PVP 19

Code: 19ME2701A

IV B.Tech - I Semester – Regular Examinations - DECEMBER 2022

OPTIMIZATION TECHNIQUES
(COMPUTER SCIENCE & ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 5 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 12 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)	Write the statement/general-form of an optimization problem.	L2	CO1
1. b)	List any four Elimination methods (under one-dimensional minimization methods)	L2	CO2
1. c)	Practical design problems are rarely unconstrained. But why is the study of unconstrained problems important? List two reasons.	L2	CO2
1. d)	State Bellman’s Principle of Optimality.	L2	CO3
1. e)	Write the classification of Integer programming methods for Linear programming problems.	L2	CO4

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	Discuss briefly various engineering applications of optimization.	L2	CO1	6 M
	b)	Find the maxima and minima, if any, of the function $f(x) = 4x^3 - 18x^2 + 27x - 7$	L3	CO1	6 M
OR					
3	a)	Find the solution of Minimize $f = 9 - 8x_1 - 6x_2 - 4x_3 + 2x_1^2 + 2x_2^2 + x_3^2 + 2x_1x_2 + 2x_1x_3$ Subject to $x_1 + x_2 + 2x_3 = 3$ using Lagrange multiplier method.	L3	CO1	8 M
	b)	Discuss the 'Objective function' in the statement of an optimization problem.	L2	CO1	4 M
UNIT-II					
4	a)	Explain the procedure of 'Interval halving method'.	L2	CO2	6 M
	b)	What are the limitations of 'Fibonacci method'?	L2	CO2	6 M
OR					
5	Find the minimum of $f = \lambda^5 - 5\lambda^3 - 20\lambda + 5$ using Interval halving method in the interval (0, 5).		L3	CO2	12 M

		UNIT-III			
6		Solve the following equations using the steepest descent method with the starting point, $X_1 = \{0\ 0\ 0\}$: $2x_1 + x_2 = 4; \quad x_1 + 2x_2 + x_3 = 8; \quad x_2 + 3x_3 = 11$	L3	CO2	12 M
		OR			
7	a)	Why is the steepest descent method not efficient in practice, although the directions used are the best directions?	L3	CO2	6 M
	b)	What are the characteristics of a direct search method?	L2	CO2	6 M
		UNIT-IV			
8	a)	Write a short notes on Characteristics of dynamic programming and basic steps in solving dynamic programming problems.	L2	CO3	6 M
	b)	What are the applications of dynamic programming?	L2	CO3	6 M
		OR			
9		Solve the following LPP using Dynamic programming Maximize $z = 8x_1 + 6x_2$ subject to $2x_1 + x_2 \leq 1000$ $x_1 + x_2 \leq 800$ $x_1 \leq 400$ $x_2 \leq 700$ and $x_1, x_2 \geq 0$	L3	CO3	12 M

UNIT-V				
10	Solve the following mixed-integer program by the branch and bound algorithm: Minimize $Z = 10x_1 + 9x_2$ subject to $5x_1 + 3x_2 \geq 45$ $x_1 \leq 8$ $x_2 \leq 10,$ and $x_1, x_2 \geq 0;$ x_2 is an integer.	L3	CO4	12 M
OR				
11	Solve the following Integer linear programming problem by Gomory's cutting plane method Maximize $Z = 4x_1 + 3x_2$ Subject to $3x_1 + 2x_2 \leq 18$ $x_1, x_2 \geq 0$ and integers.	L3	CO4	12 M