

2025

(2nd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : DSC-203

(Data Structure in C)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 45)

*The figures in the margin indicate full marks
for the questions*

1. (a) List out the three important steps to study the types of data structures. 3
- (b) What do you understand by time and space tradeoff complexity of algorithms? 2
- (c) Explain : 2+2=4
 - (i) Selection logic
 - (ii) Iteration logic

(2)

Or

(d) Explain in detail : 3+3+3=9

- (i) Big O notation
- (ii) Omega (Ω) notation
- (iii) Theta (θ) notation

2. (a) Given an array , arr [1.....10] [1....15] with base value 100 and the size of each element is 1 byte in memory. Find the address of arr [8] [6] with the help of formula—

- (i) row-major order;
- (ii) column-major order. 3+3=6

(b) Explain the representation of linked lists in memory with an example. 3

Or

(c) Write down the rules (algorithm) for the conversion from infix to postfix expression. 3

(d) Convert the following from infix to postfix expression using stack and without using stack : 4+2=6

$$K + L - M * N + (O \wedge P) * W / U / V * T + Q$$

3. (a) What is binary search tree data structure? What are the applications for binary search tree? What are the three basic qualities of a BST? 2+2+3=7

L25/876a

(Continued)

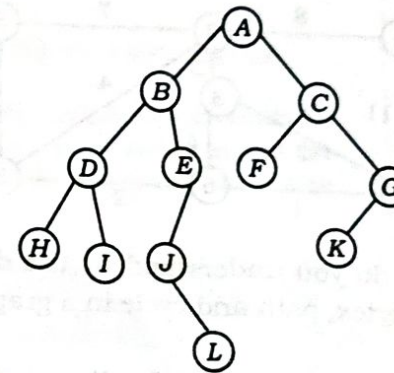
(3)

(b) What are the four rotations of AVL tree? 2

Or

(c) What are tree traversals? Explain the different ways or algorithms we use to traverse a tree. 1+3=4

(d)



Find preorder, inorder and postorder traversals from the given tree. 3

(e) What do you mean by headed nodes? 2

4. (a) What is the difference between Breadth-First Search (BFS) and Depth-First Search (DFS)? 4

(b) Explain in detail the two most common representations in graph, with proper example. 5

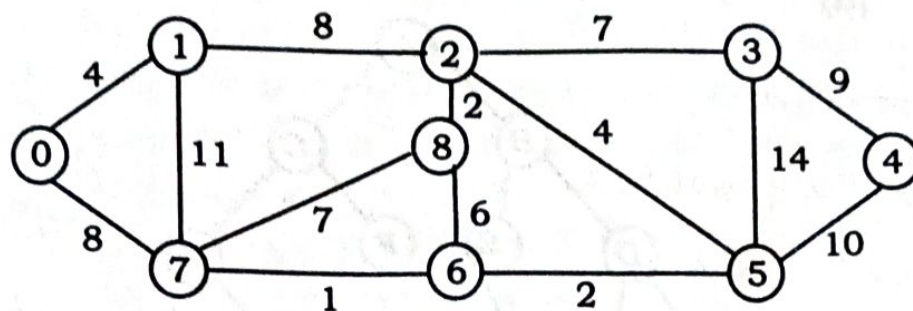
L25/876a

(Turn Over)

(4)

Or

- (c) Given a weighted graph and a source vertex in the graph. Using Dijkstra's algorithm, find the shortest paths from the source to all the other vertices in the given graph : 6



- (d) What do you understand by the degree of a vertex, path and cycle in a graph? 3

5. (a) Write the algorithms for linear search and binary search. 6

- (b) Write a C program using bubble sort. 3

Or

- (c) Explain any three hash functions along with their advantages and disadvantages in detail. 3+3+3=9

★ ★ ★

2025

(2nd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : DSC-203

(Data Structure in C)

(PART : A—OBJECTIVE)

(Marks : 25)

The figures in the margin indicate full marks for the questions

1. Put a Tick (✓) mark against the correct answer in the brackets provided : 1×10=10

(a) Which of the following is not the operation of data structure?

- (i) Operations that manipulate data in some way ()
- (ii) Operations that perform a computation ()
- (iii) Operations that check for syntax errors ()
- (iv) Operations that monitor an object for the occurrence of a controlling event ()

(2)

(b) Which of the following is not a type of queue?

- (i) Priority queue ()
- (ii) Single-ended queue ()
- (iii) Circular queue ()
- (iv) Ordinary queue ()

(c) Which of the following is the advantage of the array data structure?

- (i) Elements of mixed data types can be stored ()
- (ii) Easier to access the elements in an array ()
- (iii) Index of the first element starts from 1 ()
- (iv) Elements of an array cannot be sorted ()

(d) Which of the following data structures allows insertion and deletion from both ends?

- (i) Stack ()
- (ii) Deque ()
- (iii) Queue ()
- (iv) String ()

(3)

(e) What is the information a linked list's node must store?

- (i) The address of the next node if it exists ()
- (ii) The value of the current node ()
- (iii) Both (i) and (ii) ()
- (iv) None of the above ()

(f) In which data structure elements have a hierarchical relationship?

- (i) Array ()
- (ii) Linked list ()
- (iii) Graph ()
- (iv) Tree ()

(g) Which is the pointer associated with the availability list?

- (i) FIRST ()
- (ii) AVAIL ()
- (iii) TOP ()
- (iv) REAR ()

(h) What is the value of the postfix expression
6 3 2 4 + - * ?

(i) 1 ()

(ii) 40 ()

(iii) 74 ()

(iv) -18 ()

(i) The number of edges in a complete graph of n vertices is

(i) $n(n+1)/2$ ()

(ii) $n(n-1)/2$ ()

(iii) $n^2/2$ ()

(iv) n ()

(j) Which of the following sorting algorithms has the lowest worst-case complexity?

(i) Merge sort ()

(ii) Bubble sort ()

(iii) Quicksort ()

(iv) Selection sort ()

2. Indicate whether the following statements are True (T) or False (F) by putting a Tick (✓) mark : $1 \times 5 = 5$

(a) In POSTFIX notation for expression, operators are placed after the corresponding operands.

(T / F)

(b) The B-tree is derived from multiway search trees.

(T / F)

(c) A binary search can only be applied to sorted records.

(T / F)

(d) An $O(\log N)$ algorithm is slower than an $O(N)$ algorithm.

(T / F)

(e) An entity is something that has certain attributes or properties which may be assigned values.

(T / F)

3. Answer the following questions in brief : $2 \times 5 = 10$

- (a) What are fixed-length records and variable-length records?

- (b) What are a file and a primary key?

(c) What do you understand by free-storage list?

(d) What are the problems associated with linear queue?

(10)

(e) Write two applications of spanning tree.
