http://www.csvtuonline.com

Printed Pages – 7 Roll No. :

337556(37)

B. E. (Fifth Semester) Examination, Nov.-Dec. 2016

(New Scheme)

(Mechanical Engg. Branch)

OPERATIONS RESEARCH

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Answer all the questions Part (a) is compulsory, answer any* ***one*** *from part (b) and part (c). Graph sheets and Normal probability distribution tables are allowed*

1. (a) Solve the following L. P. P. with Graphical method

http://www.csvtuonline.com

http://www.csvtuonline.com

Maximize $z = 8x_1 + 16x_2$

Subject to $x_1 + x_2 \leq 200$

$x_2 \leq 125$

$3x_1 + 6x_2 \leq 900$

$x_1 \geq 0 \quad x_2 \geq 0$

Above problem has Multiple optimal solutions? If yes, given one more solution. 6

(b) Solve the following L. P. P. with Big M simplex method :

Maximize : $z = 2x_1 + 3x_2 + 4x_3$

Subject to :

$3x_1 + x_2 + 4x_3 \leq 600$

$2x_1 + 4x_2 + 2x_3 \geq 480$

$2x_1 + 3x_2 + 3x_3 = 540$

$x_1 \geq 0 \quad x_2 \geq 0 \quad x_3 \geq 0$. 14

Or

(c) Solve the following L. P. P. :

Maximize : $z = 22x_1 + 30x_2 + 25x_3$

Subject to : $x_1 + 2x_2 + 2x_3 \leq 100$

$2x_1 + x_2 + x_3 \leq 100$

$2x_1 + 2x_2 \leq 100$

$x_1 \geq 0 \quad x_2 \geq 0 \quad x_3 \geq 0$ 14

2. (a) A workshop has received thre jobs and four machines are available to machine the jobs. The machine time in minutes is given in the table. Perform the assignment to minimize the total time required. 6

Job's	M_1	M_2	M_3	M_4
A	18	24	28	32
B	8	13	17	19
C	10	15	19	22

(b) Solve the following travelling salesman problem:

$C_{12} = 20$; $C_{13} = 4$; $C_{14} = 10$; $C_{23} = 5$; $C_{34} = 6$;

$C_{25} = 10$; $C_{35} = 6$; $C_{45} = 20$

$C_{ij} = C_{ji}$ (in kms) 14

Or

(c) Solve the following transportation problem with North-West corner method and Vogel's approximation method. Table gives unit cost of transportation in ₹ :

DESTINATIONS

Origin	D_1	D_2	D_3	D_4	D_5	Capacity
01	12	4	9	5	9	55
02	8	1	6	6	7	45
03	1	12	4	7	7	30
04	10	15	6	9	1	50
Demand	40	20	50	30	40	

14

3. (a) In a railway yard goods train arrive at the rate of 30 trains/day. Assuming that the inter-arrival time follow an exponential distribution and the service time distribution is also exponential with an average 36 minute. Find the average number of trains in the system and the probability that the number of trains in the system exceeds 10 6

(b) A Project consists of a activities with the following relationship between the activities :

A < D, E

B, D < F

C < G

G < H

F, G < I

The duration (in days) to perform the activities is given below :

Activities	A	B	C	D	E	F	G	H	I
Duration	23	8	20	16	24	18	19	4	10

Construct the network diagram and find the Project Duration. 14

Or

(c) Activities in a new project and fine estimates (days) are given below Find the probability of completing the project in 38 days : 14

Activity	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
Optimistic time	2	2	5	1	5	2	3	2	7
Most likely time	5	5	11	4	11	5	9	2	13
Pessimistic time	14	8	29	7	17	14	27	8	31

4. (a) Solve the game whose payoff matrix for the player A is given in the table and find the saddle point. 6

		Player-B		
Player-A				
		− 2	15	− 2
		− 5	− 6	− 4
		− 5	20	− 8

(b) Solve the following 4 × 4 Pay-off matrix using dominance rules and find the value of the game. Give optimal strategies for Player-A and Player-B : 14

		Player-B			
Player-A					
		3	2	4	0
		3	4	2	4
		4	2	4	0
		0	4	0	8

Or

(c) A Bakery keeps stock of a popular brand of cake. Daily demand on past experience is given below :

Daily Demand	0	15	25	35	45	50
Probability	0·01	0·15	0·20	0·50	0·12	0·02

Consider the following random numbers

48, 78, 09, 51, 56, 77, 15, 14, 68 and 09

using the random numbers, simulate demand for 10 days. Find the average demand. 14

337556(37)

