G 1622

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B.TECH. DEGREE EXAMINATION, MAY 2016

Fourth Semester

Branch : Computer Science and Engineering

DATA STRUCTURES AND PROGRAMMING METHODOLOGIES (R)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

Part A

Answer all questions.
Each question carries 4 marks.

1. Differentiate between iteration and recursion.

2. What are the different types of complexity ? Explain any *one*.

3. What is an array ? Differentiate between one-dimensional and two-dimensional arrays.

4. Why stack is called a LIFO data structure ?

5. How would you find out if one of the pointers in a linked list is corrupted or not ?

6. How can you access individual characters in a string ? Which is the last character of a string ?

7. What must a graph look like if a row of its adjancy matrix consists only of zeros ?

8. What is a binary tree ? Mention the properties of a binary tree.

9. Describe the concept of binary search technique. Is it efficient than sequential search ?

10. Explain both the worst case and the best case analysis of quick sort.

(10 × 4 = 40 marks)

Part B

Answer all questions.
Each full question carries 12 marks.

11. What is recursion ? Explain recursive algorithm to find n^{th} Fibonacci. Give the recursive stack structure for fib (4).

Or

12. (a) What are the various notations used to denote the complexity of an algorithm ? Explain.

(5 marks)

(b) Explain the factors which influence the calculation of the running time of a program ?

(7 marks)

Turn over
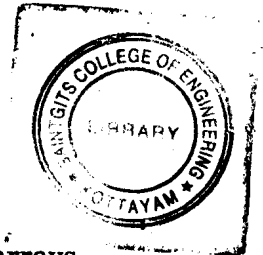
13. Write a program to convert a square matrix to a unit matrix.

Or

14. Devise an implementation of the Queue abstract data type using two stacks. Give algorithms for the Enqueue and Dequeue operations, and derive tight big-oh expressions for the running times of your implementation.

15. Write a C program to create a singly linked list and split it at the middle. Make the second half as the first and vice-versa. Display the final list.

Or

16. Write a function that creates a new linear linked list by selecting alternate elements of a given linear linked list.

17. Consider the binary tree T given below :
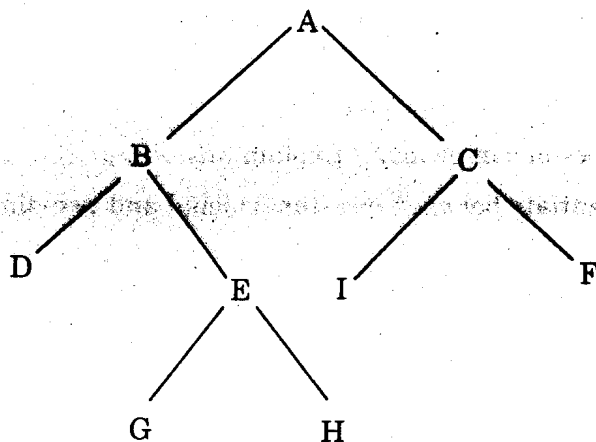
   (a) Draw the one-way in order threading of T.
   (b) Draw the one-way preorder threading of T.
   (c) Draw the two-way in order threading of T.

Or

18. Suppose the following sequence list the nodes of a binary tree T in preorder and inorder respectively. Draw the diagram of the tree :

   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

19. Here is an array of ten integers : 5 3 8 9 1 7 0 2 6 4. Suppose we partition this array using quick sort's partition function and using 5 for the pivot. Draw the resulting array after the partition finishes.

Or

20. (a) What are the pre-requisites for binary search ? (4 marks)
   (b) Sort the following numbers using heap sort :
      46, 23, 36, 48, 10, 94, 83, 31. (8 marks)

[5 × 12 = 60 marks]