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MBA024

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 270211

Roll No.

M.B.A.

(SEM. II) THEORY EXAMINATION, 2014-15

OPERATIONS RESEARCH

Time : **3** Hours] [Total Marks : **100**

PART - I

1 Answer any four **5 Marks each**

(1) Define O.R. and write the applications of O.R. in Management.

(2) Distinguish between slack, surplus and artificial variables in LPP.

(3) What is Game Theory? State the assumptions underlying it.

(4) What is Replacement Theory? Discuss the failure mechanism of item i.e. different types of failure.

(5) Explain critical path method with suitable example.

(6) What are queuing theory and queuing system?

PART - II

10 Marks each

1 Solve the following Linear Programming Problem by Big M method.

Minimize $Z = 12x_1 + 20x_1$

Subject to the constraints $6x_1 + 8x_2 \geq 100;$

$7x_1 + 8x_2 \geq 120;$

$x1, x2 \geq 0$

2 There is 40% chance that a patient admitted to the hospital, is suffering' from cancer. A doctor has to decide whether a serious operation should be performed or not. If the patient is suffering from cancer and the serious operation is performed, the chance that he will recover is 70%, otherwise it is 35%. On the other hand, if the 'patient is not suffering from cancer and the serious operation is performed. The chance that he will recover is 20%, otherwise it is 100%; assume that recovery and death are the only possible results. Construct an appropriate decision tee. What decision should the doctor take?

3 Determine an optimum distribution for the company in order to minimize the total transportation cost by Vogel Approximation method.

Destination

Sources ↓	A	B	C	D	Supply
1	11	20	7	8	50
2	21	16	20	12	40
3	8	12	8	9	70
Demand	30	25	35	40	

PART - III

10 Marks each

1 Solve the following LPP by simplex method.

Max $Z = 7X_1 + X_2 + 2X_3$

Subject to, $X_1 + X_2 - 2X_3 \leq 10$

$4X_1 + X_2 + X_3 \leq 20$

And $X_1, X_2, X_3 \geq 0$

OR

A company has five jobs to be done the following matrix shows the return in rupees on assigning i th (i= 1,2,3,4,5) machines to the j th. job(j=A,B,C,D,E).Assign the five jobs to the five machines so as to maximize the total expected profit.

JOB

MACHINE	A	B	C	D	E
1	5	11	10	12	4
2	2	4	6	3	5
3	3	12	5	14	6
4	5	14	4	11	7
5	7	9	8	12	5

2 Using dominance principle, solve the following game

Player - B

Player A ↓	B_1	B_2	B_3	B_4
A_1	2	-2	4	1
A_2	6	1	12	3
A_3	-3	2	0	6
A_4	2	-3	7	7

OR

Find the sequence of jobs that minimize the total elapsed time :

Jobs	A	B	C	D	E
Machine M_1	9	7	5	4	11
Machine M_2	8	8	6	7	12
Machine M_3	7	6	7	8	10
Machine M_4	10	5	5	4	8

3 The following table shows the various jobs of a network along with their time estimates :

Activity	Estimated duration work		
	Optimistic	Most likely	Pessimistic
1-2	1	1	7
1-3	1	4	7
2-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15
6-7	2	4	8

Draw a network diagram and determine the critical path. What is the minimum time for completion of projects'?

OR

The cost of a machine is Rs. 61000 and its scrap value is Rs. 1000. The maintenance costs found from the past experience are as follows:

Year	1	2	3	4	5	6	7	8
Maintenance cost in Rs.	1000	2500	4000	6000	9000	12000	16000	20000

When should the machine be replaced ?

4 Customers arrive at a one window drive-in bank according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The space in front of the window including that for the serviced car can accommodate a maximum of three cars. Other cars can wait outside this space. What is the probability that an arriving customer can drive to the space in front of the window?

OR

The Owner of a small machine shop has four mechanics available to assign 5 jobs for the day. Find the assignment of mechanics to the job.

Jobs

Mechanics	A	B	C	D	E
I	4	3	6	2	7
II	10	12	11	14	16
III	4	3	2	1	5
IV	8	7	6	9	6

5 What is the difference between decision making under risk and decision makirig under uncertainty? Explain thee difference between expected opportunity loss and expected value of perfect information.

OR

Write short notes on any two of the following:

(a) Advantages and disadvantages of L. P. P.

(b) Stepping Stone Methods

(c) Decision-making environment

(d) Characteristics of M/M/1 Queuing models.