

**2015**

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**

**(Objective Type Questions)**

Answer all questions.

1. Choose the correct answer of the following :  
 $2 \times 10 = 20$

(a) Array is :

- (i) Linear data structure
- (ii) Non-linear data structure
- (iii) Complex data structure
- (iv) None of these

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( Turn over )

7. Explain Dijkstra's Algorithm, with suitable examples.
8. What is AVL tree ? Compare its with Binary tree.
9. Create a binary search tree when-the elements arrive in the following in order :  
99, 15, 05, 20, 07, 23, 24, 40, 92  
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(b) Which of the following operations can not be performed on link-list ?

- (i) Modify
- (ii) Replace
- (iii) To determine if list is empty
- (iv) None of the above

(c) Which one of the following is true in case of NULL-pointer ?

- (i) Marks the end of the node
- (ii) Is equal to '\0' in C.
- (iii) Is the address of some node
- (iv) Is also called a void pointer in C

(d) Queues can be used for :

- (i) The line printer
- (ii) Access to disk storage
- (iii) Function call
- (iv) None of the above

(e) Recursion always requires :

- (i) Termination of the algorithm

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Contd.

- (ii) Key variable
- (iii) Base value
- (iv) All of the above

(f) How many cycles should be contained in tree ?

- (i) 0
- (ii) At least one
- (iii) Any number
- (iv) None of these

(g) The search keys must be ordered in :

- (i) Binary search
- (ii) Sequential search
- (iii) Hashing
- (iv) None of the above

(h) Average case time-complexity of the quick sort algorithm is more than :

- (i)  $O(n \log_2 n)$
- (ii)  $O(n/h(n))$
- (iii)  $O(\log N)$
- (iv) None of the above

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( Turn over )

(i) Name the sorting algorithm for which time is proportional to  $n^2$  :

- (i) Selection-sort
- (ii) Bubble sort
- (iii) Quick-sort
- (iv) None of these

(j) Worst case efficiency of this search is n :

- (i) Sequential search
- (ii) Binary search
- (iii) Indexed search
- (iv) None of these

**Group – B**

**(Long-answer Type Questions)**

Answer any four questions of the following :

15x4 = 60

2. (a) Write an array of size 20 and show how a string "I LOVE MY COUNTRY" is stored.
- (b) What are the advantages of linked-list over Arrays ?

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Contd.

3. What are the various operations possible on a circular linked-list ? Explain all of them with algorithm.

4. Translate, by inspection and hand each infix expression into equivalent pre-fix and post-fix expression :

- (a)  $(A - B) / ((D + E) * F)$
- (b)  $(A + B) / D * ((E - F) * G)$
- (c)  $((A * C) + B/D \wedge E) * F$
- (d)  $A + (B + C * (D + E)) + F/G$
- (e)  $A + B - (C + D) * (E - F) / G/H \wedge I$

5. (a) Explain similarities and dissimilarities between Stack and Queues.

(b) What is recursion ? Explain its characteristic and uses ?

6. (a) Construct the expression tree of the given equation :

- (i)  $(A + B) * C/D$
- (ii)  $A - C + D$

(b) What is Hashing ? Mention its uses.

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( Turn over )