POST-GRADUATE COURSE

Term End Examination : June, 2017

COMMERCE

Paper-VIII : Quantitative Techniques

Time : 2 Hours **Full Marks : 50**

(Weightage of Marks : 80%)

Special credit will be given for accuracy and relevance in the answer. Marks will be deducted for incorrect spelling, untidy work and illegible handwriting. The weightage for each question has been indicated in the margin.

MODULE – I

Answer any *two* questions : $12\frac{1}{2} \times 2 = 25$

1. a) Old hens can be bought at Rs. 100 each and young ones at Rs. 250 each. The old hens lay 3 eggs per week and the young ones 5 eggs per week, each egg being worth of Rs. 2. A hen costs Rs. 20 per week to be fed. There are only Rs. 8,000 available to be

spent on purchasing that hens and at the most 20 hens can be accommodated in the space. Formulate this problem as an LPP to determine each kind of hen that should be bought to have the maximum profit per week. 6

b) Solve the following LPP using the Simplex method :

Maximize : $Z = 5x_1 + 3x_2$

subject to $x_1 + x_2 \leq 2$

$5x_1 + 2x_2 \leq 10$

$3x_1 + 8x_2 \leq 12$

and $x_1, x_2 \geq 0$ $6\frac{1}{2}$

2. a) Use graphical method to solve the following LPP :

Minimize $Z = 20x_1 + 10x_2$

Subject to $x_1 + 2x_2 \leq 40$

$3x_1 + x_2 \geq 30$

$4x_1 + 3x_2 \geq 60$

and $x_1,\ x_2 \geq 0.$ 6

b) Solve the following transportation problem with the following cost matrix :

Machine / Factory	M_1	M_2	M_3	M_4	M_5	Supply
F_1	4	2	3	2	6	8
F_2	5	4	5	2	1	12
F_3	6	5	4	7	7	14
Demand	4	4	6	8	8	

$6\frac{1}{2}$

3. An airline that operates between Kolkata and Mumbai has the time table shown below. Crew must have a minimum layover of 4 has between two flights. Obtain the pairing of flights and also

the bare of the crew that minimizes the total layover time.

KOLKATA - MUMBAI

Flight No.	Departure	Arrival
101	6.00 am	8.00 am
102	7.30 am	9.30 am
103	10.30 am	12.30 pm
104	6.00 pm	8.00 pm

MUMBAI - KOLKATA

Fl. No.	Departure	Arrival
201	7.30 am	9.45 am
202	9.00 am	11.15 am
203	10.30 am	1.45 pm
204	7.30 pm	9.45 pm

$12\frac{1}{2}$

4. a) Find the dual of the following LPP :

Minimize $Z = x_1 + x_2 + x_3$

Subject to $x_1 - 3x_2 + 4x_3 = 5$

$x_1 - 2x_2 \leq 5$

$2x_2 - x_3 \geq 4$

and $x_1,\ x_2 \geq 0,\ x_3$ is unrestricted.

$6\frac{1}{2}$

b) Write short notes on any *two* of the following :

(i) Artificial variable

(ii) Degenerate transportation problem

(iii) Maximization assignment problem

(iv) Feasible solutions. 3 + 3

MODULE – II

Answer any *two* questions : $12\frac{1}{2} \times 2 = 25$

5. a) Briefly describe the dominance rule of game theory. 4

b) Solve the following game problem :

	B_1	B_2	B_3	B_4
A_1	– 5	3	1	10
A_2	5	5	4	6
A_3	4	–2	0	–5

$8\frac{1}{2}$

6. A small project consists of 7 activities which are given below :

Activities	Preceding Activity	Duration (Days)		
		Most likely	Optimistic	Pessimistic
A	—	3	1	7
B	*A*	6	2	14
C	*A*	3	3	3
D	*B, C*	10	4	22
E	*B*	7	3	15
F	*D, E*	5	2	14
G	*D*	4	4	4

a) Draw the network and find the critical path.

b) What project duration will have 45% confidence of completion ? $6\frac{1}{2} + 6$

7. The probability distribution of monthly sales of a certain item is as follows :

Monthly sales	0	1	2	3	4	5	6
Probability	0·01	0·06	0·25	0·35	0·20	0·03	0·10

The cost of carrying inventory is Rs. 30 per unit per month and the cost of unit shortage is Rs. 70 per month. Determine the optimum stock limit which minimizes the total expected cost. $12\frac{1}{2}$

8. Write short notes on any *two* of the following:

   a) Economic order quantity

   b) Pure strategy game

   c) Slack or float

   d) Saddle point. $6\frac{1}{4} + 6\frac{1}{4}$