

MBABM/MBAITM**Term-End Examination****December, 2015****MBM-013 : QUANTITATIVE TECHNIQUES***Time : 3 hours**Maximum Marks : 100*

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- Note :** (i) *Section-I is compulsory. Section I carries 30 marks.*
- (ii) *Section-II ; Answer any five questions. Section II carries 70 marks.*
- (iii) *Assume suitable data wherever required.*
- (iv) *Draw suitable sketches wherever required.*
- (v) *Figures to the right indicate maximum marks.*
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SECTION - I

1. Star Technologies in Mumbai manufactures three types of X ray machines - General (G type), Special Purpose (S type) and Tailor made (T type). Three shades of colours are required for painting the machines ; these are white, black and silver. For production of a G type, we require 2 liters white and 3 liters of silver, for S type, we require 3 liters of white, 2 liters of black and 2 liters of silver, for T type, we require 5 liters of black and 4 liters of silver. It is assumed that the company has a stock of 58 liters of white, 100 liters of black and 150 liters of silver paints. Revenue collected by selling of one machine of G type is ₹ 1,00,000. For a machine of S type it is ₹ 1,50,000 and for T type, it is ₹ 2,00,000. The manufacturing cost of each machine is ₹ 80,000, ₹ 1,15,000 and ₹ 1,55,000 respectively. 10

Formulate the LPP in order to maximize the profit gained from selling the machines considering the resources available.

2. (a) Can transportation problem be solved using a Linear Programming (LPP) approach ? Justify your answer with example. 5
- (b) Discuss the significance of EMV term used in Decision making. 5
- (c) Describe and discuss 2 examples of Assignment Model. Do not discuss conventional example i.e. Assignment of Machine to worker. 5
- (d) How will you use Simulation method to solve inventory problems ? Discuss specifically stock and consumption level of inventory in the answer. 5

SECTION - II

3. Minimize $Z = 30a + 40b + 40c$, Subject to 14
constraints.
 $a + 4b + 2c \geq 300$
 $5a + b + 2c \geq 180$
 $a + 3b + 2c \geq 80$
 $a, b, c \geq 0$
Use simplex method to solve the above problem.
4. A firm has three Engineers, each engineer can work up to 185 hours during the next month, during this time, three projects must be completed. Three Projects need 120 hours, 140 hours and 180 hours respectively for completion. The amount (in ₹) per hour that can be billed to the customer is as follows.

Project	1	2	3
Engineer 1	₹ 1200	₹ 1500	₹ 1900
Engineer 2	₹ 1400	₹ 1300	₹ 1200
Engineer 3	₹ 1600	₹ 1400	₹ 1500

- (a) Formulate this as a Transportation problem and allocate the number of hours with respect to the project for each Engineer. (State the assumptions made). 10
- (b) Also find the maximum optimal total billings during the next month. 4

5. Assign the following jobs to operators A, B, C and D so that the total cost of operation is minimum. The costs in I.N.R. are given in the respective cells. 14

		Operators			
Jobs		A	B	C	D
	1	40	20	20	70
	2	80	90	20	60
	3	60	50	50	70
	4	50	70	90	60

6. (a) A toy shop in Kolhapur has following daily demand pattern for a particular toy for a week along with associated probabilities as given below :

DAILY DEMAND (NOS)	0	6	7	8	9	10
PROBABILITY	0.10	0.20	0.15	0.50	0.03	0.02

Use the following sequence of random numbers :

Random Numbers	21	38	60	16	12	05	73	19	10	49
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- (i) Simulate the demand for next 10 weeks. 8
- (ii) Also find out the average demand per day. 2
- (b) The numbers of customer who arrive in a Hotel Le Meridian appear to be Poisson distributed with a mean of 15 customers per day. The receptionist attends the customer at an average rate of 18 customers per day. Find the number of working hours for the receptionist in a day. 4
7. Use uncertainty criterions to decide the stock level for the demand pattern of 20, 30, 40 and 45 Kg Parle - G biscuits at a dealer. The buying price and selling price of the dealer for the biscuits being ₹ 30 and ₹ 40 per Kg. (Hint : You have to decide whether to maintain stock of 20, 30, 40 or 45 Kg). 14

State your decision under each uncertainty criteria. Use $\text{Alfa} = 0.7$.

8. A company processes 5 jobs - p, q, r, s, t which can be processed in the machines A, B and C. The processing time in minutes is given below. 10+4
- (a) What should be the sequence of the job to have minimum idle time ?
- (b) Also calculate total elapsed time.

Jobs	p	q	r	s	t
A	6	3	7	7	7
B	2	2	4	3	5
C	4	5	7	2	4