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MBM-013

MBABM / MBAITM

Term-End Examination

00134

December, 2014

MBM-013 : QUANTITATIVE TECHNIQUES

Time : 3 hours *Maximum Marks : 100*

Note :

(i) *Section I is* ***compulsory****.*

(ii) *In Section II, solve any* ***five*** *questions.*

(iii) *Assume suitable data wherever required.*

(iv) *Draw suitable sketches wherever required.*

(v) *Italicized figures to the right indicate maximum marks.*

SECTION I

1. A firm produces three types of cars A, B and C, for which three colours are required for painting: these are white, black and silver.

For production of A, we require 2 litres white and 3 litres of silver, for B we require 3 litres of white, 2 litres of black and 2 litres of silver, and for C we require 5 litres of black and 4 litres of silver.

It is assumed that the firm has a stock of 80 litres of white, 100 litres of black and 150 litres of silver paints. Profit collected by selling of one car of 'A' type is ₹ 8,000, a car of 'B' type is ₹ 15,000 and a car of 'C' type is ₹ 10,000.

Formulate the above problem as LPP to maximize the profit. *10*

2. (a) Can a Transportation Problem be solved using a Linear Programming (LPP) approach ? Justify your answer with example. *5*

(b) Three executives arrive in a hotel and give their preferences for the rooms. The manager wants to assign the rooms to the executives which will fulfil their choice to the most optimal extent. How will you apply the "Assignment Model" to work on this ? *5*

(c) In which situation does a company use Maxi-min uncertainty criteria pertaining to decision-making theory ? *5*

(d) A glossary merchant wants to estimate the average profit for the next 8 days. He has the information of sale and expenses for the past 10 days. How will he use the Simulation Technique to achieve this ? *5*

SECTION II

3. Maximize $z = 2a + 4b + 3c$,

subject to the constraints

$2a + 4b + 2c \leq 100$

$2a + b + 2c \leq 40$

$a + 3b + 2c \leq 80$

$a, b, c \geq 0$

Use Simplex method to solve the above problem. *14*

4. Subhash Oil Mills have four plants (A, B, C, D) each of which can manufacture any one of four products (I, II, III, IV). The manufacturing cost differs from plant to plant and is given in the following matrix (Cost in Hundred ₹). Determine which plant should produce which product so that the total cost is minimal. Use Assignment Model approach to solve the problem. *14*

	Products			
	I	II	III	IV
Plants				
A	7	8	6	8
B	8	9	7	9
C	7	8	7	8
D	7	8	7	8

5. Rex Industries has received an order consisting of 4 jobs which can be processed in the processing kilns A, B and C. Determine :

- The sequence of the jobs to have minimum idle time.
- The total elapsed time and the idle time of each machine.

Refer to the following table, which describes the processing time of each job with respect to the kiln in minutes : *7+7*

Jobs	1	2	3	4
A	5	4	8	6
B	2	1	4	2
C	1	5	8	2

6. A confectioner sells various sweet-meat items. Past data of demand per week in hundred kilograms, with frequency, is given below :

DEMAND/WEEK	0	5	10	15	20	25
FREQUENCY	2	11	8	21	5	3

Using the following sequence of random numbers, generate the demand for the next 8 weeks. Also find out the average demand per week. *10+4*

RANDOM NUMBERS

35	52	90	13	23	73	34	57

7. (a) A service centre in Wakad area has an average 15 customers approaching per hour. The receptionist attends the customers on first-come first-serve basis and the customers wait if the need be. The receptionist attends the customers on an average rate of 20 customers per hour. What is the expected waiting time in the queue for customers ? *6*

(b) A company purchases an item for ₹ 20 and sells it at ₹ 30. The demand per day for the item is 5, 6 or 7 units. The probability distribution for demand of the items is 0·4, 0·4 and 0·2 respectively. Determine the optimal quantity of the number of items to be purchased by the company. *8*

8. Four switching centres have 80, 70, 90 and 40 lines of communications available and are to be distributed to three regions R1, R2 and R3 requiring 100, 100 and 80 lines respectively. The following table gives cost in ₹ of single connectivity from centres to region. Suggest an optimal connection schedule. Use Transportation Model to solve the problem. *14*

	Regions		
	R1	*R2*	*R3*
Switching Centres			
SW 1	100	80	80
SW 2	100	70	100
SW 3	110	90	70
SW 4	120	140	100