Tuesday, May 28, 2019 02:30 pm - 05:30 pm   1T00143 - M.C.A. (Sem. III)(Choice Based) / 56304 - Operation Research.   58622

Duration: 3 Hrs   **Total Marks: 80**

Please check whether you have got the right question paper

N.B: (1) Question 1 is **compulsory.**
(2) Attempt any **Three questions** out of remaining **Five questions.**
(3) Assume any **necessary data**, if required, but **justify the same.**
(4) **Figures** to the **right** indicate **full marks** for that question.
(5) Use of Scientific **calculator** is **allowed.**

Q.1 a) Solve the following LPP using Graphical Method   [10]
Maximize $Z = 20x_1 + 35x_2$
Subject to $3x_1 + 3x_2 \leq 36$
$5x_1 + 2x_2 \leq 50$
$2x_1 + 6x_2 \leq 60$
$x_1, x_2 \geq 0$

b) A small project is composed of 7 activities whose time estimates are listed   [10]
below. Activities are being identified by their beginning (i) and ending (j) node
numbers.

Activities		Times in week		
i	j	Optimistic time	Most likely time	Pessimistic time
1	2	1	1	7
1	3	1	4	7
1	4	2	2	8
2	5	1	1	1
3	5	2	5	14
4	6	2	5	8
5	6	3	6	15

1. Draw the network
2. Calculate the expected variances for each
3. Find the expected project completed time
4. Calculate the probability that the project will be completed at least 3
   weeks than expected
5. If the project due date is 18 weeks, what is the probability of not
   meeting the due date?

Q.2 a) Solve the following LPP using Simplex Method.   [10]
Maximize $Z = 2x_1 + 5x_2$
Subject to $x_1 + 4x_2 \leq 24$
$3x_1 + x_2 \leq 21$
$x_1 + x_2 \leq 9$
$x_1, x_2 \geq 0$

58622

2D0ED88CC1A6124DBE2E5C9F9E36D748

b) The Captain of a cricket team has to allot the five middle batting positions to five Batsmen. The average runs scored by each batsman at these positions are as follows: [10]

Batsman	Batting Position				
	I	II	III	IV	V
P	40	40	35	25	50
Q	42	30	16	25	27
R	50	48	40	60	50
S	20	19	20	18	25
T	58	60	59	55	53

Find the assignment of batsman to positions which will give the maximum number of runs.

Q.3 a) Solve the following using Big-M Method [10]

Minimize Z = $2X_1 + 4X_2$

Subject to $2X_1 + X_2 \leq 18$

$3X_1 + 2X_2 \geq 30$

$X_1 + 2X_2 = 26$

and $x_1, X_2 \geq 0$

b) Find the initial basic feasible solution for the following transportation problem by Vogel's approximation method. [10]

	M1	M2	M3	Capacity
W1	26	23	10	61
W2	14	13	21	49
W3	16	17	29	90
Requirement	52	68	80	

Q.4 a) Two firms are competing for business under conditions so that one firm's gain is another firm's loss. Firm A's pay-off matrix is given below. Suggest optimum strategies for the two firms and find value of game [10]

		Firm B		
		No Advertising	Medium Advertising	Heavy Advertising
Firm A	No Advertising	10	5	-2
	Medium Advertising	13	12	15
	Heavy Advertising	16	14	10

b) Solve the following problem using Dual Simplex Method [10]

Minimize Z = 2x1 + 2x2 + 4x3

Subject to $2x1 + 3x2 + 4x3 \geq 2$

$3x1 + x2 + 7x3 \leq 3$

$x1 + 4x2 + 6x3 \leq 5$

$x1, x2, x3 \geq 0$

58622

2D0ED88CC1A6124DBE2E5C9F9E36D748

Q.5 a) A truck owner finds from his past records that the maintenance cost per year of [10] a truck whose purchase price is Rs. 8000 are given below:

Year:	1	2	3	4	5	6	7	8
Maintenance cost in Rs.:	1000	1300	1700	2200	2900	3800	4800	6000
Resale value in Rs.:	4000	2000	1200	600	500	400	400	400

Determine which time is profitable to replace the truck?

b) Processing time of six jobs (in hrs) on three machines M1, M2, M3 are given below: [10]

Jobs	1	2	3	4	5	6
M/C M1	3	12	5	2	9	11
M/C M2	8	6	4	6	3	1
M/C M3	13	14	9	12	8	13

Determine the sequence which will minimize the total elapse time. Also find idle time for each machine.

Q.6 a) Solve using Gomory's cutting plane method [10]

Maximize Z=7X1 + 9X2

Subject to $-X1 + 3X2 \le 6$

$7X1 + X2 \le 35$

$x1, X2 \ge 0$ and interger

b) A small assembly plant assembles PCS through 9 interlinked activities. The time [10] duration for which is given below. I) Draw a Network ii) Calculate total float, free float and independent float.

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Duration	2	2	1	4	8	5	3	1	5	4	3

_____

58622

2D0ED88CC1A6124DBE2E5C9F9E36D748