S1

G. H. RAISONI COLLEGE OF ENGG. NAGPUR

(An Autonomous Institute under UGC Act 1956)

Department of Computer Science & Engg.

TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**

Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. Find the optimal solution to the knapsack instances n=7, m=15,

Profit <P1, P2, P3, P4, P5, P6, P7> = <10, 5, 15, 7, 6, 18, 3> and

Weight <W1, W2, W3, W4, W5, W6, W7>=<2, 3, 5, 7, 1, 4, 1>

B. In the following table, 7 activities are given with their respective start and finish times. Select the maximum number of activities that can be performed by a single person, assuming that a person can work only on a single activity at a time.

Activity	A1	A2	A3	A4	A5	A6
Start Time	0	3	1	5	5	8
Finish Time	6	4	2	9	7	9

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TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**

Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ **Roll No.:** _____ **Class:**__ _____

Q. 1. Solve following problems:

A. Create a Huffman code for the following set of data and also find the length of encode file

Character	A	B	C	D	E	F
probability	48	11	9	14	7	3

B. Find the optimal solution using knapsack greedy method n=7,m=15,

Object	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Profit	10	5	15	7	6	18	3
Weight	2	3	5	7	1	4	1

S3

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TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**
Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. Consider the following 5 jobs and their associated deadline and profit.

Job Index	1	2	3	4	5
Job	J1	J2	J3	J4	J5
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

Select jobs that will give a higher profit?

B. A networking company uses a compression technique to encode the message before transmitting over the network. Suppose the message contains the following characters with their frequency:
a:15 b:7 c:6 d:6 e:5 .If the compression technique used is Huffman Coding, how many bits will be saved in the message?

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Department of Computer Science & Engg.

TAE-III: Problem Solving | Subject: Design and Analysis of Algorithms

Time: 60 min | **Subject Teacher: Prof. Dipti Theng** | **Max Marks: 04**

Name of Student:_____ _____ **Roll No.:** _____ **Class:**__ _____

Q. 1. Solve following problems:

A. Create a Huffman code for the following set of data and also find the length of encode file

Character	A	B	C	D	E	F	G
Probability	2	3	3	4	6	10	13

B. Which is optimal value in the case of fractional knapsack problem, capacity of knapsack is 60.

Item	A	B	C	D
Profit	280	100	120	120
Weight	40	10	20	24
Ratio $(p_i w_i)$(piwi)	7	10	6	5

S5

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Department of Computer Science & Engg.

TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**
Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. Find the optimal solution to the knapsack instances N=5,M=60kg,

profit<P1,P2,P3,P4,P5 >=<30,40,45,77,99>, and

weight <W1,W2,W3,W4,W5>=<5,10,15,22,25>

B. What is Optimal Huffman code for the following set of data?

a:1,b:1,c:2,d:3,e:5,f:8,g:13,h:21

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Department of Computer Science & Engg.

TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**
Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. Consider the following set of activities with start and finish times. Select the maximum number of activities that can be performed by a single person, taking only one activity at a time.

Activity	A1	A2	A3	A4	A5	A6
Start Time	0	3	1	5	5	8
Finish Time	6	4	2	9	7	9

B. Fractional Knapsack Problem: Fill the knapsack with objects so that the profit is maximum. It is given that the capacity of knapsack is 15.

OBJECTS	1	2	3	4	5	6	7
PROFITS	10	5	15	7	6	18	3
WEIGHTS	2	3	5	7	1	4	1

S7

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Department of Computer Science & Engg.

TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**

Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. What is Optimal Huffman code for the following set of data?

e:3, d:2, u:2, l:2, space:2, k:1, b:1, v:1, i:1, s:1

B. Consider the following 5 jobs and their associated deadline and profit.

Job Index	1	2	3	4	5
Job	J1	J2	J3	J4	J5
Deadline	2	1	3	2	1
Profit	60	100	20	40	20

S8

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TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**
Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. Create a Huffman code for the following set of data and also find the length of encode file

Character	A	B	C	D	E	F
probability	45	13	12	16	9	5

B. Find the optimal solution to the knapsack instances n=7, m=15,

profit<P1,P2,P3,P4,P5,P6,P7>=<10,5,15,7,6,18,3> and

weight <W1,W2,W3,W4,W5,W6,W7>=<2,3,5,7,1,4,1>

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TAE-III: Problem Solving **Subject: Design and Analysis of Algorithms**
Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. What is Optimal Huffman code for the following set of data?

38, 42, 22, 15, 94, 63, 101, 43, 13, 21

B. Which is optimal value in the case of fractional knapsack problem, capacity of knapsack is 15

Object	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Profit	11	5	14	7	6	20	3
Weight	2	3	5	7	1	4	1

S10 **G. H. RAISONI COLLEGE OF ENGG. NAGPUR**

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Time: 60 min **Subject Teacher: Prof. Dipti Theng** **Max Marks: 04**

Name of Student:_____ _____ Roll No.: _____ Class:__ _____

Q. 1. Solve following problems:

A. Create a Huffman code for the following set of data and also find the length of encode file

Character	A	B	C	D	E	F	G
Count	29	14	9	17	45	11	5

C. Huffman coding :

How many bits may be required for encoding the message

‘mississippi’?