Printed Pages—4 MBA—024

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

PAPER ID : 7113 **Roll No.** | | | | | | | | | | |

MBA

(SEM IV) EVEN SEMESTER THEORY EXAMINATION, 2009-2010

OPERATIONS RESEARCH

Time : 3 Hours *Total Marks : 100*

Note : *(i)* *Attempt **all** questions.*

(ii) *Question paper contain **three** sections.*

SECTION - A

Attempt **all** questions :

1. Fill in the blanks with an appropriate word/phrase or formula. **(10x1=10)**

(a) Decision theory is concerned with decision making under condition of ___________ .

(b) ___________ is employed for taking decisions when regret matrix is used.

(c) The decision tree approach to decision making is used in situations where ___________ are needed.

(d) The ___________ enables the decision makers to decide whether or not to seek information.

(e) The solution to a problem is said to be degenerate if the number of occupied cells is ___________ .

(f) If the saddle point does not exist, then the players have to employ ___________ .

(g) In a Poisson – Exponential single server - infinite population model the expected number of customers in the queue is equal to ___________ .

(h) In an assignment problem solution multiple zeros in all columns and rows are indication of ___________ .

(i) If there are two (or more) critical paths in a given network, then the one with ___________ should be used for determining the probability of completing the project in given time.

(j) The difference between the earliest start of the successor activity and the latest completion of the given activity is termed as ___________ .

Attempt **all** questions :

2. Mark the following statements a **T (True)** or **F (False)**. **(10x1=10)**

(a) Every linear programming problem has a unique optimal solution.

(b) It is possible for the objective function value of an LPP to be the same at two distinct extreme points.

(c) The feasible region of a LPP must be a convex set.

(d) An LPP can have only two decision variables.

(e) To solve a LPP by simplex method it is essential that all variables in it to be non - negative.

(f) In improving a non optimal solution, the key element may be positive, negative or zero.

(g) A transportation problem is said to be unbalanced when the number of origins does not match with the number of destinations.

(h) A closed loop in a transportation problem would always involve an even number of cells.

(i) The relevant cost element is replaced by a zero in case a certain worker is not to be assigned a particular job.

(j) In a two person game, both the players must have an equal number of strategies.

SECTION - B

3. In a Game the organiser can hide the prize in one of five fox holes (1, 2, 3, 4 or 5) (see fig. 1). A gunner has a single shot and may fire at any of the four spots A, B, C or D. The gunner will win the prize if the prize is in a fox hole adjacent to the spot where the shot was fired. For example, a shot fired at spot B, the gunner wins the prize if prize is in foxhole 2 or 3.

(a) Assuming this to be a zero - sum game, construct the reward matrix. **(8)**

(b) Find and eliminate all dominated strategies. **(4)**

(c) Write down each player's LP. **(6)**

(d) Find the optimal strategy and value of the game. **(12)**

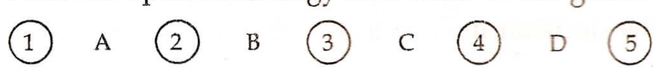

Figure-1

OR

(a) Given the following network and activity time estimate, determine the expected project completion time and variance. **(12)**

ACTIVITY	Time estimates (DAYS) to	tm	tp
1 - 2	5	8	17
1 - 3	7	10	13
2 - 3	3	5	7
2 - 4	1	3	5
3 - 4	4	6	8
3 - 5	3	3	3
4 - 5	3	4	5

(b) A businessman has two independent investments A and B available to him, but he lacks capital to undertake both of them simultaneously. He can choose to take A first and then stop, or if A is successful then take B, or vice versa. The probability of success on A is 0.7 while for B it is 0.4. Both investment require an initial capital outlay of Rs. 2000, and both return nothing if the venture is unsuccessful. Successful completion of A will return Rs. 3000/- (over cost), successful completion of B will return Rs. 5000/- (over cost). Draw the decision tree and determine the best strategy. (12)

(c) Write the dual of the following primal problem : **(6)**

Maximize $Z = -5x_1 + 2x_2$.

Subject to :

$x_1 - x_2 \geq 2$

$2x_1 + 3x_2 \leq 5$

$x_1, x_2 \geq 0$

SECTION - C

4. Attempt **any two** of the following : **(12½)**

(a) Explain the scope and methodology of Operation Research.

(b) Discuss the difference between decision making under certainty and decision making under uncertainity.

(c) Describe the meaning of EMV and EVPI.

5. Attempt **any two** of the following : **(12½)**

(a) Discuss the role of sensitivity analysis in linear programming.

(b) Using Vogal's Approximation Method, find the basic feasible solution of the following transportation problem.

	D1	D2	D3	D4	Availability
S1	19	30	50	12	7
S2	70	30	40	60	10
S3	40	10	60	20	18
Requirements	5	8	7	15	

(c) Four jobs are to be done on four different machines. Assign the jobs so as to maximize the total profit.

	M1	M2	M3	M4
J1	15	11	13	15
J2	17	12	12	13
J3	14	15	10	14
J4	16	13	11	17

6. Attempt any two of the following : (12½)

(a) Solve the following game whose pay off is given by :

	B_1	B_2	B_3	B_4
A_1	1	7	3	4
A_2	5	6	4	5
A_3	7	2	0	3

(b) We have five jobs, each of which must be processed on the two machine A and B in order AB. Processing time in hours are given in the table below :

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

Job :	1	2	3	4	5
Machine A:	5	1	9	3	10
Machine B :	2	6	7	8	4

(c) Use the graphical method to minimize the time needed to process the following jobs on the machine shown. Also calculate the total elapsed time to complete both jobs.

	Machine				
Job 1 Sequence	A	B	C	D	E
Time (hrs)	3	4	2	6	2

	Machine				
Job 2 Sequence	B	C	A	D	E
Time (hrs)	5	4	3	2	6

7. Attempt any two of the following : (12½)

(a) Give a general structure of queuing system and explain.

(b) Briefly explain the costs which are relevant to decisions for replacement of depreciable assets.

(c) Briefly discuss Resource levelling and Resource smoothing while managing a project.

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