

22317

21819

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
  - (2) Illustrate your answers with neat sketches wherever necessary.
  - (3) Figures to the right indicate full marks.
  - (4) Assume suitable data, if necessary.
  - (5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

1. Attempt any FIVE of the following :

10

- (a) List any four operations on data structure.
- (b) Enlist queue operations condition.
- (c) Define :
  - (i) Binary tree
  - (ii) Binary search tree
- (d) Show the memory representation of stack using array with the help of a diagram.
- (e) Define given two types of graph and give example.
  - (i) Direct graph
  - (ii) Undirected graph
- (f) Differentiate between linear and non-linear data structures on any two parameters.
- (g) Convert the following infix expression to its prefix form using stack  
 $A + B - C * D / E + F$

[1 of 4]

P.T.O.

## 2. Attempt any THREE of the following :

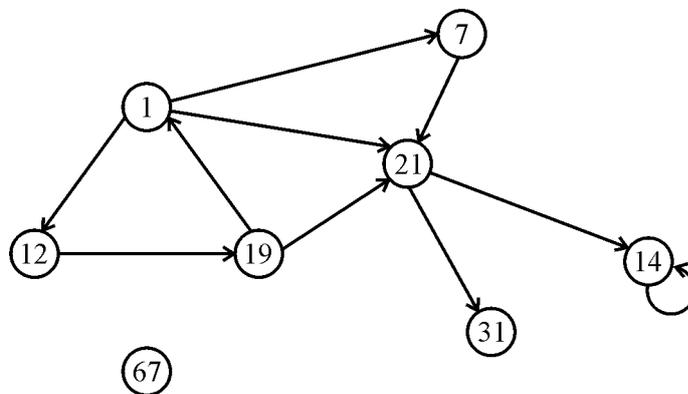
12

- Explain the working of Binary search with an example.
- Write a program to traverse a linked list.
- Draw and explain construction of circular queue.
- Explain indegree and outdegree of a graph with example.

## 3. Attempt any THREE of the following :

12

- Write C program for performing following operations on array : insertion, display.
- Evaluate the following postfix expression :  
5, 6, 2, +, \*, 12, 4, /, – Show diagrammatically each step of evolution using stack.
- Sort the following numbers in ascending order using quick sort. Given numbers 50, 2, 6, 22, 3, 39, 49, 25, 18, 5.
- From the following graph, complete the answers :



- Indegree of node 21
- Adjacent node of 19
- Path of 31
- Successor of node 67

## 4. Attempt any THREE of the following :

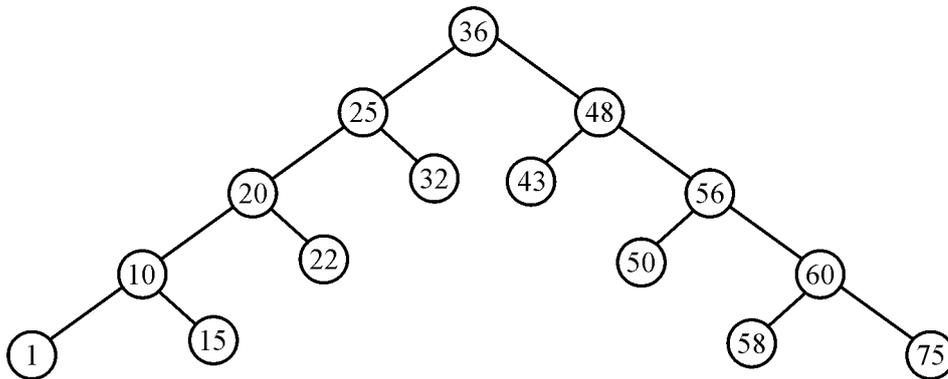
12

- (a) Differentiate between binary search and sequential search (linear search).
- (b) Draw the tree structure of the following expressions :
- (i)  $(2a + 5b)^3 * (x - 7y)^4$     (ii)  $(a - 3b) * (2x - y)^3$
- (c) Create a singly linked list using data fields 15, 20, 22, 58, 60. Search a node 22 from the SLL and show procedure step-by-step with the help of diagram from start to end.
- (d) Evaluate the following prefix expression :  
 $- * + 4 3 2 5$  show diagrammatically each step of evaluation using stack.
- (e) Write an algorithm to delete a node from the beginning of a circular linked list.

## 5. Attempt any TWO of the following :

12

- (a) Show the effect of PUSH and POP operation on to the stack of size 10. The stack contains 40, 30, 52, 86, 39, 45, 50 with 50 being at top of the stack. Show diagrammatically the effect of :
- (i) PUSH 59                      (ii) PUSH 85  
 (iii) POP                              (iv) POP  
 (v) PUSH 59                      (vi) POP
- Sketch the final structure of stack after performing the above said operations.
- (b) Traverse the following tree by the in-order, pre-order and post-order methods :



- (c) Write an algorithm to count number of nodes in singly linked list.

P.T.O.

**6. Attempt any TWO of the following :****12**

- (a) Sort the following numbers in ascending order using Bubble sort. Given numbers : 29, 35, 3, 8, 11, 15, 56, 12, 1, 4, 85, 5 & write the output after each interaction.
- (b) Evaluate the following postfix expression :
- $$57 + 62 - *$$
- (c) Create a singly linked list using data fields 90, 25, 46, 39, 56. Search a node 40 from the SLL and show procedure step-by-step with the help of diagram from start to end.
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