

Register Number.....

**M.B.A. DEGREE EXAMINATIONS: NOVEMBER/DECEMBER – 2008**

First Trimester

**P 07BA117 DECISION MODELS FOR MANAGEMENT**

**Time: Three Hours**

**Maximum Marks: 100**

**Answer ALL Questions:-**

**PART A (1 x 20 = 20 Marks)**

1. The Hi-Hi Electronics is engaged in producing a certain component which is sold at a uniform price of Rs.8 each. The variable cost of producing the component amounts of Rs.4.80 per unit while the fixed costs amount of Rs.24000.
- How many units of the component must be produced and sold so that the company breaks even?
  - How much sales would be made at this level of activity?
  - If company desires a profit of Rs.16000, how many numbers of units should be sold?

Calculate the break even sales in each of the following:-

- When the selling price increased by 25%?
- When the variable cost decrease to Rs.4 per unit?
- When the fixed cost increases by Rs.6000?
- When the above three (iv) – (vi) occur?

**PART B (10 x 2 = 20 Marks)**

- List out the steps involved in decision modeling.
- Define break even point.
- Define optimal solution.
- Define artificial variable.
- What is the purpose of MODI method?
- What is the objective of traveling salesman problem?
- What are the three main phases of a project?
- Define critical activity.
- Define traffic intensity.
- Define individual replacement.

**PART A (4 x 15 = 60 Marks)**

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

Maximize  $Z = 15X_1 + 6X_2 + 9X_3 + 2X_4$  subject to

$$2X_1 + X_2 + 5X_3 + 6X_4 \leq 20,$$

$$3X_1 + X_2 + 3X_3 + 25X_4 \leq 24,$$

$$7X_1 + X_4 \leq 70, \quad X_1, X_2, X_3, X_4 \geq 0.$$

**(OR)**

(b) Solve by Big M method.

Maximize  $Z = X_1 + 2X_2 + 3X_3 - X_4$  subject to

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

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

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

13. (a) Solve the following transportation problem whose cost matrix is given below. Use North West corner rule to find initial solution.

		Destinations				
O r i g i n		A	B	C	D	Capacity
	1	1	5	3	3	34
	2	3	3	1	2	15
	3	0	2	2	3	12
	4	2	7	2	4	19
	Demand	21	25	17	17	80

**(OR)**

(b)(i) Solve the transportation problem when the unit transportation costs, demands and supplies are as given below. (8)

		Destinations				
O r i g i n		A	B	C	D	Capacity
	1	6	1	9	3	70
	2	11	5	2	8	55
	3	10	12	41	7	70
	Demand	85	35	50	45	

- (ii) A company has 4 machines to do 3 jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given below. Determine the job assignments which will minimize the total cost. (8)

		Machine			
		W	X	Y	Z
Jobs	A	18	24	28	32
	B	8	13	17	18
	C	10	15	19	22

14. (a) The following table shows the jobs of a project with their duration in days. Draw the network and determine the critical path.

Jobs	1-2	1-3	1-4	2-5	3-7	4-6	5-7	5-8	6-7
Duration	10	8	9	8	16	7	7	7	8
Jobs	6-9	7-10	8-10	9-10	10-11	11-12			
Duration	5	12	10	15	8	5			

(OR)

- (b) A small project is composed of seven activities whose time estimates are listed below.

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

- (i) Draw the project network. (2)
- (ii) Find the expected duration and variance of each activity. (2)
- (iii) Calculate the early and late occurrence for each even and the expected project length. (2)
- (iv) Calculate the variance and standard deviations of project length. (2)
- (v) What is the probability that the project will be completed 4 weeks earlier than expected. (3)
- (vi) What is the probability that the project will be completed not more 4 weeks later than expected. (3)
- (vii) If the project due date is 19 weeks, what is the probability of meeting the due date. (2)

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 minutes.

- Calculate (i) Expected queue size. (3)  
(ii) Probability that queue size exceeds 10. (3)

If the input of trains increases to an average of 33 per day what will be effect in (i) & (ii). (2)

- (ii) A machine costs Rs.15000. The running cost for the different years are given below: (8)

Year	1	2	3	4	5	6	7
Running	2500	3000	4000	5000	6500	8000	10000

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 a mean of 4 minutes and if people arrive in a Poisson fashion at the rate of 10 an hour, then calculate

- (i) Probability of having to wait for service. (2)  
(ii) Expected percentage of idle time for each sales girl (3)  
(iii) If a customer has to wait, what is the expected length of his waiting time? (3)

- (ii) The cost of a new machine is Rs.5000. The maintenance cost of the  $n^{\text{th}}$  year is given by  $C_n = 500(n - 1)$ ,  $n = 1, 2, \dots$ . Suppose money is worth 5% per year, after how many years will it be economical to replace the machine by a new one? (8)

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