

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.

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 $f_1(n) \in O(g_1(n))$ and $f_2(n) \in O(g_2(n))$ Then $f_1(n) + f_2(n) \in O(\max\{g_1(n), g_2(n)\})$. (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)

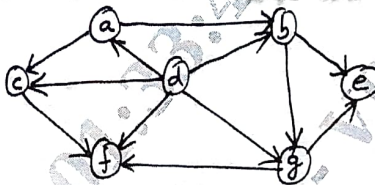


Fig.Q.4(b)

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

- b. Find the minimum spanning tree using Kruskal's algorithm. (10 Marks)

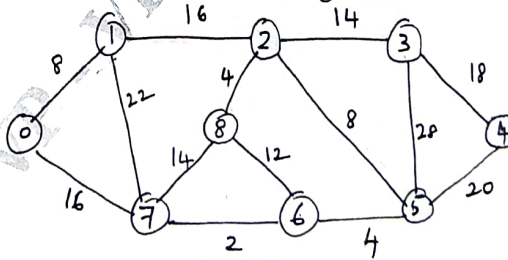


Fig.Q.5(b)

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.

OR

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

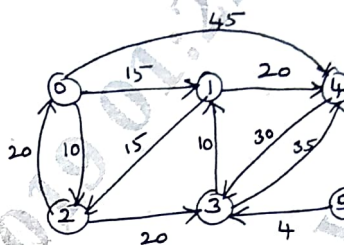
Characters	A	B	C	D	-
Probability	0.4	0.1	0.2	0.15	0.15

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:

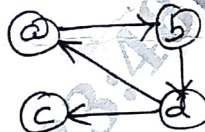
Items :	A	B	C	D
Probabilities :	0.1	0.2	0.4	0.3

(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)



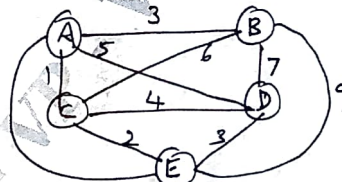
Module-5

- 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. (10 Marks)

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)
