

**AMIETE – CS/IT (New Scheme)**

Time: 3 Hours

**June 2018**

Max. Marks: 100

**PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.**

**NOTE: There are 9 Questions in all.**

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

- a. Linear arrays are also called
- (A) One-dimensional array                      (B) Vertical array  
(C) Horizontal array                              (D) All of the above
- b. Representation of data structure in memory is known as:
- (A) storage structure                              (B) file structure  
(C) abstract data type                              (D) None of the above
- c. The data structure required for Breadth First Traversal on a graph is
- (A) Queue                                              (B) Stack  
(C) Array                                                (D) None of the above
- d. Which of the following is not a type of queue?
- (A) Priority queue                                  (B) Circular queue  
(C) Single ended queue                          (D) Ordinary queue
- e. To represent hierarchical relationship, which data structure is used?
- (A) Stack                                              (B) Queue  
(C) Tree                                                (D) List
- f. The space factor when determining the efficiency of algorithm is measured by
- (A) Counting the maximum memory needed by the algorithm  
(B) Counting the minimum memory needed by the algorithm  
(C) Counting the average memory needed by the algorithm  
(D) Counting the maximum disk space needed by the algorithm
- g. The in order traversal of tree will yield a sorted listing of elements of tree in....
- (A) Merging                                          (B) AVL Trees  
(C) Binary trees                                      (D) Binary search trees
- h. The number of comparisons done by a sequential search is -----
- (A)  $(N/2)+1$                                           (B)  $(N+1)/2$   
(C)  $(N-1)/2$                                           (D)  $(N-2)/2$

- i. If the elements “A”, “B”, “C” and “D” are placed in a stack and are deleted one at a time, what is the order of removal?  
 (A) ABCD (B) DCBA  
 (C) DCAB (D) ABDC
- j. Which of the following is not an inherent application of stack?  
 (A) Reversing a string (B) Evaluation of postfix expression  
 (C) Implementation of recursion (D) Job scheduling

**Answer any FIVE Questions out of EIGHT Questions.  
 Each question carries 16 marks.**

- Q.2** a. Define ADT. Explain with an example (4)  
 b. Write a C program to multiply two matrices if multiplication is possible. (6)  
 c. Explain the operators used for dynamic memory allocation with examples. (6)
- Q.3** a. Convert the given infix expression into post fix expression and explain the representation of stacks used for conversion.  $A ? B * C - D + E / (F + (G + H))$  (6)  
 b. What is a circular Queue? Explain the need of taking an array of size one more than the size of Queue. (4)  
 c. What is Priority queue? Discuss the array implementation of priority queue. (6)
- Q.4** a. Write a function to insert and delete the element in a sorted doubly linked list. (10)  
 b. Write the C code to count the number of nodes in a single linked list. (6)
- Q.5** a. Construct a B-tree of order 5 by inserting the following items one by one. (6)  
 C N G A H E K O M F W L T Z D P R  
 b. write short notes on threaded binary tree (4)  
 c. Explain searching an element in binary search tree with suitable function. (6)
- Q. 6** a. What is BFS and DFS? Explain with an example. (6)  
 b. Discuss Prim’s and Kruskal’s algorithm for computing the minimal spanning tree weighted undirected graph. (10)
- Q.7** a. Write a C++ function to implement binary search. (8)  
 b. What is meant by collision in hashing scheme? What are ways of resolving collision? (8)
- Q.8** a. Compare the worst case and best case time complexity of various sorting techniques. (6)  
 b. Explain the algorithm of Quicksort by sorting the following set of numbers as an example: 42 47 52 57 62 37 32 27 22 (10)
- Q. 9.** a. What is a file mode? Describe the various file mode options available. (8)  
 b. Describe the direct file organization and give the procedure to retrieve a record from a direct file given the key. (8)