

B. Tech. Sem - III (Computer Engg.) 2014 COURSE) (CBCS) :
WINTER - 2018
SUBJECT: PRINCIPLES OF DATA STRUCTURES

Date: Monday
Day: 26/11/2018

W-2018-2292

Time: 10.00 AM TO 01.00 PM
Max Marks: 60

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Assume suitable data if necessary.

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- Q.1** a) Explain different factors that affect efficiency of an algorithm with a suitable example. (05)
- b) Which are the different ways to represent a polynomial equation using an array? Design an algorithm to perform addition of two polynomial equations. (05)

OR

- Q.1** a) Explain Big-O, Omega and Theta notations in details and give an example for each. (05)
- b) Why ADTs are abstract in nature, explain with suitable examples. (05)
- Q.2** Design a student management system with following data elements: (10)
a) Roll no b) PRN c) Student name d) Branch d) Class
with following functionality:
a) Insert a record b) delete a record
c) sort w. r. t. any data element d) search a record,
Which data structure will you suggest? Justify your answer.

OR

- Q.2** Explain linked representation of a queue in brief. Write a pseudo code to construct a queue with any one operation (insert/delete/search) to be performed on newly constructed queue. (10)
- Q.3** a) Construct a binary search tree from following samples, (05)
12, 8, 25, 14, 9, 6, 18. Also show preorder, postorder and inorder traversal for the same in non-recursive manner.
- b) Construct a binary tree from following nodes, 9, 17, 23, 29, 33, 59, 88, (05)
and traverse a constructed tree using depth first traversal.

(P.T.O.)

OR

- Q.3** a) Define the binary tree, how can it be represented using an array? Explain the recursive traversal of a binary tree. (05)
- b) Construct a binary tree for following nodes, 109, 7, 76, 82, 53, 10, 97, 62, and traverse constructed tree using breadth first traversal. (05)
- Q.4** Sort the set of numbers, (23, 15, 67, 12, 44, 3, 4, 9, 16) with respect to following sorting techniques with stepwise illustration, (10)
- a) Bubble Sort b) Shell Sort c) Quick Sort

OR

- Q.4** Illustrate with suitable examples, a sequential and linked representation of a graph along with its any traversal technique. (10)
- Q.5** Write an algorithm to solve a 0/1 knapsack problem using dynamic programming. (10)
- Given a set of 5 objects with (Weight, Profit) as (3, 12) (6, 13) (14, 15) (5, 10) (11, 14), solve 0/1 knapsack for size of knapsack, $M=15$.

OR

- Q.5** a) To sort a large array which sorting technique is efficient, quick sort or insertion sort? Justify it with suitable example. (05)
- b) Write short notes on: (05)
- a) Dynamic Programming
- b) Code Optimization
- Q.6** a) Discuss a 8- queens problem and suggest an efficient strategy. (05)
- b) Explain backtracking strategy with suitable example. (05)

OR

- Q.6** Sort following list using heap sort 10, 12, 1, 14, 6, 5, 8, 15, 3, 7, 4, 11, 13. (10)

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