IS313

M S RAMAIAH INSTITUTE OF TECHNOLOGY

(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)

BANGALORE – 560 054

SEMESTER END EXAMINATIONS – JANUARY 2015

Course & Branch	: **B.E. – INFORMATION SCIENCE & ENGG.**	Semester	: **III**
Subject	: **Data Structures**	Max. Marks	: **100**
Subject Code	: **IS313**	Duration	: **3 Hrs**

Instructions to the Candidates:
- Answer one full question from each unit.

UNIT – I

1. a) Write a C program to implement a stack of character strings. (10)
   b) Write a C program to convert infix to postfix expression. (10)

2. a) Write an algorithm to evaluate the following postfix expression. Give the stack conversion table for the same. (10)
   Expression: ABC + * CBA - + *
   (A = 2, B = 3, C = 5)
   b) Covert the following infix expression into postfix expression. (05)
   - a. A * (B + C / D)
   - b. ((X – Y) * (P + G))/(M + N)
   - c. ((A + (B - C) * D)^E + F)
   - d. (a+b-c)*(d-e)/(f-g+h)
   - e. 1+(2+(3+(4+(5+(6^(1+2)))))))
   c) Give the step-by-step operation of **Tower of Hanoi** for four discs pictorially. (05)

UNIT – II

3. a) What is a queue? Explain the various types of queues along with its operations that can be performed on queues. (10)
   b) Assume the queue size to be 4 and write function to insert an item at the rear and delete an item at the front in circular queue and also trace the following set of operations. (10)
   - a. Insert item 23
   - b. Insert item 99
   - c. Delete one item
   - d. Insert item 54
   - e. Insert item 88
   - f. Insert item 12
   - g. Delete one item
   - h. Insert 61
   - i. Delete all items one by one

4. a) Write a C program to implement linear queues using structures. (10)
   b) Write a C program to implement ascending order priority queue. (10)

UNIT – III

5. a) Briefly discuss the advantages of double linked list over single linked list and write a C function to insert a given integer value into an ordered doubly linked list. (10)

b) Write a program to generate Fibonacci series for first 20 numbers and store (10) each Fibonacci number in a node using circular linked list

6. a) Write a C routine to search for a key item in a singly list. (05)
   b) Write a C routine that concatenates two circular list. (05)
   c) Create an ordered linked list of students whose structure contains id, name (10) and rank. (Order the list based on the rank of a student).

UNIT – IV

7. a) Write a C program to implement Stacks using Linked List. (10)
   b) Define the following: (05)
      a. Binary Tree
      b. Complete Binary Tree
      c. Directed Graph
      d. In-degree
      e. Almost Complete Binary tree
   c) Write a function to count the number of leaf nodes in a tree using recursive (05) function call.

8. a) Write a C program to implement Queues using Linked List (10)
   b) Write a C routine to insert an item into a Binary tree. Explain with an (10) example.

UNIT – V

9. a) What is Hashing? How does hashing differs from indexing? Explain different (10) types of hashing functions.
   b) Explain the insert and delete mechanism for B-trees (10)
      • Insert: 5, 3, 21, 9, 1, 13, 2, 7, 10, 12, 4, 8
      • Delete: 2, 21, 10, 3, 4

10. a) Write a short notes on
       1. B+ Trees (05)
       2. Collisions (05)
    b) Explain chained progressive overflow with an example (10)

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