MCA–Sem –III (CBGS) 27/11/15

Operation Research

QP Code : 25276

Duration: 3 Hrs Marks: 80

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

Q.1) a) A firm manufactures two products A and B on which the profits earned per unit are Rs. 3 and Rs.4 respectively. Each product is processed on two machines M1 and M2.Product A requires One minute of processing time on M1 and two minutes on M2 while B requires one minute on M1 and one minute on M2.Machine M1 is available for not more than 450 minutes while M2 is Available for not more than 600 minutes during any working day. Find the number of units of Products A and B to be manufactured to get maximum profit. Formulate the above as a LPP and solve by graphical method. [10]

b) The processing time in hours for the jobs when allocated to the different machines are indicated below.Assign the machines for the jobs so that the total processing time is minimum by using Hungarian method. [10]

		Machines			
		M1	M2	M3	M4
Jobs	J1	5	7	11	6
	J2	8	5	9	6
	J3	4	7	10	7
	J4	10	4	8	3

Q.2) a) Solve the following LPP by Simplex Method

Maximize $Z=300X_1+200X_2$

Subjected to, $5X_1+2X_2 \leq 180$

$3X_1+3X_2 \leq 135$

And $X_1, X_2 \geq 0$ [8]

b) Find the initial basic feasible solution for the following transportation problem by Least Cost Method.

	To				Supply
From	1	2	1	4	30
	3	3	2	1	50
	4	2	5	9	20
Demand	20	40	30	10	

[7]

Q.3) a) Solve the following LPP using Two-Phase Method.

Minimize $2X_1-X_2$

Subjected to, $X_1 + X_2 \geq 2$

$X_1 + X_2 \leq 4$

and $X_1, X_2 \geq 0$ [8]

b) Suppose the following estimates of activity times (days) are provided

Activity	Optimistic time	Most Likely time	Pessimistic time
1-3	1	3	5
1-2	3	4	5
3-5	4	5	6
2-4	3	5	7
4-5	5	6	13
5-6	4	7	10
4-6	[redacted]	8	[redacted]

i)Determine the expected completion and variance of the project.

ii) What is the probability that the project will be completed with in 20 days

(Given P(Z≤1.64)=0.9495) [7]

Q.4) a) Find the sequence that minimizes the total elapsed time required to complete the following task On the machines in the order 1-2-3.Find also the minimum total elapsed time (hours) and the Idle times on the machines.

Task	A	B	C	D	E	F	G
M1	3	8	7	4	9	8	7
M2	4	3	2	5	1	4	3
M3	6	7	5	11	5	6	12

[8]

b) Find the optimal strategies and value of the game where pay-off matrix of the two player is given by

		Player B		
		B1	B2	B3
Player A	A1	2	6	1
	A2	8	4	6
	A3	1	2	1

[7]

Q.5) a) Solve the following using Dual Simplex Method.

Minimize $Z=2X_2+5X_3$

Subjected to , $X_1 + X_2 \geq 2$

$2X_1 + X_2 + 6X_3 \leq 6$

$X_1 - X_2 + X_3 \geq 4$

and $X_1, X_2, X_3 \geq 0$ [8]

b) A truck owner finds from his past records that the maintenance cost per year of a truck whose purchase price is Rs.8,000 are given below

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

Determine at which time it is profitable to replace the truck. [7]

Q.6) a) A salesman wants to visit cities A,B,C,D and E.he does not want to visit any city twice before Completing his tour of all the cities and wishes to return to the point of starting journey. Cost Of going from one city to another (in Rupees) is shown in the following table.Find the least route

To City

From City	A	B	C	D	E
A	-	2	5	7	1
B	6	-	3	8	2
C	8	7	-	4	7
D	12	4	6	-	5
E	1	3	2	8	-

[8]

b) i) Explain in brief 'Redundant constraints in LPP'

ii) Obtain the dual of the following

Maximize $Z = 40X_1 + 50X_2$

Subjected to, $2X_1 + 3X_2 \leq 3$

$8X_1 + 4X_2 \leq 5$

and $X_1, X_2 \geq 0$ [7]

Q.7) a) Draw the network diagram. Find total, free and independent floats.

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-7	5-8	6-8	7-9	8-9	9-10
Duration	2	2	2	4	5	8	4	2	4	5	3	4

[8]

b) The states of natures and strategies of a Food Products Company is as Follows:

States of Nature

Strategies	N1	N2	N3
S1	7,00,000	3,00,000	1,50,000
S2	5,00,000	4,50,000	0
S3	3,00,000	3,00,000	3,00,000

Which strategy should the concered executive choose on the basis of i) Maximin criterion ii) Maximax criterion iii) Minimax criterion iv) Laplace criterion ? [7]

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