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**Question Paper Code: 41847**

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Fourth Semester

Electrical and Electronics Engineering

14UIT424 - DATA STRUCTURES AND ALGORITHMS

(Common to EIE and ICE branches)

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- The preprocessor directive `#include` is required if
  - Console output is used
  - Console input is used
  - Both console input and output is used
  - None of these
- Which of the following concepts means determining at runtime what method to invoke?
  - Data hiding
  - Dynamic Typing
  - Dynamic Binding
  - Dynamic Loading
- The void type is used for
  - Returning the value
  - Creating generic pointers
  - Creating functions
  - A void error
- A constructor is called whenever
  - an object is declared
  - an object is used
  - a class is declared
  - a class is used
- The postfix form of  $A*B+C/D$  is
  - $*AB/CD+$
  - $AB*CD/+$
  - $A*BC+/D$
  - $ABCD+/*$

6. Linked lists are best suited
- (a) for relatively permanent collections of data
  - (b) for the size of the structure and the data in the structure are constantly changing
  - (c) for both of above situation
  - (d) none of these
7. A binary search tree is generated by inserting in order the following integers: 50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24. The number of nodes in the left sub-tree and right sub-tree of the root respectively is
- (a) (4, 7)
  - (b) (7, 4)
  - (c) (8, 3)
  - (d) (3, 8)
8. Deletion from one end and insertion from other end is
- (a) stack
  - (b) branch
  - (c) tree
  - (d) queue
9. You have to sort a list L consisting of a sorted list followed by a few “random” elements. Which of the following sorting methods would be especially suitable for such a task?
- (a) Bubble sort
  - (b) Selection sort
  - (c) Quick sort
  - (d) Insertion sort
10. How many rotations are there in AVL tree
- (a) 3
  - (b) 4
  - (c) 5
  - (d) 6

PART - B (5 x 2 = 10 Marks)

11. Write a C++ code to create an array of 10 integers dynamically.
12. Define virtual functions with example.
13. Show how will you represent polynomial in linked representation.
14. Define NP completeness.
15. Compare and contrast greedy algorithm with dynamic programming.

PART - C (5 x 16 = 80 Marks)

16. (a) Explain in detail (i) Tokens (ii) Functions in C++ and (iii) basic concepts in OOP. (16)

Or

- (b) (i) What is dynamic initialization of objects? Why is it needed? How is it accomplished in C++? Illustrate. (8)

(ii) Create a class vector that represents an integer array. Using friend function overload \* operator to perform  $3*m$ , where  $m$  is an object of the class vector. Test the class with suitable main function. Can we use member function to overload the \* operator instead of friend function? Justify your answer. (8)

17. (a) (i) Assume that the test results of a batch of students are stored in three different classes, student, test and result. Write a program using multilevel inheritance to print the result of two students having two subject marks. (8)

(ii) Write a C++ program to count and display the number of BLANK SPACES in an existing text file notes.txt. (8)

Or

(b) Explain exception handing in detail with example programs. (16)

18. (a) Explain about lists and types of list in detail with suitable diagrams and example code. (16)

Or

(b) (i) Illustrate the steps for converting an infix expression into a postfix expression for the following expression

$$(a + b) * (c + d) / (e + f) ^ g. \quad (8)$$

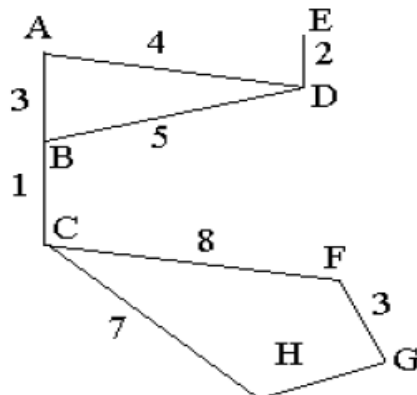
(ii) What is priority queue? Explain how priority queues can be implemented? Give the applications of priority queues. (8)

19. (a) Explain Binary tree and Binary Search tree in detail with example diagrams. (16)

Or

(b) (i) What is a Binary Search Tree (BST)? Make a BST for the following sequence of numbers: 45, 36, 76, 23, 89, 115, 98, 39, 41, 56, 69, 48. Traverse the tree in Preorder, Inorder and Postorder. (8)

(ii) What is the difference between Prim's algorithm and Kruskal's algorithm for finding the minimum-spanning tree of a graph? Implement Prim's algorithms on the following graph. (8)



20. (a) Develop Heap sort , sort the given numbers 12, 56, 34, 78, 23 and write its routine. (16)

Or

(b) (i) Sort the following sequence of keys using merge sort:  
66, 77, 11, 88, 99, 22, 33, 44, 55 (8)

(ii) Write an algorithm to sort a given list using quick sort method. Describe the behaviour of quick sort when input is already sorted. (8)

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