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M.Com. 1st Semester Examination, 2024

COMMERCE

*(Quantitative Techniques for
Managerial Decisions)*

PAPER—COM-104.1 & 104.2

Full Marks : 50

Time : 2 hours

Answer all questions

The figures in the right hand margin indicate marks

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

COM-104.1

[Marks : 20]

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

(Turn Over)

(2)

(a) Obtain the dual of the following L.P.P :

$$\text{Min } Z = 40 X_1 + 120 X_2$$

$$\text{Subject to, } -X_1 + 2X_2 \geq -8$$

$$3X_1 + 5X_2 = 90$$

$$15X_1 + 44X_2 \leq 660$$

Provided that $X_1, X_2 \geq 0$

(b) Briefly write the steps in solving a maximization assignment problem using Hungarian method.

(c) Solve the following assignment problem of minimizing total time for doing all the jobs using Hungarian method.

Operators	Jobs				
	J ₁	J ₂	J ₃	J ₄	J ₅
A	6	2	5	3	6
B	2	5	8	7	7
C	7	8	6	9	8
D	6	2	3	4	5
E	9	3	8	9	7
F	4	7	4	6	8

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

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

$$\text{Max } Z = X_1 - X_2 + 3X_3$$

$$\text{Subject to, } X_1 + X_2 + X_3 \leq 10$$

$$2X_1 - X_3 \leq 2$$

$$2X_1 - 2X_2 + 3X_3 \leq 0$$

Provided that $X_1, X_2, X_3 \geq 0$

(b) From the following initial solution using VAM of a transportation problem calculate optimal transport cost using MODI method. Assume right upper corner box represent transport cost per unit and left bottom box indicates initial allocated units in a cell.

(4)

Terminals	Plants				Avail ability
	A	B	C	D	
S	20	36	10	28	10
T	3	1	6	4	4
U	75	35	45	50	6
V	30	35	40	25	5
W (Dummy)	0	0	0	0	10
Requirement	13	10	6	6	

COM-104.2

[Marks : 20]

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

(a) (i) What do you mean by stock-out cost ?

(ii) Under what conditions will total inventory costs be at a minimum ?

(5)

(iii) State any three important objectives of inventory control. 1 + 1 + 3

(b) (i) What do you mean by Crashing in Network Analysis ?

(ii) How will you deal with the situation if negative value of independent float or interfering float is obtained ?

(iii) Draw a network from the following activities and find critical path and total duration of project. 1+1+(1+1+1)

Activity	Duration (Days)	Activity	Duration (Days)
1-2	4	3-5	7
1-3	7	4-5 (Dummy)	0
1-4	6	5-6	5
2-3 (Dummy)	0	5-7	6
3-4	5	6-7 (Dummy)	0

(c) (i) State the conditions for a single-channel, queuing model.

(ii) A TV repairman finds that the time spent on his job has an exponential distribution with mean 20 minutes. If he repairs sets in the order in which they come in, and if the arrival of sets is approximately Poisson with an average rate of 10 per 8 hours a day, what is the repairman's expected idle time each day? How many jobs are on an average in the system?

$$2 + \left(1\frac{1}{2} + 1\frac{1}{2}\right)$$

4. Answer any *one* question from the following: 10 × 1

(a) (i) Briefly explain the concepts of dangling and looping in network analysis.

(7)

- (ii) Find the optimal order quantity for a product with the following price discounts :

Order Quantity	Unit Price (₹)
$0 \leq Q < 500$	10.00
$500 \leq Q < 750$	9.25
$750 \leq Q$	8.75

The monthly demand for the product is 200 units, storage cost is 2% of unit cost and cost of ordering is ₹100.

$$\left(2\frac{1}{2} + 2\frac{1}{2}\right) + 5$$

- (b) (i) Compare the PERT and CPM techniques, explaining their similarities and differences.
- (ii) A project consists of the following activities :

Activity	Optimistic Time (Weeks)	Most Likely Time (Weeks)	Pessimistic Time (Weeks)
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

Required :

- (A) Draw the PERT network diagram.
- (B) Determine the expected project completion time.
- (C) Find the probability that the project will be completed at least 3 weeks earlier than expected. $3 + (2 + 3 + 2)$

[Internal Assessment – 10 Marks]