

MBA DEGREE EXAMINATIONS: JUNE 2010

First Trimester

MBA507: DECISION MODELS FOR MANAGEMENT

Time: Three Hours

Maximum Marks: 100

Answer All the Questions:

PART A (1 x 20 = 20 Marks)

1. Case Study:

- 1 (a). The ABC electronics is engaged in producing a certain component which is sold at a uniform price of Rs.10 each. The variable cost of producing the component amounts of Rs.500 per unit while fixed costs amount of Rs.20000.
- (i) How much sales would be made at this level of activity?
 - (ii) How much desires would be made at this level of activity?
 - (iii) If company desires a profit of Rs.20000, how many numbers of units should be sold?
 - (iv) When the selling price increased by 25%?
 - (v) When the variable cost decrease to Rs.4 per unit?
 - (vi) When the fixed cost increases by Rs.8000?
 - (vii) When the above three (IV)-(VI) occur?

PART B (10 x 2 = 20 Marks)

- 2. What are the types of Decision Models?
- 3. Define Break Even point.
- 4. Define Basic feasible solution.
- 5. Define Slack variable.
- 6. What is the objective of Transportation problem?
- 7. What do you understand by restricted assignment?
- 8. Distinguish between PERT and CPM.
- 9. Write down the three time estimates in PERT models.
- 10. Define traffic intensity.
- 11. Define group replacement policy?

PART C (4 x 15 = 60 Marks)

12. (a) Solve the LPP using the simplex method.

maximize $Z = 3X_1 + 2X_2$, Subject to constraints :

$$X_1 + X_2 \leq 4$$

$$X_1 - X_2 \leq 2$$

$$X_1, X_2, \geq 0.$$

(OR)

(b) Solve by BigM method

$$\text{Maximize } Z = X_1 + 2X_2 + 3X_3 - X_4$$

$$X_1 + 2X_2 + 3X_3 = 15$$

$$2X_1 + X_2 + 5X_3 = 20$$

$$X_1 + 2X_2 + X_3 + X_4 = 10, X_1, X_2, X_3, X_4 \geq 0$$

13. (a) Solve the following transportation problem whose cost matrix is given below. Use VAM method to find the initial solution.

(OR)

		Destinations				
O		A	B	C	D	Capacity
R	1	15	10	17	18	2
I	2	16	13	12	13	6
G	3	12	17	20	11	7
I	Demand	3	3	4	5	15
N						

(b) Five men are available to do five different jobs. From past records, the time (in hours) that each man takes to do each job is known and given in the following table.

		Job				
Men		I	II	III	IV	V
		A	2	9	2	7
	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

Find the assignment of men to jobs that will minimize the total time taken.

14. (a) A project consists of a series of tasks labeled A,B,....,H,I with the following relationships ($W < X,Y$, means X and Y cannot start until W is completed; $X,Y < W$ means W cannot start until both X and Y are completed). With this notation, construct the network diagram having the following constraints:

$$A < D,E; B,D < F; C < G; B < H; F,G < I.$$

Find also the optimum time of completion of the project, when the time(in days) of completion of each task is as follows:

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

(OR)

- (b) The following table lists the jobs of a network with their estimates.

Activity	Optimistic	Most likely	Pessimistic
1-2	3	6	15
1-6	2	5	14
2-3	6	12	30
2-4	2	5	8
3-5	5	11	17
4-5	3	6	15
6-7	3	9	27
5-8	1	4	7
7-8	4	19	28

- (i) Draw the project network,
- (ii) Calculate the length and variance of the critical path, and
- (iii) What is the approximate probability that the jobs on the critical path will be completed in 41 days.

15. (a) (i) In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter arrival time follows an exponential distribution and the service time distribution is also exponential with an average of 36 as students.

Calculate (i). Expected queue size

- (ii) Probability that queue size is exceeds 10.

If the input of trains increase to an average of 33 per day what will be effect in (i) & (ii).

(ii) A machine costs Rs. 14000.the running cost for the different years are given below:

Year	1	2	3	4	5	6	7
Running	1500	2000	3000	4000	5500	7000	9000

Find the optimum replacement period if the capital is worth 10% and has no salvage value.

(OR)

(b) (i) A super market has two sales girls at the sales counters. If the service time for each customer is exponential with an mean of 6 minutes and if people arrive in a Poisson fashion at the rate of 12 an hour, then calculate.

(i) Probability of having to wait for service

(ii) Expected percentage of idle time for each sales girl

(iii) If a customer has to wait, what is the expected length of his waiting time?

(ii) A computer contains 10,000 resistors. When any one of the resistor fails, it is replaced.

The cost of replacing a single resistor is Rs. 10 only. If all the resistors are replaced at the same time, the cost per resistor would be reduced to Rs. 3.50. The percent of surviving by the end of month t is as follows:

Month(t)	0	1	2	3	4	5	6
% surviving by the end of month:	100	97	90	70	30	15	0

What is the optimum plan?
