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THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, NOVEMBER 2013

IT/CS 09 303/PT/CS 09 302—DATA STRUCTURES

(2009 Admissions)

Time : Three Hours

Maximum : 70 Marks

Part A

Answer all questions.
Each question carries 2 marks.

1. Differentiate Recursion and iteration.

2. Give the array representation binary tree.

3. What is the significant of threaded binary array ?

4. Define Minimum spanning tree.

5. Write the worst case, best case and average case time complexity of Heap and Quick sorts.

(5 × 2 = 10 marks)

Part B

Answer any four questions.
Each question carries 5 marks.

1. Write a function in C which searches string x for the first occurrence of string y. If y does not appear in x, then function returns zero. Otherwise function returns starting position in x of the first occurrence of y.

2. State the Tower of Hanoi problem. Design a recursive algorithm to solve the problem.

3. How would you implement a circular queue of integers in C using array ? Write routines to implement appropriate operations for it.

4. Write a program to add subtract polynomials in single variables.

5. Write an algorithm, to merge three singly linked lists whose elements are sorted in ascending order to produce a single singly linked list sorted in ascending order.

6. Write an algorithm for sorting a set of integers using Heap sort procedure. Also compute the average case complexity of your algorithm.

(4 × 5 = 20 marks)

Turn over

Part C

Answer Section (a) **or** *Section (b) of each question.*

1. (a) (i) Write a recursive program to compile height of a binary tree.

   (ii) Draw a binary search tree that results from inserting into an initial empty tree records with keys given below in order. E,A,S,Y,Q,U,E,S,T,I,O,N, and then deleting 'Q'.

   Or

   (b) (i) State Tower of Hanoi problem. Write recursive algorithm to solve the problem.

   (ii) Design a method for keeping two stacks within a single linear array so that neither stack overflows until all of the memory is used. Write a C function push(x, s) that pushes element x onto stack s, where s is one or other of these two stacks. Include all necessary error checks.

2. (a) Write an algorithm for matching different paranthesis such as {, [, (in an algerbraic expression.

   Or

   (b) (i) Write a short note on Garbage Collection and Compaction.

   (ii) Design an algorithm to delete a node from a doubly linked list. Derive the time complexity of the same.

3. (a) (i) How would you implement a circular queue of integers in C using array ? Write routines to implement the appropriate operations for it.

   (ii) Differentiate between dequeue and priority queue using suitable illustrations.

   Or

   (b) Explain the Prim's algorithm with relevant example in detail.

4. (a) (i) What is incidence matrix ? Find the incidence matrix of the following graph.
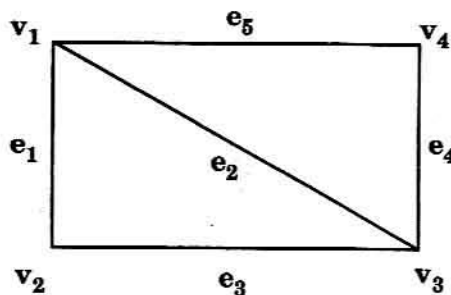
   (ii) Discuss the concept of open hashing and closed hashing techniques with suitable examples.

   Or

   (b) Sort the following elements using insertion, merge sort and selection sort 25, 55, 46, 35, 10, 90, 84, 31. Derive the complexity of each sorting technique.

(4 × 10 = 40 marks)