2017

M.Com.

1st Semester Examination

QUANTITATIVE TECHNIQUES FOR MANAGERIAL DECISIONS

PAPER—COM-103

Subject Code—03

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* of the following questions : 2×5

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

Max $z = 40x_1 + 120x_2$

Subject. to, $x_1 - 2x_2 \leq 8$

$-4x_1 + 5x_2 = 70$

$15x_1 + 44x_2 \geq 65$

Provided that $x_1, x_2 \geq 0$. 5

(b) Write notes on the following :

(i) Degeneracy in LPP ;

(ii) Unbalanced Assignment Problem. 3+2

(c) Five different machines can do any of the five required jobs. The associated cost matrix is as follows :

Machine / Job	M_1	M_2	M_3	M_4	M_5
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

Required : Solve the Assignment Problem so that the cost is minimum. 5

(d) A trip from Chennai to Mangalore takes six hours by bus. A typical time table of the bus service in both directions is given below :

Departure from Chennai	Route Number	Arrival at Mangalore	Arrival at Channai	Route Number	Departure from Mangalore
6.00	a →	12.00	11.30	← 1	5.30
7.30	b →	13.30	15.00	← 2	9.00
11.30	c →	17.30	21.00	← 3	15.00

The cost of providing the services by the transport company depends upon the time spent by the bus crew away from their places in addition to service time. There are three crews. There is a constraint that every crew should be provided with more than 4 hours rest before the return trip again and should not wait for more than 24 hours for the return trip. The company has residential facilities for the crew at Chennai as well as at Mangalore. Using the above information prepare an assignment matrix. 5

2. Answer any *one* of the following questions : 1×10

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

Min. $z = 3x_1 + 2.5x_2$

Subject to, $2x_1 + 4x_2 \geq 40$

$3x_1 + 2x_2 \geq 50$

Provided that $x_1 \geq 0$ and $x_2 \geq 0$. 10

(b) The manager of a cement factory is considering the best way to transpoert cement from his three manufacturing centres P, Q, R to depots A, B, C, D and E. The weekly productions and demands along with transportation costs per tonne are given below :

Manufacturing Centre	Depots					Supply (Tonnes)
	A	B	C	D	E	
P	4	1	3	4	4	60
Q	2	3	2	3	3	35
R	3	5	2	4	4	40
Demand (Tonnes)	22	45	20	18	30	135

(i) Find the initial basic feasible solution using VAM.

(ii) Find the optimal allocation using MODI method.

5+5

Unit – II

[Marks : 20]

3. Answer any *two* of the following questions : 2×5

(a) State the different types of floats in network analysis.

5

(b) Draw a network for the following activities and determine the critical path and minimum duration of project.

Activity	*Duration (Days)*
1 – 2	15
1 – 3	20
2 – 3	10
2 – 4	12
3 – 4	5
4 – 5	10

5

(c) Discuss the inventory model relating to Economic Lot size system with Uniform Demand. 5

(d) A cement company distributes its products by trucks loaded at its only loaded station. Both company's trucks and contractor's trucks are used for this purpose. It was found that on an overage in every 5 minutes one truck arrived and the average loading time was 3 minutes. 40% of the trucks belong to the contractors.

Find out :

(i) The probability that a truck has to wait ;

(ii) The waiting time of a truck that waits ;

(iii) The expected waiting time of contractor's trucks before being loaded, assuming a 24 hours shift.

2+2+1

4. Answer any *one* of the following questions : 1×10

(a) A project consists of seven activities as given below :

Activity	Optimistic time	Most Likely time	Pesimistic time
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) Estimate the expected duration of the project ;

(iii) Determine the probability that the project will be completed at least 3 weeks earlier than expected.

2+4+4

(b) Find the optimal order quantity for a product for which price breaks are as follows :

Quantity (Units)	*Unit Price* (Rs.)
$0 < Q_1 < 100$	20 per unit
$100 \leq Q_2 < 200$	18 per unit
$200 \leq Q_3$	16 per unit

The monthly demand for the product is 400 units. The storage cost is 20 percent of the unit cost of the product and the cost of ordering is Rs. 25.00 per month. 10

[Internal Assessment — 10 Marks]