M.Prod.E 1st Year 1st Semester 2024

Ref. No.: Ex/PG/ProdE/T/113B/2024

Subject: Quantitative Methods & Decision Theories in Management

Time: 3 hours Marks:100

Use separate answer script for each Part

PART I (60 Marks)

Answer any three questions

1. The following table is the cost matrix for travel among a particular set of locations. Determine a minimum cost & travelling salesman itinerary: (20)

States	1	2	3	4	5
1	-	1	8	3	4
2	1	-	8	2	3
3	1	3	-	5	1
4	2	5	6	-	5
5	5	3	7	6	-

2. a) Differentiate between MADM and MODM. (4)
   b) Outline different forecast errors. (2)
   c) Discuss different methods of forecasting with examples. (14)

3. How is ELECTRE approach used in decision theory? Expound with illustration. (20)

4. A country has decided to purchase a fleet of jet fighters from another country. The AirForce analyst team agreed to consider the following four characteristics(attributes) : Maximum speed(x_1); ferry range(x_2); maximum payload(x_3); and purchasing cost(x_4). The values of four attributes for each model(alternatives) are given below:

	x_1	x_2	x_3	x_4
A_1	2.0	1500	20000	5.5
A_2	2.5	2700	18000	6.5
A_3	1.8	2000	21000	4.5
A_4	2.2	1800	20000	5.5
A_5	2.4	2100	25000	4.9

Unit of each alternative is shown below:

Attribute	Unit
Maximum speed (x_1)	Mach
Ferry range (x_2)	Km
Maximum payloads (x_3)	Pounds
Purchasing cost (x_4)	Ro. 10^6

Make an eclectic decision. (20)

[Turn over

5. Write short notes on any four:

a) Tracking speed

b) Shadow price

c) Aggregate production planning

d) MRP- II

e) Capacity planning

f) Kruskal algorithm

g) Ford Fulkerson algorithm

(5x4=20)

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M.E. PRODUCTION ENGINEERING FIRST YEAR FIRST SEMESTER – 2024

Subject : QUANTITATIVE METHODS & DECISION THEORIES IN MANAGEMENT (PM)

Time : Three Hours (Part I & Part II) **Full Marks : 100**

Part II (40 Marks)

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Use Separate Answer scripts for each part. **Answer any Two questions from Part II.**

(Graph Paper to be provided)

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1. (a) Why post-optimal sensitivity analysis is important? Explain binding and non-binding constraints.

(b) StyleHats produces two types of cowboy hats. A type 1 hat requires twice as much labour time as a type 2. If the all-available labour time is dedicated to Type 2 alone, the company can produce a total of 400 Type 2 hats a day. The respective market limits for the two types are 150 and 200 hats per day. The profit is Rs. 8 per Type 1 hat and Rs. 5 per Type 2 hat.

Determine the number of hats of each type that would maximize profit. (Formulate the problem as LPP and Solve.)

Also, determine Scarce and Abundant resources.

5+ (5 + 5 + 5)

2. (a) How would you define a Transportation Model? How would you solve a transportation problem using (i) North –West Corner Method and (ii). Multiplier Method / Modified Distribution Method (MODI).

(b) Using the following cost matrix determine the optimal job assignment and the cost of the assignments.

Machinist	Job				
	1	2	3	4	5
A	10	3	3	2	8
B	9	7	8	2	7
C	7	5	6	2	4
D	3	5	8	2	4
E	9	10	9	6	10

(12+8)

3. Write Short Notes on the following (any four): (a) Degeneracy and Alternative Optima (b) Properties of Linear Programming (c) Balanced Transportation (d) Vogel's Approximation Method (VAM) (e) Elements of Decision Models

(4 × 5)

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