

2010

Time : 3 hours

Full Marks : 80

*Candidates are required to give their answers in
their own words as far as practicable.*

The figures in the margin indicate full marks.

Answer from both the Groups as directed.

Group – A

(Compulsory)

1. Choose the correct answer of the following :

2×10 = 20

(a) Time complexity of insertion sort algorithm
in the best case is :

(i) $O(n)$

(ii) $O(n \log_2 n)$

- (iii) $O(n^2)$
 - (iv) None of the above
- (b) The prefix expression for the infix expression $a*(b + c) / e - f$ is :
- (i) $/* a+ bc -ef$
 - (ii) $-/* + abc ef$
 - (iii) $-/* a + bcef$
 - (iv) None of the above
- (c) The smallest number of keys that will force a B-Tree of order 3 to have a height 3 is :
- (i) 12
 - (ii) 10
 - (iii) 7
 - (iv) None of the above
- (d) The following sequence of operation is performed on a stack push(1), push(2), pop, push(1), push(2), pop, pop, pop, push(2), pop. The sequences of popped out values are :
- (i) 2, 2, 1, 2, 1
 - (ii) 2, 2, 1, 1, 2

- (iii) 2, 1, 2, 2, 1
- (iv) 2, 1, 2, 2, 2
- (e) Depth first traversal of a graph produces :
 - (i) A spanning tree of the graph
 - (ii) A spanning forest of the graph
 - (iii) A minimal spanning tree
 - (iv) None of the above
- (f) Which of the following statements is true ?
 - (i) A binary tree is always a heap
 - (ii) A heap is a full binary tree
 - (iii) A heap is a complete binary tree
 - (iv) Root of the heap is always the smallest element in the heap
- (g) The property of hash function is that :
 - (i) It minimizes the rate of overflow
 - (ii) It preserves the order of key values
 - (iii) It minimizes number of collisions
 - (iv) None of the above

Group – B

Answer any **four** questions :

2. (a) Write a "C" function to copy one stack to another assuming the stack is implemented using array. 8
- (b) Write an algorithm to evaluate Postfix expression with the help of a stack. 7
3. (a) What is Circular link list ? Write an algorithm for inserting a node at the front. 8
- (b) What is a spanning tree ? What do you mean by minimal spanning tree ? 7
4. (a) Write down the iterative algorithm for in-order traversal of a binary tree. 8
- (b) What is a binary tree ? Write down different properties of a binary tree. 7
5. (a) What is hashing ? Give the characteristics of hash function. 8
- (b) What are the different methods of handling overflow in hashing ? 7

6. (a) Create a B-tree of order 5, when the keys arrive in the following order : 8
a, f, g, b, k, d, m, j, e, s, i, x, r, y, c
- (b) Create a binary search tree when the elements arrive in the following order : 7
10, 5, 20, 7, 29, 11, 23, 29, 13, 12
7. (a) Write an algorithm to implement merge sort with n elements. Explain with an example. 8
- (b) What are the differences between internal sorting and external sorting ? When is a sorting technique said to be stable ? 7
8. (a) Compare and contrast : DFS and BFS (Breadth First Search) with examples of each. 8
- (b) What is Stack ? Implement its PUSH() and POP() functions with the help of link list method. 7
9. (a) Explain Queue. Define the queue with the help of array implementation. 8

- (b) Write an algorithm to insert an element at desired position in the doubly link list. 7
10. (a) What do you mean by Threaded Binary Tree? Explain it with example. 8
- (b) Construct the binary tree with the help of following given nodes and write the sequence of all traversal methods of the given nodes : 7
- 80, 12, 100, 15, 350, 400, 5, 70, 75, 450

