RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous Degree College with P.G. Section under University of Calcutta)

B.A./B.SC. SECOND SEMESTER EXAMINATION, MAY 2011

FIRST YEAR

Date : 24/05/2011 **COMPUTER SCIENCE (Honours)**

Time : 11 am – 2 pm Paper : II Full Marks : 75

Answer <u>any five</u> questions:

1. a) What is PSW? What do you mean by user visible registers?
   b) Discuss the importance of stack organization for zero address instructions. Write an assembly language program using zero address instructions to evaluate the following expression
   $V = 2 \times W - (X/(Y + Z))$
   c) What is the importance of normalized floating point number? Describe the IEEE 754 format for representing floating point number with double precision using hidden one. Calculate the expansible number domain limits for this format. [(1+2) + (2+3) + (1+4+2) = 15]

2. a) Explain the concept of DMA.
   b) Compare and contrast Hardwired control unit design v/s Microprogrammed control unit design.
   c) design a 4-bit array-multiplier using the hardware implementation of Booth's algorithm. [5+5+5 = 15]

3. a) What are the different types of addressing modes commonly used? (Name <u>any four</u> only)
   b) How associative memory can be used for Cache design.
   c) Write a procedure to check whether a given expression is valid or invalid with a suitable illustration. (Consider arithmetic expression in Infix notation and also check whether properly parenthesized or not)
   d) Write an algorithm for RK method of fourth order. [2+3+5+5 = 15]

4. a) Write an algorithm to find the minimum element from a binary search tree. What are the disadvantages of BST?
   b) i) "Inorder Traversal has an important role in case of Binary Tree Construction"— Justify
   ii) Suppose in the following sequences, the nodes of a Binary Tree T, are in preorder and inorder respectively.
   Preorder : G, B, Q, A, C, K, F, P, D, E, R, H
   Inorder : Q, B, K, C, F, A, G, P, E, D, H, R
   Draw the diagram of the binary tree
   c) i) Write short notes on AVL Tree.
   ii) Can you perform binary search on linked list? Explain. [(3+2)+(2+3)+(3+2) = 15]

5. a) i) What is Sparse matrix?
   ii) Write an algorithm to reverse a singly linked list.
   b) Compare Insertion sort, Quick Sort, Selection Sort and Merge Sort with respect to their performance and complexity (worst case only). When insertion Sort will be much more useful than others? (Give example)
   c) Show the Hash table that results when the letters in "COMPUTER SCIENCE" are stored in the order using the linear probe collision resolution method. Assume a Hash table of size 19 and use the function h(K) = K mod 19 for K-th letter of English Alphabet. [(1+3)+(5+2)+4 = 15]

6. a) Explain the concept of absolute error, relative error and percentage error with proper example.
   b) Geometrically interpret the formula of Newton Raphson Method.
   c) Fit a straight line using least square method w.r.t the following data
   (x = 3, y = 4), (x = 9, y = 10), (x = 6, y = 7), (x = 2, y = 3) [6+4+5 = 15]

7. a) Write an algorithm for Simpson's ⅓rd rule.
   b) Compare and contrast Gauss elimination algorithm with gauss Seidel algorithm to solve a system of linear equations.
   c) Solve the following system using Gauss elimination method.
   $X + Y + Z = 6$
   $X + 2Y + 3Z = 14$
   $3X + Y – Z = 2$ [5+3+7 = 15]