Reg. No. : ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚

Question Paper Code : 65228

5 Year M.Sc. DEGREE EXAMINATION, MAY/JUNE 2013.

Third Semester

Software Engineering

ESE 031 — DATA STRUCTURES

(Regulation 2010)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A Character array A[2][3][4] is stored using row major order. What will be the address of the element A[2][2][1]? (Assume base address = 310)

2. How will you partition the array into 2 subsets such that elements $>x$ are in one subset and the remaining in other subset?

3. Write a pseudocode to delete the last element in a singly linked list.

4. How will you implement insertion on a circular queue.

5. Draw the tree for the following specifications. Preorder : *+AB+CD, Postorder: AB+CD+*.

6. What is a complete binary tree? Give an example.
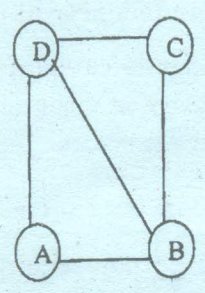
7. Write the adjacency list for the graph Fig 1.

Fig. 1

8. Give the multiply linked list representation for the following sparse matrix

$$\begin{pmatrix} -7 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 4 & 0 & 5 \\ 0 & 6 & 0 & 4 \end{pmatrix}.$$

9. What is rehashing? How does it serve to overcome the drawbacks of linear probing?

10. Write the limitations of compaction routine.

PART B — (5 × 16 = 80 marks)

11. (a) Given a stack S and a queue Q, write procedures FILL_S which will empty the contents of the stack S and insert them into the queue Q and FILL_Q which will fill the stack S with the elements deleted from the queue Q. Implement the procedures with S and Q having an array representation.

Or

(b) Give the procedure to evaluate a postfix expression. Using this algorithm evaluate $A + BC\uparrow D$ for $A = 2$, $B = -1$, $C = 2$ and $D = 3$.

12. (a) How will you represent a priority queue using an array? Give the procedure for deleting and inserting elements in a priority queue.

Or

(b) (i) Write an algorithm to store the contents of a stack in a queue.

(ii) Write the algorithm to insert in the middle of a doubly linked list.

13. (a) In a railway reservation centre, Railway employee serves a single queue of passengers. Every passenger receives a token as soon as he/she enters the queue. After the service has been completed, the token is returned to the railway employee.

(i) Implement this system using an appropriate data structure, Simulate a random arrival and departure of passengers. (8)

(ii) Each passenger is categorized according to their nature of service and also priority is assigned to them. Simulate and show how the passengers are serviced. (8)

Or

(b) Write a recursive and non-recursive algorithm to search for a particular element in a binary tree.

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14. (a) Suppose a binary tree T is in memory. Write a non–recursive procedure for each of the following.

    (i) Finding the number of nodes in T.

    (ii) Finding the depth D of T.

    (iii) Finding the number of terminal nodes in T.

Or

(b) Write the algorithms for Graph traversals. Trace the algorithms for the graph in Fig.2. (Start from Vertex C)
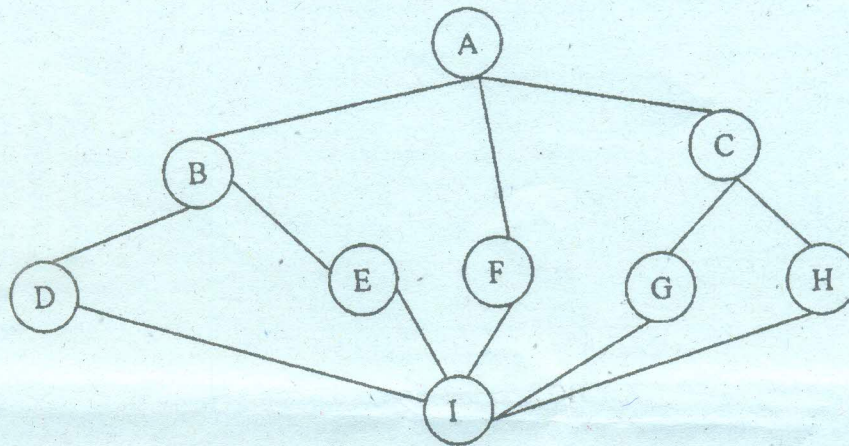

Fig. 2

15. (a) Explain first-fit allocation algorithm. What are the improvements that can be made in the first fit method?

Or

(b) Write a note on processing Direct files and indexed sequential files.

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