Register Number: ……

M.B.A DEGREE EXAMINATIONS: NOV/DEC 2010

First Trimester

MASTER OF BUSINESS ADMINISTRATION

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**

A plant is manufacturing 3,000 heavy duty lathes per year and is operating at 75% of its capacity. The annual sales return is Rs. 1,05,00,000. The fixed cost of the plant is Rs.40,00,000 and variable cost is Rs.4,150 per unit. There is a proposal to utilize spare capacity by manufacturing precision lathes which would increase the fixed cost by Rs.8,00,000 but reduce the variable cost by Rs.750 per unit.

(i) Is the proposal economical? Give reasons for your answer.

(ii) A reduction in selling price by Rs.500 per units required to the plant run at 90% of its capacity to break-even, would this be a better proposal than the earlier one?

PARTB (10 x 2 = 20 Marks)

2. Define decision variables.
3. Define Break Even point.
4. State 'True or False': Graphical method is not possible for more than two constraints. Justify.
5. What is a feasibility region? Is necessary that it should always be a convex set?
6. Write down any two methods for finding initial basic feasible solution of a transportation problem.
7. Define Unbalanced Assignment problem.
8. Define the term critical path.
9. Write down the three time estimates in PERT network.
10. Write down various types of queuing models.
11. What is group replacement policy?

PART C (4 x 15 = 60 Marks)

12. a) (i) The standard weight of special purpose brick is 5 kg and it contains two basic ingredients B1 and B2. B1 costs Rs 5 per kg and B2 costs Rs 8 per kg. Strength consideration dictates that the brick should contain no more than 4 kg of B1 and a minimum of 2 kg of B2. Since the demand for the product is likely to be related to the price of the brick, find out graphically the minimum cost of the brick satisfying the above conditions. . (7)

(ii) Solve, by using Simplex method, the following LPP.

Maximize $Z = 2x + y$

Subject to $x - y \leq 10$; $2x - y \leq 40$; $x, y \geq 0$.

(8)

(OR)

b) Use the penalty (Big – M) method to solve the following LP problem.

Minimize $Z = 5x + 3y$

Subject to the constraints

$2x+4y \leq 12$; $2x + 2y = 10$; $5x + 2y \geq 10$; $x, y \geq 0$.

13. a) A company has factories at F1, F2 and F3 which supply to warehouses at W1,W2 and W3 weekly factory capacities are 200,160 and 90 units, respectively. Weekly warehouse requirement are 180, 120 and 150 units, respectively. Unit shipping cost(in rupees) are as follows: Use matrix minima method to find the initial solution.

Warehouse

Factory	W1	W2	W3	supply
F1	16	20	12	200
F2	14	8	18	160
F3	26	24	16	90
Demand	180	120	150	450

Determine the optimal distribution for this company to minimize total shipping cost.

(OR)

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	4	6	7	5	11
	B	7	3	6	9	5
	C	8	5	4	6	9
	D	9	12	7	11	10
	E	7	5	9	8	11

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

14. a) (i) Define the term critical activity. (2)

(ii) A project has the following activities and other characteristics:

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Predecessors	---	A	B	A	D	E	---	G	J,H	---	A	C,K	I,L
Duration(days)	6	4	7	2	4	10	2	10	6	13	9	3	5

Draw an arrow diagram for this project.

Indicate the critical path.

For each non-critical activity, find the total and free float. (13)

(OR)

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

Activity	Optimistic	Most likely	Pessimistic
1-2	1	2	9
2-3	1	4	7
2-4	2	4	12
3-4	0	0	0
3-5	2	3	4
3-7	6	8	16
4-5	4	6	8
4-6	3	5	7
5-6	$1/2$	1	$3/2$
5-7	5	7	15
6-7	3	5	13

Draw the project network,

Calculate the length and variance of the critical path, and

What is the approximate probability that the jobs on the critical path will be completed in 25 days?

15. a) (i) A tax consulting firm has 3 counters in its office to receive people who have problems concerning their income, wealth and sales taxes. On the average 48 persons arrive in an 8-hour day. Each tax adviser spends 15 minutes on an average on an arrival. If the arrivals are Poisson distributed and service times are according

to exponential distribution, find the average number of customer in the system, average number of customers waiting to be served, average time a customer spends in the system. (8)

(ii) A machine owner finds from his past records that the costs per year of maintaining a machine whose purchase price is Rs.6000 are given below:

Year	1	2	3	4	5	6	7	8
Maintenance cost(Rs.)	1000	1200	1400	1800	2300	2800	3400	4000
Resale Price	3000	1500	750	375	200	200	200	200

Determine at what age is a replacement due? (7)

(OR)

b) (i) A T.V repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8-hour day, what is repairman's expected idle time each day? How many jobs are ahead of the average set just brought in? (7)

(ii) A computer contains 1000 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. 4. The percent of surviving by the end of month t is as follows:

Month(t)	1	2	3	4	5
% failing by the end of month:	10	25	50	80	100

What is the optimum plan? (8)

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