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MBA
(SEM II) THEORY EXAMINATION 2017-18
OPERATIONS RESEARCH

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

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

a. What is Operations Research?
b. Describe basic feasible solution in transportation problem.
c. Write Standard and Canonical Forms of LPP.
d. State different decision making environments.
e. Define degeneracy in LPP.
f. Differentiate between T.P. & A.P.
g. What is a replacement problem?
h. Elaborate CPM & PERT.
i. Define Saddle Point, & Two Person Zero Sum Game.
j. What is Queuing system?

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. What are main characteristics of O.R.? State any four applications of Operations Research.

b. Using Simplex method, find the maximum value of

$$Z = 5X + 7Y$$

Subject to the constraints,

$$X+Y<=4,$$
$$3X+8Y<=24,$$
$$10X+7Y<=35, \qquad X, Y>=0$$

c. Write algorithm of "VAM Method".

d. What is an assignment problem? State its applications. Also discuss an unbalanced assignment problem.

e. There are five jobs, each of which must go through the two machines A & B. Processing times (in hrs) are given below.

Job	1	2	3	4	5
M/c A	5	1	9	3	10
M/c B	2	6	7	8	4

Determine a sequence for the five jobs that will minimize the total elapsed time.

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SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) Define Pure and Mixed strategies with examples. Discuss the conditions for a game to be deterministic and fair.

(b) Solve the following game graphically:

	Player B			
Player A	3	2	4	12
	11	9	6	3

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) What do you understand by transportation problem? Discuss any three approaches used in T.P. for determining the feasible solution in detail.

(b) Solve the following TP using VAM & check its optimality:

	D1	D2	D3	D4	Supply
O1	2	3	11	7	6
O2	1	0	6	1	1
O3	5	8	15	9	10
	7	5	3	2	

5. Attempt any *one* part of the following: 10 x 1 = 10

(a) In a supermarket, the average arrival rate of customer is 10 every 30 minutes following Poisson. The average time taken by a cashier to list and calculate the customer's purchase is 2.5 minutes following exponential distribution.

(i) What is the probability that the queue length exceeds 6?

(ii) What is expected time spent by a customer in the system?

(b) A finance manager is considering drilling a well. In the past only 70% of wells drilled were successful at 20 meters depth in that area. Moreover on finding no water at 20 meters, some persons drilled it further up to 25 meters but 20% struck water at that level. The prevailing cost of drilling is Rs.500 per meter. The finance manager estimated that in case he does not get water in his own well, he will have to pay Rs.15000 to buy water from outside for the same period of getting water from the well. Draw an appropriate decision tree and determine the optimal strategy.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) There are four jobs to be assigned to the machines. Only one job can be assigned to one machine. The amount of time in hours required for the jobs is given in the matrix.

	Machines				
Jobs	A	B	C	D	E
1	4	3	6	2	7
2	10	12	11	14	16
3	4	3	2	1	5
4	8	7	6	9	6

Find an optimum assignment of jobs to minimize the total processing time. What is the total processing time to complete all the jobs?

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(b) A machine costs Rs8000. Details are given below:

Year	1	2	3	4	5	6	7	8
Operating cost	2500	2600	2800	3100	3500	3900	4400	5400
Resale value	6500	5500	4700	4200	3800	3500	3500	3500

Determine at what time, it should be replaced.

7. Attempt any *one* part of the following: 10 x 1 = 10

(a) A project consists of a series of tasks labeled A, B…H, I with the following constraints, A<D,E; B,D<F; C<G; B<H; F,G<I. Find out total project duration along with total float and free float, when the time of completion of each task is given as follows:

Task	A	B	C	D	E	F	G	H	I
Time (days)	23	8	20	16	24	18	19	4	10

(b) What do you mean by a project? What are the two basic planning and control techniques in a network analysis? Also discuss the concept of dummy activity.

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