CBCS SCHEME

USN | | | | | | | | | |

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 $f_1(n) \in 0(g, (n))$ 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)**

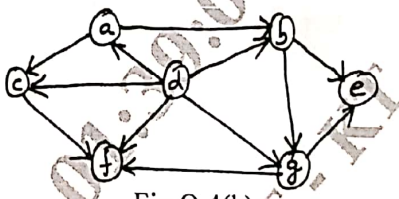


Fig.Q.4(b)

Module-3

5 a. Find the optimal solution to the knap sack instant n = 7, m = 15 using greedy method. **(10 Marks)**

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)**

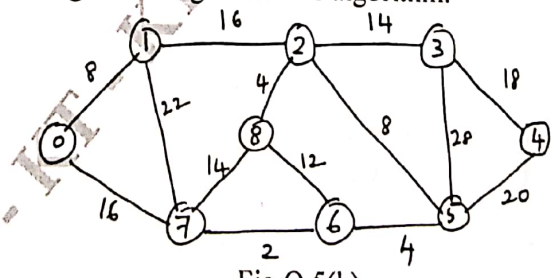


Fig.Q.5(b)

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

b. Calculate the shortest distance and shortest path from vertex 5 to vertex 0 using

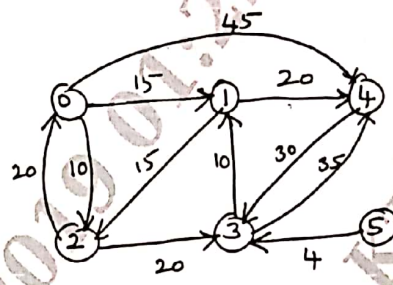


Fig.Q.6(b)

Module-4

7 a. Explain the general procedure to solve a multistage graph problem using backward with an example.

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

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

OR

8 a. Design Floyd's algorithm to find shortest distances from all nodes to all other nodes.

b. Apply Warshall's algorithm to compute transitive closure for the graph below.

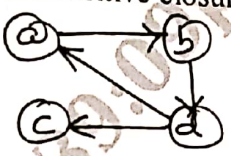


Fig.Q.8(b)

Module-5

9 a. What is Hamiltonian circuit problem? What is the procedure to find Hamiltonian cir graph?

b. Explain the classes of NP-Hard and NP-complete.

OR

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

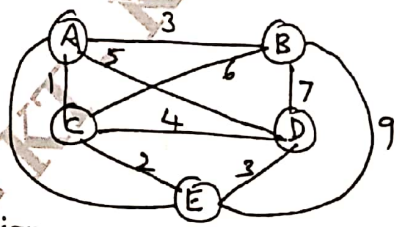


Fig.Q.10(a)

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

* * * * *

CBCS SCHEME

SN | | | | | | | | | | |

15CS43

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define algorithm. What are the properties of an algorithm? Explain with an example. **(08 Marks)**

b. Explain asymptotic notations, with examples. **(08 Marks)**

OR

2 a. Explain general plan of mathematical analysis of nonrecursive algorithm with example. **(08 Marks)**

b. Define time and space complexity. Explain important problem types. **(08 Marks)**

Module-2

3 a. Explain divide and conquer technique. Write binary search algorithm. **(08 Marks)**

b. Apply quick sort to sort the list 'QUESTION' in alphabetical order. Draw the tree of recursive calls made. **(08 Marks)**

OR

4 a. What is decrease and conquer approach? Explain the different major variations of decrease and conquer. **(08 Marks)**

b. Design merge sort algorithm and discuss its best-case, average-case and worst-case efficiency. **(08 Marks)**

Module-3

5 a. Explain Geedy criterion. Write a Prim's algorithm to find minimum cost spanning tree. **(08 Marks)**

b. Sort the given list of numbers using heap sort: 2, 9, 7, 6, 5, 8 **(08 Marks)**

OR

6 a. Construct a Huffman tree and resulting code word for the following:

Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

Encode the words DAD and ADD. **(08 Marks)**

b. Write an algorithm to find single source shortest path. **(08 Marks)**

Module-4

7 a. Define transitive closure. Trace the following graph using Warshall's algorithm. **(08 Marks)**

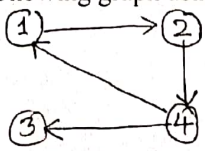


Fig.Q.7(a)

b. What is Dynamic programming? Explain in detail with suitable examples. **(08 Marks)**

OR

8 a. Solve the following instance of knapsack problem using dynamic progra
capacity of knapsack is W = 5.

Item	Weight	Value
1	2	3
2	3	4
3	4	5
4	5	6

US

b. Explain multistage graphs with example. Write multistage graph algorithm
approach.

T

Module-5

9 a. Solve subset sum problem for the following example S = {3, 5, 6, 7} and d = 15
state space tree.

b. Explain back tracking concept and how back tracking is used for solving
problem. Show the state space table.

1

10 a. Explain LC branch and bound and FIFO branch and bound.

OR

b. Obtain the optimal solution for the given assignment problem as a matrix sho
using branch and bound method.

2

Person	Job1	Job2	Job3	Job4
A	10	2	7	8
B	6	4	3	7
C	5	8	1	8
D	7	6	10	4

* * * * *

CBCS Scheme

USN | | | | | | | | | | |

15CS43

Fourth Semester B.E. Degree Examination, June/July 2018
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Write an algorithm to find the maximum element in an array of n element. Give the mathematical analysis of this non-recursive algorithm. **(06 Marks)**

b. Explain the asymptotic notations BigO, BigΩ and big theta used to compare orders of growth of an algorithm. **(06 Marks)**

c. Explain with an example how a new variable count introduced in a program can be used to find the number of steps needed by a program to solve a particular problem instance. **(04 Marks)**

OR

2 a. Write a recursive function to find and print all possible permutations of a given set of n elements. **(05 Marks)**

b. Solve the recurrence relation : $M(n) = 2M(n-1) + 1$. Take $M(1) = 1$, $M(n)$ is given for $n > 1$. **(05 Marks)**

c. Define algorithm. What are the criteria that an algorithm must satisfy? **(06 Marks)**

Module-2

3 a. Write a function to find the maximum and minimum elements in a given array of n elements by applying the divide and conquer technique. **(06 Marks)**

b. Explain the divide and conquer technique. Give the general algorithm DAndC(P)[Where P is the problem to be solve] to illustrate this technique. **(04 Marks)**

c. Apply source removal method to obtain topological sort for the given graph in Fig.Q3(c). **(06 Marks)**

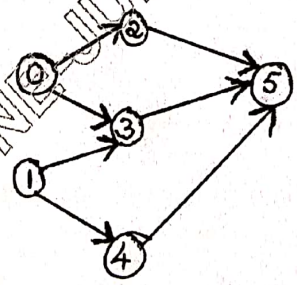


Fig.Q3(c)

OR

4 a. Explain the merge sort algorithm. Illustrate with an example and give the worst case efficiency of merge-sort. **(08 Marks)**

b. Apply quick sort algorithm to the following set of numbers.
65, 70, 75, 80, 85, 60, 55, 50, 45. **(08 Marks)**

Module-3

5 a. Apply greedy method to obtain an optimal solution to the knapsack problem given M = 60, $(w_1, w_2, w_3, w_4, w_5) = (5, 10, 20, 30, 40)$ $(p_1, p_2, p_3, p_4, p_5) = (30, 20, 100, 90, 160)$. Find the total profit earned. (04 Marks)

b. Explain Huffman algorithm. With an example show the construction of Huffman tree and generate the Huffman code using this tree. (06 Marks)

c. Apply Prim's algorithm to obtain a minimum spanning tree for the given weighted connected graph. [Fig.Q5(c)]. (06 Marks)

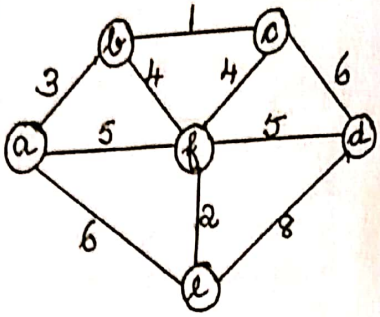


Fig.Q5(c)

OR

6 a. Explain the bottom up heap construction algorithm with an example. Give the worst case efficiency of this algorithm. (08 Marks)

b. Apply single source shortest path problem assuming vertex a as source.[Refer Fig.Q6(b)]. (08 Marks)

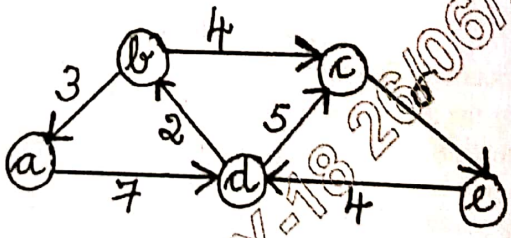


Fig.Q6(b)

Module-4

7 a. Explain multistage graph with an example. Write multistage graph algorithm using backward approach. (08 Marks)

b. Apply Floyd's algorithm to solve all pair shortest path problem for the graph given below in Fig.Q7(b). (08 Marks)

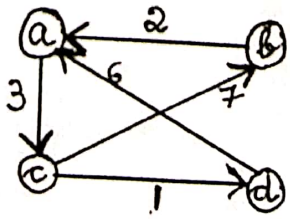


Fig.Q7(b)

CBCS SCHEME

USN | | | | | | | | | | |

15CS43

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is an algorithm? What are the properties of an algorithm? Explain with an example. **(04 Marks)**

b. Explain the general plan for analyzing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of a number. Derive its efficiency. **(08 Marks)**

c. If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$, prove that $t_1(n) + t_2(n) \in O(\max\{g_1(n), g_2(n)\})$. **(04 Marks)**

OR

2 a. Explain the asymptotic notations with examples. **(06 Marks)**

b. Distinguish between the two common ways to represent a graph. **(04 Marks)**

c. Discuss about the important problem types and fundamental data structures. **(06 Marks)**

Module-2

3 a. Discuss how quick-sort works to sort an array and trace for the following data set. Draw the tree of recursive calls made.

65	70	75	80	85	60	55	50	45

Derive the best case complexity of quick sort algorithm. **(10 Marks)**

b. Briefly explain the Strassen's matrix multiplication. Obtain its time complexity. **(06 Marks)**

OR

4 a. Explain the concept of divide and conquer. Design an algorithm for merge sort and derive its time complexity. **(10 Marks)**

b. What are the three major variations of decrease and conquer technique? Explain with an example for each. **(06 Marks)**

Module-3

5 a. Explain the concept of greedy technique for Prim's algorithm. Obtain a minimum spanning tree for the graph shown in Fig.Q5(a). (08 Marks)

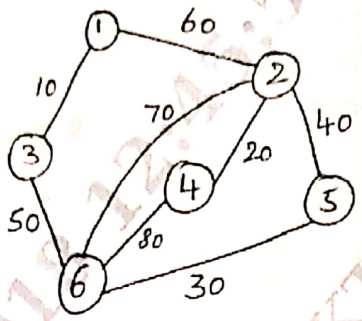


Fig.Q5(a)

b. Solve the below instance of the single source shortest path problem with vertex 6 as source. With the help of a suitable algorithm. (08 Marks)

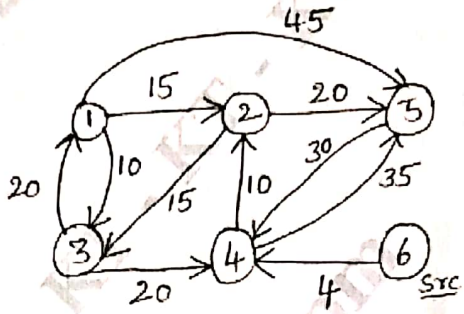


Fig.Q5(b)

OR

6 a. What are Huffman trees? Explain. Construct a Huffman code for the following data :

Character	A	B	C	D	E	–
Probability	0.5	0.35	0.5	0.1	0.4	0.2

Encode DAD_CBE using Huffman encoding. (08 Marks)

b. Explain transform and conquer technique. Sort the below list using Heap sort : 3, 2, 4, 1, 6, 5. (08 Marks)

Module-4

7 a. Define transitive closure of a graph. Write Warshall's algorithm to compute transitive closure of a directed graph. Apply the same on the graph defined by the following adjacency matrix :

$$R = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}.$$

(08 Marks)

b. Using Dynamic programming, solve the below instance of knapsack problem. (08 Marks)

Item	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	15

Capacity w = 5

OR

8 a. Obtain a optimal binary search tree for the following four-key set. **(08 Marks)**

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

b. Solve the following travelling sales person problem represented as a graph shown in Fig.Q8(b), using dynamic programming. **(08 Marks)**

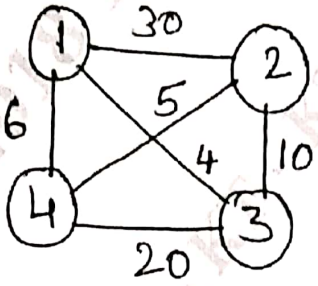


Fig.Q8(b)

Module-5

9 a. What is the central principle of backtracking? Apply backtracking to solve the below instance of sum of subset problem
S = {5, 10, 12, 13, 15, 18} d = 30. **(08 Marks)**

b. Solve the below instance of assignment problem using branch and bound algorithm.

$$C = \begin{matrix} \text{Job}_1 & \text{Job}_2 & \text{Job}_3 & \text{Job}_4 & \\ \begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix} & & & & \begin{matrix} \text{Person a} \\ \text{Person b} \\ \text{Person c} \\ \text{Person d} \end{matrix} \end{matrix}$$

(08 Marks)

OR

10 a. Draw the state-space tree to generate solutions to 4-Queen's problem. **(04 Marks)**

b. Apply backtracking to the problem of finding a Hamiltonian circuit in the graph shown below : **(04 Marks)**

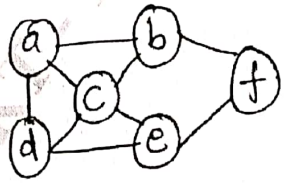


Fig.Q10(a)

c. Define the following :
i) Class P
ii) Class NP
iii) NP complete problem
iv) NP hard problem. **(08 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

15CS43

Fourth Semester B.E. Degree Examination, June/July 2019
Design and Analysis of Algorithm

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is an algorithm? Summarize the properties of an algorithm. **(04 Marks)**

b. Solve the following recurrence relation:

$x(n) = x(n/2) + n$ for $n > 1, x(1) = 1$

Assume $n = 2^k$ **(06 Marks)**

c. Algorithm Test(n)

```
// Input : A non negative integer 'n'
    s ← 0
    for i ← 1 to n do
        for j ← 1 to n do
            s ← s + i * j
    return s
```

(i) What does this algorithm compute?

(ii) What is the basic operation?

(iii) How many times the basic operation executed?

(iv) What is the efficiency class of this algorithm? **(06 Marks)**

OR

2 a. With neat diagram summarize the steps used to solve a given problem using computer. **(06 Marks)**

b. Consider the following algorithm:

```
Algorithm s(n)
{
  If (n = 1) return 1,
  Else return (s(n – 1) + n.n.n)
}
```

What does this algorithm? What is the basic operation? How many times the basic operation executed? **(04 Marks)**

c. Design a recursive algorithm for computing factorial of a number n. Set up a recurrence relation and find its efficiency. **(06 Marks)**

Module-2

3 a. Discuss how to find maximum and minimum element in an array recursively. Trace the same for the following data set 65, 70, 75, 80, 85, 60, 55, 50, 45. Also derive the worst case complexity. **(06 Marks)**

b. What is stable algorithm? Is quick sort stable explain with an example. **(04 Marks)**

c. Define decrease and conquer technique and mention all the variations with an example. **(06 Marks)**

OR

4 a. Design recursive algorithm for mergesort and derive its complexity. (06 Marks)

b. How would you demonstrate the steps used in Strassen's matrix multiplication. (04 Marks)

c. What actions would to take to perform topological sort using source removal method explain with an example. (06 Marks)

Module-3

5 a. Recall the concept of Greedy technique. (03 Marks)

b. In the weighted diagraph given below Fig.Q5(b), determine the shortest paths from vertex '0' to all other vertices. (07 Marks)

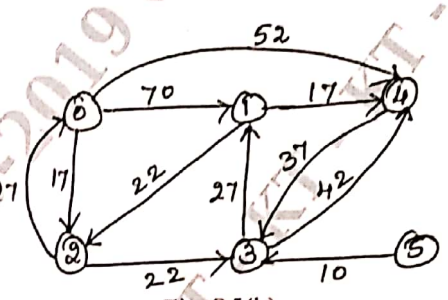


Fig.Q5(b)

c. How would you solve the following instance of knapsack problem, using greedy algorithm.

Item	1	2	3	4
Weight	4	7	5	3
Profit	40	42	25	12

Knapsack capacity M = 10. (06 Marks)

OR

6 a. State job sequencing with deadline. Explain algorithm for job sequencing with dead line. (08 Marks)

b. Obtain minimum cost spanning tree for the graph given below in Fig.Q6(b), using Prim's algorithm. (08 Marks)

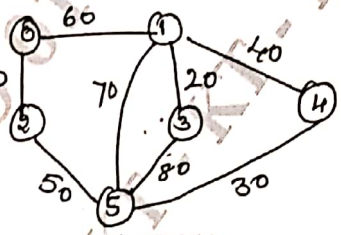


Fig.Q6(b)

Module-4

7 a. Using Floyd's Algorithm solve the all pair shortest path problem for the graph whose weight matrix is given below. (06 Marks)

$$\begin{bmatrix} 0 & 10 & \infty & 40 \\ \infty & 0 & \infty & 20 \\ 50 & \infty & 0 & \infty \\ \infty & \infty & 60 & 0 \end{bmatrix}$$

b. Explain Bellman Ford algorithm. (04 Marks)

c. State travelling sales person problem. Solve the following using dynamic programming.

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$ Starting city = 1 **(06 Marks)**

OR

8 a. How would you define Dynamic programming? With an example illustrate multistage graph for forward approach. **(06 Marks)**

b. Using dynamic programming solve the following knapsack n = 4, M = 5, $(w_1\ w_2\ w_3\ w_4) = (2, 1, 3, 2)$, Profit $(P_1\ P_2\ P_3\ P_4) = (8, 6, 16, 11)$. **(06 Marks)**

c. Write Warshall's algorithm. **(04 Marks)**

Module-5

9 a. Explain back tracking method? Draw state space tree to generate solutions to 4-Queen's problem. **(06 Marks)**

b. What is branch and bound algorithm? How it is different from backtracking? **(04 Marks)**

c. Define the following :
(i) Class P
(ii) Class NP
(iii) NP complete problem. **(06 Marks)**

OR

10 a. Apply backtracking technique to solve the instance of the sum of subset problem : S = {3, 5, 6, 7} and d = 15. **(08 Marks)**

b. Apply branch and bound algorithm to solve the traveling salesman problem for the following graph in Fig.Q10(b). **(08 Marks)**

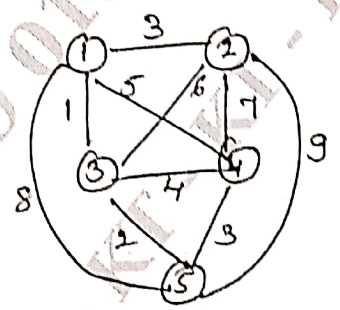


Fig.Q10(b)

* * * * *

CBCS SCHEME

USN | | | | | | | | | | **17CS43**

Fourth Semester B.E. Degree Examination, June/July 2019
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. Design an algorithm to search an element in a array using sequential search. Discuss the worst case, best case and average case efficiency of this algorithm. **(08 Marks)**

b. Discuss adjacency matrix and adjacency list representation of a graph with suitable example. **(06 Marks)**

c. Give the recursive algorithm to solve towers of Hanoi problem. Show that the efficiency of this algorithm is exponential. **(06 Marks)**

OR

2 a. Give the general plan for analyzing time efficiency of non recursive algorithms. Derive the worst case analysis for the algorithm to check whether all the elements in a given array are distinct. **(08 Marks)**

b. List and define any three asymptotic notations. What are the various basic asymptotic efficiency classes? **(06 Marks)**

c. Explain the following types of problems:
(i) Combinatorial problems (ii) Graph problems. **(06 Marks)**

Module-2

3 a. Write an algorithm to sort 'n' numbers using Quick sort. Trace the algorithm to sort the following list in ascending order.
80 60 70 40 10 30 50 20 **(08 Marks)**

b. Discuss general divide and conquer technique with control abstraction and recurrence relation. **(06 Marks)**

c. Apply DFS based algorithm and source removal method to find the topological sequence for the graph shown in Fig.Q3(c). **(06 Marks)**

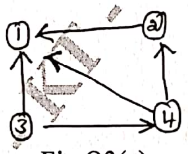


Fig.Q3(c)

OR

4 a. Apply Strassen's matrix multiplication to multiply following matrices. Discuss how this method is better than direct matrix multiplication method.

$$\begin{bmatrix} 4 & 3 \\ 2 & 1 \end{bmatrix} \times \begin{bmatrix} 2 & 5 \\ 1 & 6 \end{bmatrix}$$ **(08 Marks)**

b. Write recursive algorithm to find maximum and minimum element in an array. **(06 Marks)**

c. Write an algorithm to sort 'n' number using merge sort. **(06 Marks)**

Module-3

5 a. Write an algorithm to solve knapsack problem using Greedy technique. Find the optimal solution to the knapsack instance n = 7, m = 15

$(P_1, P_2 \ldots\ldots P_7) = (10, 5, 15, 7, 6, 18, 3)$

$(W_1, W_2 \ldots\ldots W_7) = (2, 3, 5, 7, 1, 4, 1)$ **(10 Marks)**

b. Apply Prim's algorithm and Kruskal's method to find the minimum cost spanning tree to the graph shown in Fig.Q5(b). **(10 Marks)**

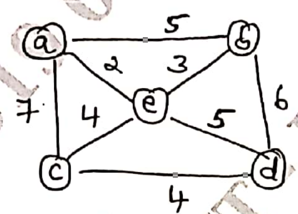


Fig.Q5(b)

OR

6 a. Write an algorithm to solve single source shortest path problem. Apply the algorithm to the graph shown in Fig.Q6(a) by considering 'a' as source. **(10 Marks)**

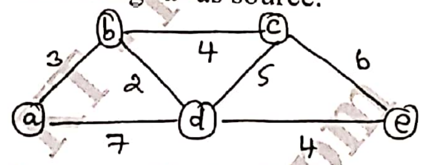


Fig.Q6(a)

b. Define heap. Write bottom-up heap construction algorithm. Construct heap for the list 1, 8, 6, 5, 3, 7, 4 using bottom-up algorithm and successive key insertion method. **(10 Marks)**

Module-4

7 a. Define transitive closure of a directed graph. Find the transitive closure matrix for the graph whose adjacency matrix is given.

$$\begin{bmatrix} 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 \end{bmatrix}$$

(10 Marks)

b. Find the optimal tour for salesperson using dynamic programming technique. The directed graph is shown in Fig.Q7(b). **(10 Marks)**

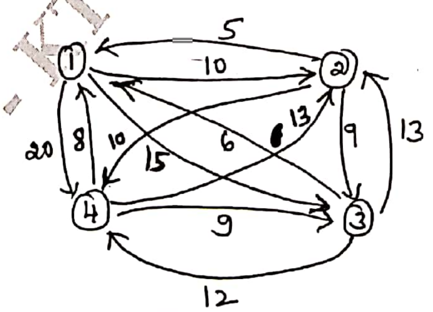


Fig.Q7(b)

OR

8 a. Write an algorithm to construct optimal binary search tree for the following data:

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

(10 Marks)

b. Apply the bottom-up dynamic programming algorithm to the following instance of the knapsack problem. Knapsack capacity W = 10.

Item	Weight	Value
1	7	42
2	3	12
3	4	40
4	5	25

(10 Marks)

Module-5

9 a. Construct state-space tree for solving four queens problem using backtracking. **(06 Marks)**

b. Discuss graph coloring problem. Find different solutions for 4 nodes and all possible 3 coloring problem. **(06 Marks)**

c. Write a note on: (i) Non deterministic algorithms. (ii) LC branch and bound solution to solve O/I knapsack problem. **(08 Marks)**

OR

10 a. What are the two additional items required by Branch and Bound technique, compared with backtracking. Solve the following assignment problem using branch and bound technique, whose cost matrix for assigning four jobs to four persons are given

$$\begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix}$$

(10 Marks)

b. Discuss the following :

(i) Subset sum problem

(ii) NP hard and NP complete classes. **(10 Marks)**

* * * * *

CBCS Scheme

USN | | | | | | | | | | |

15CS43

Fourth Semester B.E. Degree Examination, June/July 2017
Design and Analysis of Algorithms

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define algorithm. Explain asymptotic notations, Big O, big Omega, big theta notations. **(08 Marks)**

b. Explain general plan of mathematical analysis of nonrecursive algorithms with example. **(08 Marks)**

OR

2 a. Define time and space complexity. Explain important problem types. **(08 Marks)**

b. Illustrate mathematical analysis of recursive algorithm for towers of hanoii. **(08 Marks)**

Module-2

3 a. Explain concept of divide and conquer. Write merge sort algorithm. **(08 Marks)**

b. Write a recursive algorithm for binary search and also bring out its efficiency. **(08 Marks)**

OR

4 a. Illustrate the tracing of quick sort algorithm for the following set of numbers:
25, 10, 72, 18, 40, 11, 64, 58, 32, 9 **(08 Marks)**

b. List out the advantages and disadvantages of divide and conquer method and illustrate the topological sorting for the following graph.

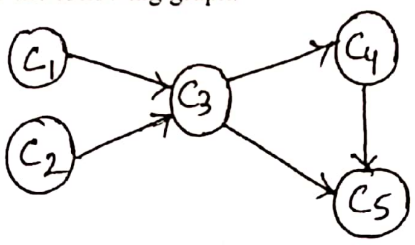


Fig.Q4(b) **(08 Marks)**

Module-3

5 a. Explain Greedy criterion. Write a Prim's algorithm to find minimum cost spanning tree. **(08 Marks)**

b. Sort the given list of numbers using heap sort: 2, 9, 7, 6, 5, 8. **(08 Marks)**

OR

6 a. Write an algorithm to find single source shortest path. **(08 Marks)**

b. Construct a Huffman tree and resulting code word for the following:

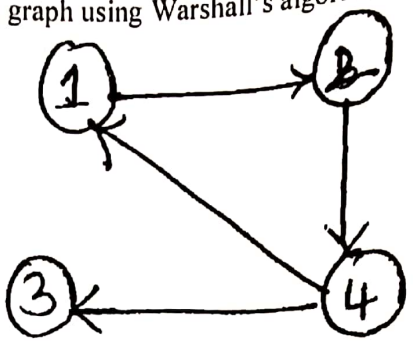
Character	A	B	C	D	-
Probability	0.35	0.1	0.2	0.2	0.15

Encode the words DAD and ADD. **(08 Marks)**

Module-4

7 a. Explain the concept of dynamic programming, with example. **(08 Marks)**

b. Trace the following graph using Warshall's algorithm.



(08 Marks)

Fig.Q7(b)

OR

8 a. Explain Multistage graphs with example. Write multistage graph algorithm to forward approach. **(08 Marks)**

b. Solve the following instance of Knapsack problem using dynamic programming. Knapsack capacity is 5.

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

(08 Marks)

Module-5

9 a. Explain backtracking concept. Illustrate N queens problem using backtracking to solve 4-Queens problem. **(08 Marks)**

b. Solve subset sum problem for the following example, s = {3, 5, 6, 7} and d = 15. Construct a state space tree. **(08 Marks)**

OR

10 a. Explain the concept of branch and bound and solve assignment problem for the following and obtain optimal solution.

Person	Job1	Job2	Job3	Job4
a	9	2	7	8
b	6	4	3	7
c	5	8	1	8
d	7	6	9	4

b. Explain LC Branch and Bound and FIFO branch and bound. **(08 Marks)**

(08 Marks)

* * * * *