CBCS SCHEME

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17CS43

Fourth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Explain Asymptotic notations in detail with example. **(12 Marks)**

b. Outline an algorithm to find maximum of n elements and obtain its time complexity. **(08 Marks)**

OR

2 a. Design algorithm for tower of Hanoi problem and obtain time complexity. **(10 Marks)**

b. Prove the theorem

if $f_1(n) \in 0\ (g, (n))$ and $f_2(n) \in 0\ (g_2\ (n))$ Then $f_1(n) + f_2(n) \in 0\ (\max\ \{g_1(n), g_2(n)\})$. **(10 Marks)**

Module-2

3 a. Design a recursive algorithm for binary search and calculate time complexity. **(10 Marks)**

b. Write the algorithm for merge sort and Trace 60, 50, 25, 10, 35, 25, 75, 30. **(10 Marks)**

OR

4 a. Develop an algorithm for Quick sort and derive its time complexity. **(10 Marks)**

b. What is topological sorting? Apply DFS for below graph to solve topological sorting. **(10 Marks)**

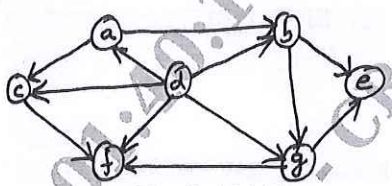

Fig.Q.4(b)

Module-3

5 a. Find the optimal solution to the knap sack instant n = 7, m = 15 using greedy method.

Object	1	2	3	4	5	6	7
Weight	02	03	05	07	01	04	01
Profit	10	05	15	07	06	18	03

(10 Marks)

b. Find the minimum spanning tree using Kruskal's algorithm.

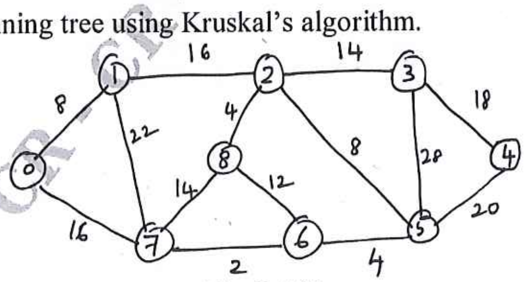

Fig.Q.5(b)

(10 Marks)

1 JAN 2020

OR

6 a. Construct a Huffman code for the following data:

Characters	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

Encode the text ABACABAD and decode 100010111001010 **(10 Marks)**

b. Calculate the shortest distance and shortest path from vertex 5 to vertex 0 using Dijkstra's. **(10 Marks)**

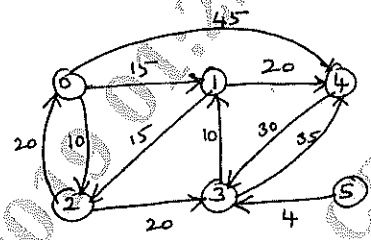

Fig.Q.6(b)

Module-4

7 a. Explain the general procedure to solve a multistage graph problem using backward approach with an example. **(10 Marks)**

b. Construct an optimal binary search tree for the following:

Items :	A	B	C	D
Probabilities :	0.1	0.2	0.4	0.3

(10 Marks)

OR

8 a. Design Floyd's algorithm to find shortest distances from all nodes to all other nodes. **(10 Marks)**

b. Apply Warshall's algorithm to compute transitive closure for the graph below. **(10 Marks)**

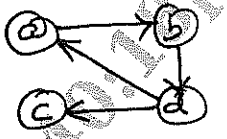

Fig.Q.8(b)

Module-5

9 a. What is Hamiltonian circuit problem? What is the procedure to find Hamiltonian circuit of a graph? **(10 Marks)**

b. Explain the classes of NP-Hard and NP-complete. **(10 Marks)**

OR

10 a. Apply the branch and bound algorithm to solve the travelling salesman problem for the graph below.

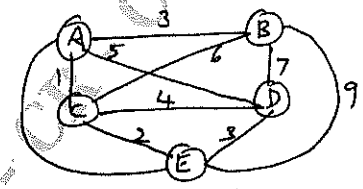

Fig.Q.10(a)

(10 Marks)

b. Obtain the optimal solution assignment problem given:

	J_1	J_2	J_3	J_4
a	9	2	7	8
b	6	4	3	7
c	5	8	1	8
d	7	6	9	4

(10 Marks)

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