PVP 23

Code: 23HS1403

II B.Tech - II Semester – Regular Examinations – MAY 2025

OPTIMIZATION TECHNIQUES

(Common for IT, AIML, DS)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	Define slack variable and surplus variables.	L2	CO1
1.b)	What are the merits of operations Research?	L2	CO1
1.c)	Discuss about degeneracy in Transportation problem.	L2	CO1
1.d)	How to convert maximization assignment problem into minimization problem.	L2	CO1
1.e)	Write a note on types of sequencing problems?	L2	CO1
1.f)	Discuss general guidelines need to follow while drawing project network diagrams.	L2	CO1
1.g)	Explain different types of inventory models.	L2	CO1
1.h)	Explain cost management in Break-even-Analysis.	L2	CO1
1.i)	Define saddle point and value of the game.	L2	CO1
1.j)	What is the role of theory of games in scientific decision making?	L2	CO1

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	Solve the following LPP using graphical method $Maximize\ z = 20x_1 + 10x_2$ subject to $2x_1 + 3x_2 \geq 30,\ 3x_1 + 2x_2 \leq 24,\ x_1 + x_2 \geq 3\ and\ x_1, x_2 \geq 0$		L3	CO2	10 M

OR

3	Use simplex method to solve the following LPP $Maximize\ z = 3x_1 + 5x_2 + 4x_3$ subject to $2x_1 + 3x_2 \le 8,\ 2x_2 + 5x_3 \le 10,\ 3x_1 + 2x_2 + 4x_3 \le 15\ and\ x_1, x_2, x_3 \ge 0$	L3	CO2	10 M

UNIT-II

4	Determine an optimal solution to the following Transportation problem.	L3	CO2	10 M

	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	30
O_3	4	2	5	9	20
Demand	20	40	30	10	

OR

5	A market manager has 5 salesmen and there are 5 sales districts. Considering the capabilities of the salesmen and the nature of districts, the estimates made by the marketing manager for the sales per month(in 1000 rupees) for each salesman in each district would be as follows. $\begin{bmatrix} 32 & 38 & 40 & 28 & 40 \\ 40 & 24 & 28 & 21 & 36 \\ 41 & 27 & 33 & 30 & 37 \\ 22 & 38 & 41 & 36 & 36 \\ 29 & 33 & 40 & 35 & 39 \end{bmatrix}$ Find the assignment to the districts that will result in the maximum sales.	L3	CO2	10 M

UNIT-III

6	There are seven jobs each of which has to go through the machines M_1, M_2 in the order of M_1, M_2. Processing time (in hours) is given as	L3	CO3	10 M

Job	1	2	3	4	5	6	7
$Machine\ M_1$	3	12	15	6	10	11	9
$Machine\ M_2$	8	10	10	6	12	1	3

Determine the sequence of these jobs that will

	minimize the total elapsed time. Also find the idle times of machines.			
	OR			
7	A project has the following characteristics Construct a PERT Network. Also find the critical path and variance for each event.	L3	CO3	10 M

Activity	Most Optimistic time	Most likely time	Most pessimistic time
(1 – 2)	1	1.5	5
(2 – 3)	1	2	3
(2 – 4)	1	3	5
(3 – 5)	3	4	5
(4 – 5)	2	3	4
(4 – 6)	3	5	7
(5 – 7)	4	5	6
(6 – 7)	6	7	8
(7 – 8)	2	4	6
(7 – 9)	5	6	8
(8 – 10)	1	2	3
(9 – 10)	3	5	7

	UNIT-IV			
8	The following table gives the annual demand and unit price of the item. Order cost is Rs5 per order and holding cost is 10% of unit price. Determine (i) EOQ. (ii) Total Inventory cost. (iii) Number of orders in a year.	L4	CO4	10 M
	OR			
9	If sales are 10,000 units and selling price is Rs. 20 per unit, variable cost is Rs.10 per unit and fixed cost is Rs.80,000/-. Find out BEP in units and sales revenue. What is the profit earned? What should be the sales for earning profit of Rs.60,000/-?	L4	CO4	10 M

Item	A
Annual demand (units)	400
Unit Price (Rs)	8.00

UNIT-V

10	Using the graphical method, Solve the following game and the value of the game.	L4	CO5	10 M

Player A	Player B			
	1	2	3	4
A1	2	2	3	-2
A2	4	3	2	6

OR

11	A Glass factory specializing in crystal is developing a substantial backlog and the firm's management is considering three courses of action: (A) arrange for sub-contracting (B) overtime (C) construct new facilities. The correct choice depends largely upon future demand which may be low, medium or high. By consensus, management ranks the respective probabilities as 0.10, 0.50 and 0.40. A cost analysis reveals the effect upon the profits that is shown in the table below.	L4	CO5	10 M

Profit (Rs. '000) if demand is	Courses of action		
	A (subcontracting)	B (over time)	C (construct facilities)
Low (p=0.10)	10	-20	-150
Medium (p=0.50)	50	60	20
High (p=0.40)	50	100	200

Show this decision is in the form of a decision tree and indicates the most preferred decision and corresponding expected value.