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CHIKO'i *   17CS43

USN

Fourth Semester B.E. Degree Examination, Dee.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)**
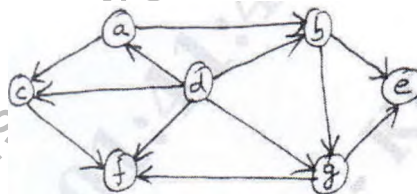   b. What is topological sorting? Apply DFS for below graph to solve topological   sorting.   **(10 Marks)**

Fig.Q.4(b)

Module-3

5 a. Find the optimal solutio

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.
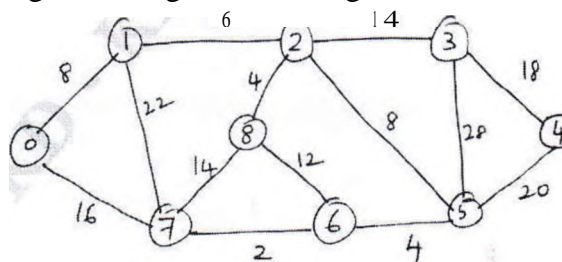

Fig.Q.5(b)

                                                                          (10 Marks)

OR

6   a.   Construct a Huffman code for the followin 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**)
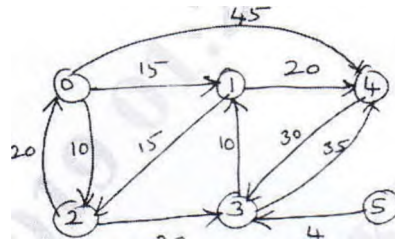
Fig.Q.6(b)

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 binar

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

(10 Marks)

OR

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

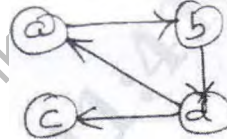b. Apply Warshall's algorithm to compute transitive closure for the graph below.   **(10 Marks)**

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.
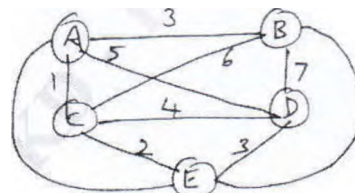
Fig.Q.10(a)

(10 Marks)

b. Obtain the optimal solution assignmenproblem given:

	J1		J3	J4
a	9	2	7	8
b	6	4	3	
c	5	8	1	
d	7	6	9	4\

(10 Marks)

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