

**U.G. 2nd Semester Examination - 2022****BCA****[HONOURS]****Course Code : BBCACCHC202****Course Title: Data Structure using C**

Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **ten** questions: 1×10=10
- Draw a fully connected graph with 4 vertices.
  - In what respect linked list is a nonlinear data structure?
  - Which data structure is applied when dealing with recursive function?
  - What is the post fix equivalent of the following prefix expression: / + a b + c d?
  - What is the maximum number of nodes in a binary tree of height 'h'?
  - Define polish notation.
  - Write down the structure definition of doubly linked list.

*[Turn Over]*

- Define abstract data type.
- What do you mean by time complexity of an algorithm?
- Differentiate between complete binary tree and strictly binary tree.
- From the following adjacency matrix draw the graph:

	A	B	C	D
A	0	1	0	1
B	0	0	1	1
C	0	0	0	0
D	0	0	1	1

- Which data structures allow insertion and deletion from both ends?
  - On which type of data list both sequential and binary search can apply?
  - What the traversal strategies used in traversing a graph?
  - Which traversal technique lists the nodes of a binary search tree in ascending order?
2. Answer any **five** questions: 2×5=10
- Evaluate X using stack.  
Where X = 12, 7, 3, -, /, 2, 1, 5, +, \*, +.

- b) What is spanning tree and how it is different from minimum spanning tree?
- c) Find out the height of binary tree of the number of nodes of the binary tree is 7.
- d) Make a comparison chart between tree and graph.
- e) Construct the binary tree from the following information:  
 Inorder Sequence : D G B H E A F I C  
 Preorder Sequence : A B D G E H C F I
- f) Apply Bubble Sort on the following array:  
 20 40 30 10 15
- g) Find out the time complexity of the following code block—
- ```
void fun (int n)
(   int i, j;
  if (n < 5)
      printf("%d", n);
  else
      for (i=1; i<=n; i++)
      {
          for (j=1; j<=i; j++) {
              printf("\n%d", i*j); }
      }
}
```

- h) Differentiate between Prim's and Kruskal's Algorithm.

3. Answer any **two** questions: 5×2=10

- a) Define AVL tree. Show the step wise diagram to construct the AVL tree for the following input

40, 20, 10, 25, 30, 22, 50. 1+4=5

- b) i) Write down the function code for Insertion Sort.  
 ii) Consider the following sorted array:

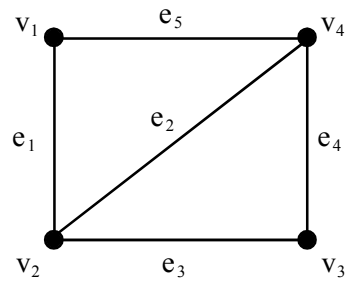
5 12 25 32 37 40 42

and if searching element is 12, then find out the number of comparison. 3+2=5

- c) i) How can you represent a graph using adjacency matrix?  
 ii) Suppose G is undirected graph of m nodes  $v_1, v_2, v_3, \dots, v_m$  and n edges  $e_1, e_2, e_3, \dots, e_n$ . The incidence matrix of G is the m x n matrix  $M = (m_{ij})$  where—

$$m_{ij} = \begin{cases} 1 & \text{If node } v_i \text{ belongs to edge } e_j \\ 0 & \text{otherwise} \end{cases}$$

Find the incidence matrix  $M$  of the following graph:  $2+3=5$



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