2018

M.Com. 1st Semester Examination

QUANTITATIVE TECHNIQUES FOR MANAGERIAL DECISIONS

PAPER—COM-103

Full Marks : 50

Time : 2 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Unit–I

[Marks : 20]

1. Answer any *two* questions : 2×2

(a) Distinguish between Primal and Dual of a L.P.P.

(b) Explain the term feasible solution of a L.P.P.

(c) Explain the term 'Degeneracy' in assignment problem.

(d) Explain the term 'unbalanced transportation problem'.

2. Answer any *two* questions : 2×4

(a) Find the dual of the following L.P.P.

$$\text{Max } Z = -3x_1 - 2x_2$$

Subject to,

$$x_1 + x_2 \geq 1$$
$$x_1 + x_2 \leq 7$$
$$x_1 + 2x_2 \geq 10$$
$$x_2 \leq 3$$

Provided that $x_1 \geq 0$, x_2 unrestricted.

(b) Four salesmen are to be assigned to four districts. Estimates of the sales revenue in '000 of rupees for each sales are as under :

Salesman \ District	A	B	C	D
1	320	350	400	280
2	400	250	300	220
3	420	270	340	300
4	250	390	410	350

Assign the salesmen in right district.

(c) Write notes on the following :

(i) Multiple optimal solutions of an assignment problem.

(ii) Prohibited Assignment. 2+2

(d) Write notes on the following :

(i) Use of Slack Variable in a L.P.P.

(ii) Use of Surplus and Artificial variable in a L.P.P.

2+2

3. Answer any *one* question : 1×8

(a) Solve the following L.P.P. using Simplex method :

$$\text{Min } z = 3x_1 - x_2$$

Subject to,

$$-x_1 + x_2 \geq 2$$

$$5x_1 - 2x_2 \geq 2$$

Provided that $x_1, x_2 \geq 0$.

(b) From the following initial solution of the given problem find optimal solution by MODI method to minimize total transportation cost.

Plant	Plant Location				Availability
	A	B	C	Dummy	
W	8 (112)	16	16 (40)	0	152
X	32 (32)	48 (50)	32 (82)	0	164
Y	16	32 (154)	48	0	154
Requirement	144	204	82	40	470

Unit–II

[Marks : 20]

4. Answer any *two* questions : 2×2

(a) Define the term 'Looping' in the context of network analysis.

(b) Why and how are inventories maintained ?

(c) What do you mean by 'Crashing' in network analysis ?

(d) State the assumptions of queuing models.

5. Answer any *two* questions : 2×4

(a) Distinguish between PERT and CPM.

(b) A project consists of seven specific activities mentioned below :

Activity	Optimistic time (days)	Most likely time (days)	Pessimistic time (days)
1 – 2	1	1	7
1 – 3	1	4	7
1 – 4	2	4	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) State the expected duration of the project.

(c) The ABC company purchases 90,000 containers each year from XYZ company. The ordering cost in Rs. 90. The carrying cost per container is assumed to be 20% of the unit price. The discount price schedule is as follows :

Order quantity	Price per unit (Rs.)
1 to 10000	0.45
10000 to 20000	0.38
20000 and above	0.35

Assuming instantaneous delivery, find :

(a) EOQ ; and

(b) Optimum total cost. 2+2

(d) Explain the following terms in the context of queuing theory :

(i) Jockeying ;

(ii) Reneging. 2+2

6. Answer any *one* question : 1×8

(a) The average rate of arrival of airplanes at an airport during the peak period is 20 per hour and the actual number of arrivals in any hour follows a poisson distribution. The airport can land 60 airplanes per hour on an average in good weather and 30 airplanes per hour in bad weather but the actual number of landed in any hour follows a poisson distribution with these respective averages. When ther is congestion, the airplanes are forced to fly over the field in the stack awaiting the landing of other airplanes that arrive earlier.

(i) How would many airplanes be flying over the field in the stack on an average in good weather and the bad weather ?

(ii) How long would a airplane be in the stack and in the process of landing in good and in bad weather ?

(iii) How long would a airplane be in the process of landing in good and bad weather after stack awaiting ?

(b) Write short notes on :

(i) Economic lot size system with uniform demand model in inventory management ;

(ii) M/M/I Queuing Model. 4+4

Internal Assessment — 10

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