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B.E. (Computer Engineering)
DESIGN AND ANALYSIS OF ALGORITHM
(2019 Pattern) (Semester-I) (410241)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates :

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Write High-level description of job sequencing algorithm. Let number of jobs (n)=5; Profit vector P={20, 15, 10, 5, 1); Deadline vector D={2, 2, 1, 3, 3) Find the feasible solutions. What is the optimal solution and maximum profit? **[9]**

b) Consider the following instance of the knapsack problem. Find the optimal solution by using dynamic programming approach. **[9]**

Item	Weight	Profit
1	2	$12
2	1	$10
3	3	$20
4	2	$15

Capacity of the knapsack = 5.

OR

Q2) a) What is Job scheduling algorithm? How job scheduling algorithm can be solved using Greedy algorithmic approach? Explain your answer with respect to Principle, control abstraction, time analysis of control abstraction, of greedy approach for the following instance of Knapsack problem. **[12]**
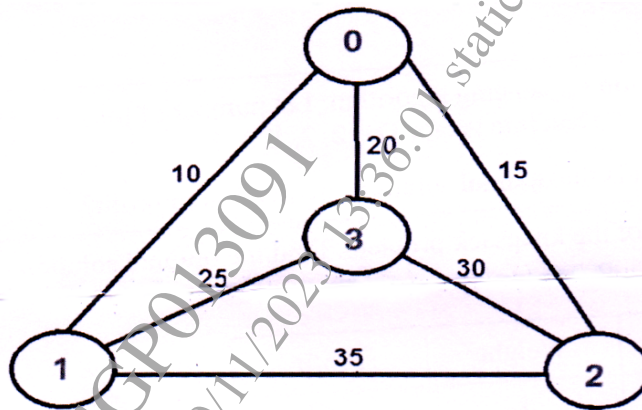
Each job is associated with a deadline and profit.

Job	J_1	J_2	J_3	J_4	J_5
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

b) Write steps for Greedy approach for Job sequencing. **[6]**

P.T.O.

Q3) a) What is branch and bound algorithmic strategy? Apply branch n bound algorithmic strategy to solve traveling salesman problem for **[9]**

b) Explain with suitable example Backtracking: Principle, control abstraction, time analysis of control abstraction. **[8]**

OR

Q4) a) Explain the 'branch and bound' approach for solving problems. Write a branch and bound algorithm for solving the 0/1 Knapsack problem. Use the same algorithm to solve the following 0/1 Knapsack problem. The capacity of the knapsack is 15 kg. **[9]**

Item	A	B	C	D
Profit(Rs.)	18	10	12	10
Weight (Kg.)	9	4	6	2

b) What is sum of subset problem? Solve sum of subset problem for following instance using backtracking approach **[8]**

Input: set[ ] = {2, 3, 5, 6, 8, 10}, sum = 10

Q5) a) What is amortized analysis? Explain the aggregate method with example. **[9]**

b) What is Potential function method of amortized analysis? To illustrate Potential method, find amortized cost of PUSH, POP and MULTIPOP stack operations. **[9]**

OR

Q6) a) What are special needs of embedded algorithm? Which sorting algorithm is best for embedded systems? Why? **[6]**

b) Explain Randomized and Approximate algorithms. **[4]**

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c) What is randomized algorithm? Give any example of randomized algorithm? Also explain Random variable, Binomial random variable and-Mathematics for Randomized algorithm. **[8]**

Q7) a) i) Explain an algorithm for Distributed Minimum Spanning Tree.

ii) Write and explain Rabin-Karp algorithm for string matching. **[10]**

b) With respect to Multithreaded Algorithms explain Analyzing multithreaded algorithms, Parallel loops, Race conditions. **[7]**

OR

Q8) a) Write and explain pseudo code for Multi-threaded merge sort algorithm. How parallel merging gives a significant parallelism advantage over Merge Sort? **[9]**

b) For string matching, working module q = 11, how many spurious hits does the Rabin- Karp matcher encounters in Text T = 31415926535.....**[8]**

i) T = 31415926535

ii) P=26

iii) Here T.Length = 11 so Q = 11

iv) And P mod Q = 26 mod 11 = 4

v) Now find the exact match of P mod Q...

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