

B.E./B.TECH. Degree Examination, December 2020

Fourth Semester

**IT16401 Paradigms of Algorithm Design**

(Regulation 2016)

Time: Three hours

Maximum : 80 Marks

Answer **ALL** questions**PART A - (8 X 2 = 16 marks)**

1. When an algorithm is written in the form of a programming language, it becomes a \_\_\_\_\_
  - a) Flowchart
  - b) Program
  - c) Pseudo code
  - d) Syntax
2. Which of the given options provides the increasing order of asymptotic complexity of functions  $f_1$ ,  $f_2$ ,  $f_3$  and  $f_4$ ?  
 $f_1(n) = 2^n$ ,  $f_2(n) = n^{3/2}$ ,  $f_3(n) = n \log n$ ,  $f_4(n) = n^{\log n}$ 
  - a.  $f_3, f_2, f_1, f_4$
  - b.  $f_2, f_3, f_1, f_4$
  - c.  $f_2, f_3, f_4, f_1$
  - d.  $f_3, f_2, f_4, f_1$
3. The complexity of searching an element from a set of  $n$  elements using Binary search algorithm is
  - a.  $O(n \log n)$
  - b.  $O(\log n)$
  - c.  $O(n^2)$
  - d.  $O(n)$
4. In the development of dynamic programming the value of an optimal solution is computed in
  - a. Top up fashion
  - b. Bottom up fashion
  - c. Both a and b
  - d. None of the above
5. How will you measure input size of algorithms.
6. Devise an algorithm to compute  $\text{gcd}(m,n)$
7. Find all possible subset from the set  $\{10,12,25,15,7,5,8\}$  such that the sum of subset is 35.
8. Distinguish between CRCW PRAM model and CREW PRAM model.

**PART B - (4 X16 = 64 marks)**

09. (a) Devise an algorithm to multiply two nxn matrices using strassen approach. Trace the approach to multiply two 3x3 matrices using your algorithm. (16)

**(OR)**

- (b) Devise an algorithm to find the shortest path between all source and destination nodes using dynamic approach. Trace your algorithm for the given adjacency matrix: (16)

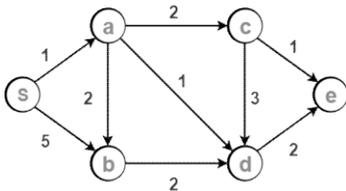
$$\begin{array}{c|ccc} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{array}$$

10. (a) Solve the following instances of 0/1 knapsack problem, given the knapsack capacity W=5 using dynamic programming. (16)

Item	Weight	Value
1	4	10
2	3	20
3	2	15
4	5	25

**(OR)**

- (b) Solve 4 queens problem using backtracking. Also Depict the statespace tree for the same. (16)
11. (a) Devise an algorithm for vertex cover problem using approximation algorithm. Trace your algorithm to colour the following graph using 3 colors. (16)

**(OR)**

- (b) Illustrate the different classes of problems with examples. (16)
12. (a) Explain the different types of parallel architectures used to implement parallel algorithms. (16)

**(OR)**

- (b) Explain in detail how genetic algorithm can be used in Financial trading application. (16)