Code No: RT32054 **R13** SET - 1

III B. Tech II Semester Supplementary Examinations, November -2018

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Computer Science Engineering and Information Technology)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1	a)	Using step count find the time complexity of sum of 'n' natural numbers	[3M]
	b)	Write the control abstraction for divide and conquer.	[4M]
	c)	Give the problem formulation of Knapsack problem using greedy method.	[4M]
	d)	Prove that dynamic programming constructs solution in bottom up approach.	[4M]
	e)	Write about the constraints and criterion function used in backtracking.	[4M]
	f)	What is bounding function? Give example.	[3M]

PART –B

2	a)	Explain the role of instance characteristics in finding the time and space complexities with an example.	[8M]
	b)	In what way amortized analysis is used for performance analysis of algorithms? Explain.	[8M]
3	a)	For $T(n)=7T(n/2)+18n^2$ Solve the recurrence relation and find the time complexity.	[8M]
	b)	Given 2 sorted lists of numbers. Write the algorithm to merge them and analyze its time complexity.	[8M]
4	a)	A motorist wishing to ride from city A to B. Formulate greedy based algorithms to generate shortest path and explain with an example graph.	[8M]
	b)	What is the solution generated by function Job Sequencing algorithm when n=6 (P1…p6) = (3, 5, 20, 18, 1, 6), and (d1..d6) = (1, 3, 4, 3, 2, 1).	[8M]
5	a)	Write a function to compute lengths of shortest paths between all pairs of nodes for the given adjacency matrix. $\begin{pmatrix} 0 & 6 & 13 \\ 8 & 0 & 4 \\ 5 & \infty & 0 \end{pmatrix}$	[8M]
	b)	Let the dimensions of A,B,C,D respectively be 10X5, 5X15, 15X8, 8X20 generate matrix product chains that produces minimum number of matrix multiplications using dynamic programming.	[8M]

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6 a) Relate Hamiltonian cycle with travelling sales person problem and also give the backtracking solution vector that finds all Hamiltonian cycles for any directed or undirected graph. [8M]

b) Draw the portion of state space tree generated by recursive backtracking algorithm for sum of subsets problem with an example. [8M]

7 Write the branch and bound algorithm to generate minimum length tour for the given cost adjacency matrix. [16M]

$$\begin{bmatrix} \infty & 18 & 28 & 8 & 9 \\ 13 & \infty & 14 & 2 & 1 \\ 1 & 3 & \infty & 1 & 2 \\ 17 & 4 & 16 & \infty & 1 \\ 14 & 2 & 5 & 16 & \infty \end{bmatrix}$$

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