation $a_n = 4a_{n-1} + 5a_{n-2}$; with initial conditions $a_1 = 2, a_2 = 6$. (6)

Q.7 (a) What is a minimum spanning tree. Apply Kruskal's algorithm to calculate the minimum spanning tree of the following graph. (9)



(b). Let $A = \{a, b, c, d, e, f\}$ be a set and $\{\{a, f\}, \{e, b, d\}, \{c\}\}$ be a partition of A . Then determine (i) corresponding equivalence relation matrix M_R (ii) Quotient graph G^R for the graph shown below. (6)



Enrol. No. S R H U

Regn. No. D D

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (Hons.) CSE in AI/DS & ML Semester - IV****Course Name: Formal Languages and Automata Theory****Course Code: CS405T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q.1. Objectives Type (Very short/ Short Answer, MCQ, One-liners, Fill in the Blank, True/ False) Attempt all. (10×2=20)**

	CO	PO
a. What is Finite State Machine? What are its elements?	1	1,2
b. Describe the relationship between Grammars and Languages.	1	1,2
c. Find out the ϵ^* and ϕ^* .	1	2
d. Mention the applications of regular expressions.	1	1
e. Define Mealy and Moore Machines.	1	1
f. What is an ambiguous grammar?	1	1,2
g. What are the components of PDA?	1	1,2
h. What is a Turing machine?	1	1,2
i. When we say a problem is decidable?	1	2
j. What properties of recursive enumerable sets are not decidable?	1	2

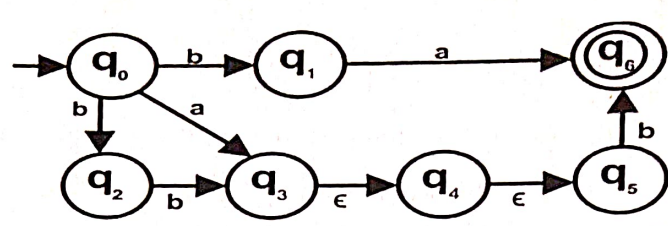
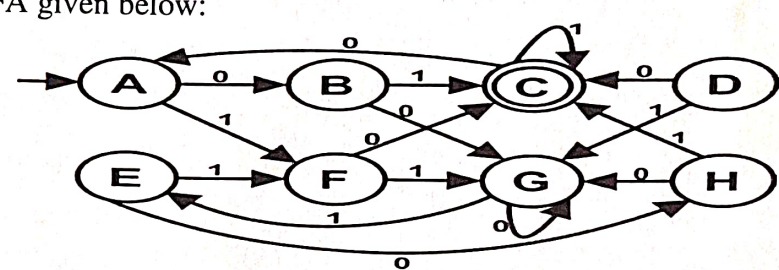
Q.2. Short notes / Short Answer Type (Attempt any five out of Seven) (5×4=20)

	CO	PO
a. Design a NFA in which all the string contain substring 1110.	2	2,3
b. Design a DFA that recognizes the set of strings such that every block of its Consecutive symbols contain at least two 0's on $\Sigma = \{0, 1\}$	2	2
c. What are state diagram and state transition table?	2	1,2
d. Construct an NFA accepting the set of all strings over $\{0,1\}$ whose second symbol from last is 1.	2	2,3
e. Give the formal definition of Moore machine.	2	1,2
f. Write about the model of Push Down Automata and context free grammar.	2	2
g. Construct Turing Machine for multiplication of two unary numbers.	2	1

P.T.O./-

Q.3. Structured Question (Attempt any three out of four)

(3×10=30)

		CO	PO
a.	Construct an NFA without ϵ -moves corresponding to the following NFA	3	2
			
b.	Minimize the DFA given below:	3	2
			
c.	Convert the following grammar into Greibach normal form. $S \rightarrow AA/a$ $A \rightarrow SS/b$	3	1,2
d.	Briefly explain about various operations on Strings with suitable examples.	3	1,2

Q.4. Long Answer / Essay type (Attempt any two out of three)

(2×15=30)

		CO	PO
a.	i. Design a context free grammar for the language $L = \{W=WR \mid W \text{ is in } \{a,b\}^*\}$. ii. What is an ambiguous grammar? Show that the following grammar is ambiguous. $S \rightarrow AB \mid aaB$ $A \rightarrow Aa \mid a$ $B \rightarrow b$	4	1,2
b.	i. Draw a transition diagram for turing machine and explain it in detail? ii. Design a Turing Machine to accept the set of all palindrome over $\{0,1\}^*$. Draw the Transition diagram for the same.	4	1,2
c.	i. How to eliminate unit productions? Discuss with example. ii. Explain about different normal forms with example.	4	2,5

Enrol. No.

S	R	H	U																
---	---	---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Regn. No.

D	D																		
---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

END SEMESTER EXAMINATION, JUNE- 2024

B. Tech. (CSE) Semester – IV

Course Name: Computer Organization and Architecture

Course Code: CCS241

Time allotted: 03 Hours

Max. Marks: 100

Note: Read all the instructions carefully.

Note: Attempt all Sections & Questions.

Section (A)

Q. 1. Attempt all questions.

(10 x 2 = 20)

- a. Distinguish between error and failure.
- b. Explain different levels of software testing.
- c. Discuss ISO 9001 standard.
- d. Differentiate between functional requirement and non-functional requirements.
- e. Explain regression testing.
- f. Explain stress testing.
- g. Explain Activity Network.
- h. Name a few well-established object-oriented software design techniques.
- i. Define Cyclomatic complexity.
- j. Write the procedure to calculate function points metric.

Section (B)

Q. 2. Attempt any 5 questions.

(5 x 7 = 35)

- a. Distinguish between software verification and software validation. Can one be used in place of the other?
- b. Discuss Code Reviews. Explain Code Inspection and list out some classical programming errors which can be checked during Code Inspections.
- c. Write down the important shortcoming of LOC for use as a software size metric.
- d. Differentiate between function- oriented design and object-oriented design.
- e. Explain basic COCOMO model and also, estimate development effort and development time for organic, Semi-detached, and Embedded types of software development projects.
- f. Discuss about term system testing. Write and explain different kinds of system testing that are usually performed on a large software products.
- g. Explain why the spiral life cycle model is considered to be a Meta model.

Section (C)

Attempt any 3 questions.

(3 x 15 = 45)

- Q.3.**
 - a. Discuss the term software reverse engineering. Why is it required? 8
 - b. Define risk. Discuss the main steps that would follow to manage risks in software project. 7
- Q.4.**
 - a. Explain software reliability. Compare software vs. hardware reliability. 7
 - b. Explain different levels of SEI Capability Maturity Model (CMM). 8
- Q.5.**
 - a. Discuss SA/SD methodology. 7
 - b. Write the main shortcomings of Data Flow Diagram (DFD) as a tool for performing structured analysis. 8
- Q.6.**
 - a. Explain cohesion with a suitable example. 8
 - b. Categorize and explain different types of coupling that might exist between two modules. 7
- Q.7.** Explain about the following terms:
 - a. Project Monitoring and Control. 8
 - b. Staffing level estimation. 7

Enrol. No.

S	R	H	U								
---	---	---	---	--	--	--	--	--	--	--	--

Regn. No.

D	D										
---	---	--	--	--	--	--	--	--	--	--	--

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (Hons.) CSE in AI/DS & ML Semester - IV****Course Name: Environmental Studies****Course Code: HS401T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q.1. Attempt all.****(10×2=20)**

QN	Questions	CO	PO
a.	Define lapse rate in atmosphere.	2	7
b.	Give an example of edaphic factor of an ecosystem.	2	7
c.	Flow of energy in an ecosystem is cyclic. (True/False)	2	7
d.	The advancement of an ecological community with time is called ecological succession. (True/False)	1	7
e.	Geothermal energy is an example of renewable source of energy. (True/False)	3	7
f.	Decibel (dB) is used to measure _____.	2	7
g.	Give two examples of secondary air pollutant.	2	7
h.	Define rehabilitation.	1	7
i.	Acid rain causes corrosion of material. (True/False)	2	12
j.	Air Pollution control act was enacted in 1986. (True/False)	2	12

Q.2. Attempt any five out of Seven.**(5×4=20)**

QN	Questions	CO	PO
a.	Explain the vertical structure of atmosphere.	2	7
b.	Write any four characteristics of aquatic ecosystem.	1	7
c.	What are different types of forest?	1	7
d.	Brief the anthropogenic causes of biodiversity loss.	2	12
e.	Write a short note on nuclear hazards.	4	7
f.	Brief the consequences of ozone layer depletion.	4	12
g.	What are the causes of overpopulation?	2	12

Q.3. Attempt any three out of four.**(3×10=30)**

QN	Questions	CO	PO
a.	Discuss the significance of sustainable development.	4	10
b.	Describe the process of ecological succession in detail.	1	7
c.	Explain the process of rain water harvesting.	2	12
d.	Brief values and services of biodiversity.	1	12

Q.4. Attempt any two out of three.**(2×15=30)**

QN	Questions	CO	PO
a.	Explain the concept of carbon footprint. How it can be minimized at individual level?	3	3
b.	Discuss the causes and effects of climate change. How it can be minimized?	2	7
c.	Explain your experience with reference to environmental field visit.	3	12

Enrol. No.

S	R	H	U											
---	---	---	---	--	--	--	--	--	--	--	--	--	--	--

Regn. No.

D	D													
---	---	--	--	--	--	--	--	--	--	--	--	--	--	--

END SEMESTER EXAMINATION, JUNE- 2024**B. Tech. (Hons.) CSE in AI/DS & ML Semester - IV****Course Name: Machine Learning & Pattern Recognition****Code: PC413T/PC423T****Time allotted: 03 Hours****Max. Marks: 100****Note: Read all the instructions carefully.****Q.1. Objectives Type (Very short) Attempt all.****(10×2=20)**

a.	What is Machine Learning	CO1	PO1
b.	Explain a Well posted learning problem	CO1	PO1
c.	What is self learning theory?	CO2	PO1
d.	What is Cross Validation?	CO2	PO1
e.	What is Bayes Theory	CO4	PO1
f.	What is the primary goal of reinforcement learning?	CO3	PO1
g.	How do statistical methods contribute to pattern recognition systems?	CO4	PO1
h.	What is overfitting problem	CO3	PO1
i.	What is K in KMean and what is its default value in scikit-learn library	CO3	PO1
j.	Discuss the role of syntactic approaches in recognizing patterns.	CO5	PO1

Q.2. Short notes Type (Attempt any five out of Seven)**(5×4=20)**

a.	Discuss some applications of machine learning with examples.	CO1	PO1
b.	Describe the K-Means clustering algorithm. Discuss its basic steps and how it assigns data points to clusters.	CO3	PO1
c.	What is multiclass classification, and how does it differ from binary classification? Provide examples of real-world applications where multiclass classification is used.	CO2	PO1,2
d.	Explain Naïve Bayes Classifier with an Example	CO5	PO1
e.	Write Reinforcement learning problem characteristics.	CO4	PO1
f.	Describe the Parzen window method for non-parametric density estimation.	CO5	PO1
g.	Explain the process of Patterns and Features Extraction in the context of Pattern Recognition. Provide examples to illustrate your explanation.	CO4	PO1,2

P.T.O./-

Q.3. Structured Question (Attempt any three out of four)

(3×10=30)

a.	(i) Write the perspective and issues in Machine Learning (ii) Explain Types of machine learning	CO1	PO1
b.	(i) Describe the process of training in Pattern Recognition. (ii) Describe Gradient Descent as an optimization algorithm. Discuss its advantages and limitations.	CO4,2	PO1,2
c.	(i) Explain Maximum Likelihood hypotheses in Bayesian learning? (ii) Discuss the applications based on Bayes Classifier	CO4,5	PO1
d.	(i) Remarks on Lazy and eager learning algorithms (ii) Explain the performance metrics of machine learning	CO3	PO1

Q.4. Long Answer type (Attempt any two out of three)

(2×15=30)

a.	(i) Discuss the concept of anomaly and novelty detection in the context of clustering. (ii) Compare and contrast Bayesian Gaussian Mixture Models with traditional clustering algorithms for anomaly and novelty detection. (iii) How do you design a checkers learning problem	CO1,4,5	PO1
b.	(i) What is Regression, also discuss linear regression. (ii) Discuss Hyper parameter Tuning	CO2	PO1
c.	(i) Discuss the role of data visualization in exploratory data analysis for Machine Learning. (ii) Discuss visualization techniques	CO1,2	PO1,2,4
