

M. Prod. E 1st year 1st semester Examination 2025

Ref No: EX|PG | Prod E|T|113B|2025

Subject: Quantitative Methods and Decision Theories in Management

Time: 3 hours

Marks: 100

(Use separate Answer Scripts For each Group)

Group A (60 marks)

Answer any three questions:

1. Elucidate TOPSIS through an example known to you. (20)
2. Expound the procedural steps of AHP with a suitable example. (20)
3. Discuss ELECTRE method. (20)
4. Explain Ford Fulkerson algorithm with an example. (20)
5. Write short notes on any two.
 - a) Shadow price.
 - b) Assignment problem
 - c) Travelling salesman problem
 - d) Horwicz Criteria
 - e) Big data analytics. (10+10=20)

[Turn over

M.E. PRODUCTION ENGINEERING FIRST YEAR FIRST SEMESTER – 2025**Subject : QUANTITATIVE METHODS & DECISION THEORIES IN MANAGEMENT (PM)****Time : Three Hours (Part I & Part II)****Full Marks : 100****Part II (40 Marks)**.....
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) A company is engaged in the production of two components P_1 and P_2 that are used in computer hardware systems. Each unit of P_1 costs the company Rs. 25 in wages and Rs. 25 in material, while each unit of P_2 costs Rs. 125 in wages and Rs. 75 in material. The company sells both products on one-period credit terms, but the company's labour and material expenses must be paid together at the same time. The selling price of P_1 is Rs. 150/ unit and of P_2 is Rs. 350/unit. The company can sell as many units as it can produce. Its production capacity is, however, limited by two considerations: First, at the beginning of period 1, the company has an initial balance of Rs. 20,000. Second, the company has available in each period 4,000 hours of machine time and 2,800 hours of assembly time. The production of each P_1 requires 6 hours of machine time and 4 hours of assembly time, whereas the production of each P_2 requires 4 hours of machine time and 6 hours of assembly time.
 Formulate the problem as an LP model so as to maximize the total profit to the company.
 Solve the LP model graphically. Identify and mention the scarce and abundant resources and them maximum possible change in level. 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) Formulate the LP model for the following Transportation Model. Find the Basic Feasible Solution for the following Transportation Problem using (i) North –West Corner Method and (ii) Vogel's Approximation Method (VAM). Comment on both the solutions obtained.

		Distribution Centres				Supply
		1	2	3	4	
Plants	1	2	3	11	7	6
	2	1	0	6	1	1
	3	5	8	15	9	10
Demand		7	5	3	2	17

(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) Queue Structure (e) Elements of Decision Models (4 × 5)

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