

POST-GRADUATE COURSE

Term End Examination — December, 2007

M.Com.

QUANTITATIVE TECHNIQUES

PAPER VIII

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.

Group - A

Answer any two questions :

1.(a) A manufacturer employs three inputs : man hours, machine hours and cloth material to manufacture two types of dresses. Type A dress fetches him a profit of Rs. 160 per piece, while type B, gives Rs. 180 per piece. The manufacturer has enough man hours to manufacture 50 pieces of type A or for 20 pieces of type B dresses per day while the machine-hours he possesses suffice only for 30 pieces of type A or for 24 pieces of type B dresses. Cloth material available per day is limited but sufficient enough for 30 pieces of either type of dresses. Formulate the linear programming model and solve it graphically.

(b) Write short note on *any one* of the following :

(i) basic solutions in a L.P.P.

(ii) degeneracy in L.P.P.

8½+4=12½

2.(a) Solve the following L.P.P.

Maximize $z = 3x_1 + 2x_2 + 5x_3$

Sub. to $x_1 + 2x_2 + 2x_3 \leq 8$

$3x_1 + 2x_2 + 6x_3 \leq 12$

$2x_1 + 3x_2 + 4x_3 \leq 12$

$x_1, x_2, x_3 \geq 0$

(b) Write the dual of the following L.P.P.

Maximize $z = 8x_1 + 10x_2 + 5x_3$

Sub. to $x_1 - x_3 \leq 4$

$2x_1 + 4x_2 \leq 12$

$x_1 + x_2 + x_3 \geq 2$

$3x_1 + 2x_2 - x_3 = 8$

$x_1, x_2, x_3 \geq 0$

7½+5=12½

3. The following table shows all the necessary information on the availability of supply to each warehouse, the requirement of each market and unit transportation costs (in Rs.) from each warehouse to each market.

		Market				Supply
		P	Q	R	S	
Warehouse	A	6	3	5	4	22
	B	5	9	2	7	15
	C	5	7	8	6	8
demand		7	12	17	9	

8½+4=12½

(3)

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The shipping clerk has worked out the following schedule from experience : 12 units from A to Q, 1 unit from A to R, 8 units from A to S, 15 units from B to R, 7 units from C to P and 1 unit from C to R

- (i) Check and see if the clerk has the optimal schedule.
- (ii) Find the optimal schedule and minimum total transport cost.

(b) Discuss the modification is the transportation algorithm when the transportation problem is unbalanced.

4. A small project is composed of 7 activities whose time estimates are listed in the table below. Activities are identified by their beginning (i) and ending (j) node-numbers.

Activity i - j	Estimated duration (in weeks)		
	Optimistic	Most likely	Pessimistic
1 - 2	1	1	7
1 - 3	1	4	7
1 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15

- (i) Draw the project network.
- (ii) Find the expected duration and variance of each activity.
- (iii) Calculate the variance and standard deviation of project duration.
- (iv) What is the probability that the project will be completed atleast 4 weeks earlier than expected ?

$3+3+3+3\frac{1}{2}=12\frac{1}{2}$

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(4)

Group - B

Answer any two questions :

5.(a)The demand for an item in a company is 18,000 units per year. The company can produce the item at a rate of 3,000 per month. The cost of one set-up is Rs. 500 and the holding cost of one unit per month is Re 0.15. The shortage cost of one unit is Rs. 20 per month. Determine the optimum manufacturing quantity and the shortage quantity. Also determine the manufacturing time and the time between set-ups.

(b) Discuss different costs associated with inventory control system.

$6\frac{1}{2}+6=12\frac{1}{2}$

7.(a)Solve the game whose pay off matrix is

		Player B			
		I	II	III	IV
Player A	I	4	2	3	5
	II	-2	-1	4	-3
	III	5	2	3	3
	IV	4	0	0	1

(b) Explain the following terms (any two) :

- (i) Value of a game
- (ii) Pure strategy in game theory
- (iii) Principles of dominance.

$6\frac{1}{2}+6=12\frac{1}{2}$

7.(a)Give the mathematical formulation of an assignment problem.

(5)

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- (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.

		Jobs				
		I	II	III	IV	V
Men	A	2	9	2	7	1
	B	6	8	7	6	1
	C	4	6	5	3	1
	D	4	2	7	3	1
	E	5	3	9	5	1

Find the assignment of men to jobs that will minimise the total time taken. $5+7\frac{1}{2}=12\frac{1}{2}$

8. Write short notes (**any two**) :
- (i) Critical activities and their importance in project scheduling.
 - (ii) Total float and free float.
 - (iii) Lead time in inventory control models.
 - (iv) Primal dual relationship in L.P.P. $6+6\frac{1}{2}=12\frac{1}{2}$
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