

**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

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**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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