

Total No. of Questions: 22

Total No. of Pages: 02

Roll No. _____

Paper Code
3E1202

B.Tech. III-Sem (Main & Back) 2025-26
Artificial Intelligence
3CS4-05 Data Structures and Algorithms
AID,CAI,CS,IT,CCS, CDS,CIT,CSD,CSR,AI
3E1202

Time: 3 Hours

Maximum Marks: 70

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1- _____

2- _____

Part A

(Answer should be given up to 25 words only)

All questions are compulsory.

10x2=20

- Q.1 Define stack and mention two applications?
Q.2 What is the difference between static and dynamic arrays?
Q.3 Write postfix expression for $(A+B) * (C-D)$
Q.4 Differentiate between circular queue and priority queue.
Q.5 List advantages of linked list over arrays.
Q.6 Write the time complexity of quick sort in best and worst case.
Q.7 What is difference between AVL Tree and B-Tree.
Q.8 Define BFS and DFS in graph traversal.
Q.9 Write the function of hash function in hashing.
Q.10 State Dijkstra's Algorithm in one line.

Part B

(Analytical/Problem Solving Questions)

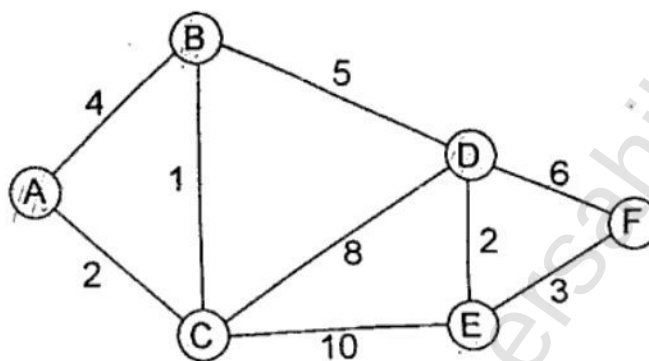
Attempt any Five questions.

5x4=20

- Q.1 Convert the following infix expression into postfix and evaluate :

$(5 + 2) * (8 - 3)$

- Q.2 Explain Round Robin scheduling using queue with an example.
- Q.3 (a) Write short notes on singly linked list and doubly linked list.
(b) Compare linked list with arrays.
- Q.4 Sort the following numbers using heap :
Sort - 15, 8, 3, 20, 10 with explanation.
- Q.5 Find minimum spanning tree of the given graph using Prim's algorithm.



- Q.6 What is hashing? Explain Collision resolution techniques.
- Q.7 Explain bubble sort and quick sort algorithm with complexity.

Part C

(Descriptive/Analytical/Problem solving/Design questions)

Attempt any Three questions .

3x10=30

- Q.1 Explain Heap Sort? Build max heap for the array [9,4,7,1,5,3] and show the array after the First two extract-max. operations.
- Q.2 Describe Binary Search on a sorted array. Provide the Iterative algorithm and explain best, average and worst case time complexities.
- Q.3 Explain the difference between a B-tree and a B+tree. Mention one scenario where a B+tree is preferred.
- Q.4 Describe with an example how infix-to-postfix conversion is done using a stack? Show intermediate stack contents for expression : $(A+B) * (C-D)/E$.
- Q.5 Write a short algorithm to implement a circular queue using an array. Explain how you detect full and empty condition.