

**B.Tech Odd Semester (CBCS) Exam.,
December—2016**

INFORMATION TECHNOLOGY

(3rd Semester)

Course No. : IT-304

(Data Structure)

Full Marks : 75

Pass Marks : 30

Time : 3 hours

- Note :*
1. Attempt **one** question from each Unit.
 2. Begin each answer in a new page.
 3. Answer parts of a question at a place.
 4. Assume reasonable data wherever required.
 5. The figures in the margin indicate full marks for the questions.

UNIT—1

1. (a) How do you find the complexity of an algorithm? Explain Abstract Data Type (ADT). 4+3=7

- (b) What is recursion? Write an algorithm to calculate the factorial of a number recursively. 4+4=8

2. (a) What is an algorithm? Explain all the characteristics of an algorithm. Briefly discuss the factors that affect the efficiency of a program. 2+3+5=10

- (b) Explain Greedy approach with a suitable example. 5

UNIT—2

3. (a) Explain queue data structure in detail. 4

- (b) What are circular queues? Write down routines for inserting and deleting elements from a circular queue implemented using arrays. 4+7=11

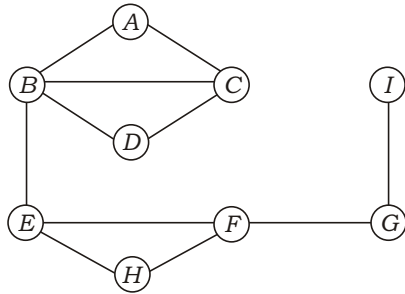
4. (a) Write a C program to illustrate all the operations of a stack. 9

- (b) A double-ended queue is a linear list where additions and deletions can be performed at either end. Represent a double-ended queue using an array to store elements and write modules for additions and deletions. 6

(3)

UNIT—3

5. (a) Give the adjacency matrix and adjacency list of the following graph : 8



- (b) What is a height-balanced tree? Explain how the height is balanced after addition/deletion of nodes in it. 2+5=7

6. (a) Construct the binary tree for the following sequence of nodes : 5

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

- (b) Explain various graph traversal schemes in detail and write their merits and demerits. 10

(4)

UNIT—4

7. (a) Write binary search algorithm and trace to search element 91 in the following list (show all the steps) :

13 30 62 73 81 88 91

What are the limitations of binary search? 5+2=7

- (b) Sort the following list using heap sort technique, displaying each step : 8

20 12 25 6 10 15 13

8. (a) Compare and contrast various sorting techniques with respect to memory space and computing time. 9

- (b) A certain sorting technique was applied to the following data set :

81 72 63 45 27 36

After the two passes the rearrangement of data set is given below :

27 36 81 72 63 45

Identify and explain the sorting algorithm that was applied. 6

(5)

UNIT—5

9. What do you understand by the term file organization? Briefly summarise different file organizations that are widely used today. Explain the basic file operations. $5+5+5=15$
10. Define hashing. Describe any two commonly used hash functions. Describe one method of collision resolution. $2+8+5=15$

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