2022

M B A

2nd Semester Examination

OPERATIONS RESEARCH

PAPER—MBA-205

Full Marks : 100

Time : 3 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.

Answer all questions.

1. Answer any *eight* questions. 8×5

(a) A particular patient must take at least 60 units of Vitamin-A, 30 units of Vitamin-C and at most 40 units of Vitamin-B. Two types of

diet 'P' and 'Q' are provided to the patient at a cost of Rs. 20 and Rs. 10 per unit respectively. If one unit of 'P' contains 4 units of Vitamin-A, 1 units of Vitamin-B and 3 units of Vitamin-C as well as one unit of 'Q' contains 3 units of Vitamin-A, 2 units of Vitamin-B and 1 unit of Vitamin-C. Formulate the linear programming problem on the basis of the above information.

(b) Distinguish between slack variable and artificial slack variable in linear programming problem.

(c) Mention various applied areas of operations research in business.

(d) Distinguish between a balanced and an unbalanced transportation problem.

(e) Distinguish between a transportation problem and an assignment problem.

(f) State the fundamental properties of duality.

(g) Write a short note on 'VED Analysis' of inventory control.

(h) Derive the formula of Economic Order Quantity.

(i) Explain the term critical path in a network diagram.

(j) Distinguish between PERT and CPM.

(k) Explain the concept of 'decision tree'?

(l) Distinguish between Primal problem and Dual problem in LPP.

2. Answer any *four* questions. 4×10

(a) Solve the following LPP by using the Simplex method :

Maximize $Z = 3x_1 + 2x_2$

Subject the restrictions

$2x_1 + x_2 \leq 5$;

$x_1 + x_2 \leq 3$;

$x_1, x_2 \leq 0$.

(b) Given below is a transportation problem in which the cells contain the unit transportation costs in rupees. Find the initial solution by unsing.

(i) North West Corner Rule

(ii) Least Cost Method

		Destination				Supply
		1	2	3	4	
Sources	A	2	3	11	7	6
	B	1	0	6	1	1
	C	5	8	15	9	10
	Demand	7	5	3	2	

5+5

(c) A sales manager has five salesmen and monitors five different areas. He estimates sales per week (in Rs. '000) in order to

salesman credential and area potentiality for individual salesman in individual area as mentioned below :

		Areas				
		P	Q	R	S	T
Salesmen	I	18	24	25	14	25
	II	23	8	12	5	20
	III	26	12	18	15	22
	IV	7	23	26	22	21
	V	13	17	23	19	22

Find the assigment of salesmen to different areas for achieving maximum sales.

(d) From the following information, make ABC analysis.

Unit (No)	7,000	8,000	10,000	6,000	8,000	2,000	5,000	4,000
Unit Cost (Rs.)	10	9	2	8	1	60	4	40

(e) Determine the EOQ from the following *information* :

Lot Size	Price per Unit (Rs.)
Less than 200	10
200-399	8
400-599	5
600-799	4
800 and above	3

Per order ordering cost = Rs. 4

Holding cost per unit per year = Rs. 2

Annual demand = 1600 units.

(f) A small project is composed of nine activities whose time estimates are listed in the following table :

Activity	t_0	t_p	t_m
1–2	5	10	8
1–3	18	22	20
1–4	26	40	33
2–5	16	20	18
2–6	15	25	20
3–6	6	12	9
4–7	7	12	10
5–7	7	9	8
6–7	3	5	4

Find the expected task time and their variance.

[Internal Assessment – 20 Marks]

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