

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I – Semester (Supplementary) Examination, July 2014

Subject : Design and Analysis of Algorithms**Time : 3 hours****Max. Marks : 75****Note: Answer all questions from Part-A. Answer any FIVE questions from Part-B.****PART – A (25 Marks)**

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|----|---|---|
| 1 | Present an algorithm that searches an unsorted array $a[1 : n]$ for the element 'x'. If 'x' occurs, then returns a position in the array, else return zero? | 3 |
| 2 | State the weighting, collapsing rules in sets. | 2 |
| 3 | Briefly differentiate quick sort and merge sort. | 2 |
| 4 | Define the terms Feasible solution, optimal solution and objective function. | 3 |
| 5 | State the purging rule and list out its applications. | 2 |
| 6 | Draw a five-stage graph. | 3 |
| 7 | What is the objective of m-colorability optimization problem? | 2 |
| 8 | Differentiate FIFO, LIFO branch-and-bound. | 3 |
| 9 | Define the terms cliques, node cover. | 2 |
| 10 | What are NP-Hard code generation problems? | 3 |

PART – B (5 x 10 = 50 Marks)

- 11 a) Explain back tracking. Give the various applications of backtracking.
b) Solve the 8-Queen's problem using backtracking.
- 12 Briefly explain the terms
a) Non-deterministic algorithms b) Satisfiability problem c) Reducibility
- 13 Solve the 0/1 knapsack instance where
 $n = 3, (w_1, w_2, w_3) = (2, 3, 4), (p_1, p_2, p_3) = (1, 2, 5)$ and 6 using Dynamic programming.
- 14 a) Present an algorithm 'select' that finds the k^{th} smallest element in an array $a[1:n]$.
b) Briefly explain spanning trees and their applications.
- 15 Present the heap sort algorithm. Explain and analyze its time complexity.
- 16 What are comparison trees? Explain their applications in searching and sorting problems?
- 17 Solve the all-pairs shortest path problem for a diagraph with the following weight matrix?

$$\begin{matrix} & 1 & 2 & 3 \\ \begin{matrix} 1 \\ 2 \\ 3 \end{matrix} & \begin{bmatrix} 0 & 4 & 11 \\ 6 & 0 & 2 \\ 3 & \infty & 0 \end{bmatrix} \end{matrix}$$
