ROLL NO. _____

Code: AC104/AT104 Subject: DATA STRUCTURES WITH C & C++

AMIETE – CS/IT *{NEW SCHEME}*

Time: 3 Hours **JUNE 2016** **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. Which data structure would be ideal for recursive call
(A) Stack **(B)** Queue
(C) Linked list **(D)** Array

b. Int A[4] = {1, 2, 3, 4}; Suppose the base address is 1000 then cout <<(A+1) will display
(A) 2 **(B)** 1000
(C) 1 **(D)** 1002

c. A file in C++ can be opened using
(A) constructor of the appropriate class
(B) open( ) function
(C) append( ) function
(D) both **(A)** & **(B)**

d. The nodes with zero descendants are called
(A) root nodes **(B)** internal nodes
(C) leaf nodes **(D)** all of the above

e. The complexity of merge sort algorithm is
(A) O(n) **(B)** O(log n)
(C) O(n2) **(D)** O(n log n)

f. The operation of processing each element in the list is known as
(A) Sorting **(B)** Merging
(C) Inserting **(D)** Traversal

g. Which of the scenario will result in an average case for a linear search algorithm

(A) When Item is somewhere in the middle of the array
(B) When Item is not in the array at all
(C) When Item is the last element in the array
(D) When Item is the last element in the array or is not there at all

h. Which of the following data structure is linear data structure?
(A) Trees **(B)** Graphs
(C) Arrays **(D)** None of above

i. When in order traversing a tree resulted E A C K F H D B G; the pre-order traversal would return
(A) FAEKCDBHG **(B)** FAEKCDHGB
(C) EAFKHDCBG **(D)** FEAKDCHBG

j. The depth of a complete binary tree is given by
(A) $D_n = n \log_2 n$
(B) $D_n = n \log_2 n+1$
(C) $D_n = \log_2 n$
(D) $D_n = \log_2 n+1$

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

Q2. a Explain, in brief, the various factors that determine the selection of an algorithm to solve a computational problem **(6)**

b. Explain the following
(i) "this" pointer (ii) the new operator
(iii) big oh(O) notation (iv) free( ) function
(v) delete operator **(10)**

Q3. a. Write an algorithm to convert an infix expression into postfix form. **(8)**

b. Write algorithms to Insert and Delete an element in a circular Queue. **(4+4)**

Q4. a. Discuss the advantages and disadvantages of linked list over arrays. **(6)**

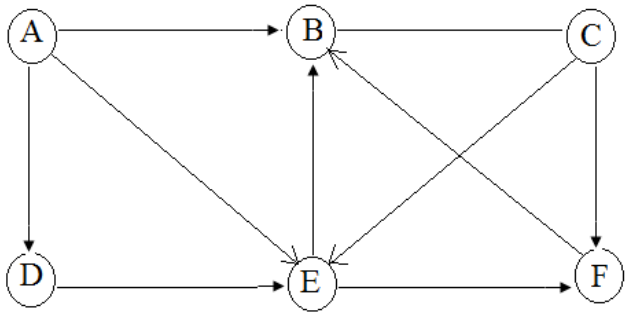
b. Write a program to implement the following operations on a single linked list.
a. Create
b. Insert
c. Traversal **(10)**

Q5. a. Define the following:
(i) Complete binary tree
(ii) Binary search tree
(iii) Almost complete binary tree **(6)**

b Construct the expression tree for the following expression
a * (b + c) / d – e
Also show the pre-order and post-order traversal of the constructed tree. **(10)**

Q6. a. Give an algorithm to implement a breadth-first search traversal of a given graph. **(8)**

b. Find the in-degree and out-degree of all nodes for the following graph **(8)**



Q7. a. Write a program to implement the binary search. **(10)**

b. What is hashing? Explain any one method for collision resolution. **(6)**

Q8. a. Write a program to implement bubble sort using arrays. **(8)**

b. Write a program to implement merge sort without recursion **(8)**

Q9. a. List and explain the various classification of files according to the functions, access method or data storage method. **(10)**

b. Compare the following:
(i) seekg() and seekp() function
(ii) tellg() and tellp() function **(6)**