Reg. No.															

Question Paper Code	13458

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Sixth Semester

Artificial Intelligence and Data Science

20AIPW603 - OPTIMIZATION TECHNIQUES FOR PROGRAMMING WITH LABORATORY

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	An optimization problem involves finding. (a) A set of decision variables that maximize or minimize an objective function (b) The most complex function (c) The solution to a linear equation (d) Only feasible solutions	1	K1	CO1
2.	Constrained optimization, the feasible region is (a) The region where all constraints are violated (b) The region where all constraints are satisfied (c) Only a part of the solution space (d) Always the entire solution space	1	K1	CO1
3.	A constraint in a Linear programming model represents _____. (a) Limitations (b) Requirements (c) Balancing limitations and requirements (d) All of the above	1	K1	CO2
4.	A feasible solution to a linear programming problem _____. (a) Must optimize the value of the objective function (b) Must be a corner point of the feasible region (c) Need not satisfy all of the constraints, only some of them (d) Must satisfy all of the problem's constraints simultaneously	1	K2	CO2
5.	_____is a key property of a convex function. (a) Any local minimum is a global minimum (b) Only linear solutions exist (c) Function value increases exponentially (d) Has multiple optima by default	1	K1	CO3
6.	Genetic Algorithms are inspired by: (a) Thermodynamics (b) Evolution and natural selection (c) Swarm behavior (d) Game theory	1	K1	CO3
7.	In which domain is the Monte Carlo method NOT commonly used? (a) Finance (b) Engineering (c) Pure Geometry (d) Statistical physics	1	K2	CO4
8.	Swarm Intelligence algorithms are primarily inspired by_____ (a) Human logic (b) Neural computation (c) Collective behavior of social organisms (d) Circuit theory	1	K1	CO4
9.	Primary role of a neural network in optimization problems_____ (a) To perform classification only (b) To act as a surrogate model for objective functions (c) To increase the number of iterations (d) To simplify mathematical models	1	K1	CO5
10.	_____ are the way to represent uncertainty. (a) Fuzzy Logic (b) Probability (c) Entropy (d) All of the mentioned	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Define the term objective function in the context of optimization.	2	K1	CO1
12.	Write the difference between convex and non-convex optimization problems.	2	K2	CO1

13.	State optimal solution.	2	*K1*	*CO2*
14.	Develop the steps involved in a linear programming problem using the simplex method.	2	*K3*	*CO2*
15.	Identify the basic terminology used in non-linear programming.	2	*K3*	*CO3*
16.	Direct root method for solving systems of non-linear equations. Comment your answer.	2	*K3*	*CO3*
17.	Infer the key components of simulated annealing.	2	*K2*	*CO4*
18.	Memorize the methods that are commonly used to handle constraints in genetic algorithm.	2	*K2*	*CO4*
19.	How does the Bat Algorithm use echolocation?	2	*K2*	*CO5*
20.	Write about an aspiration criterion in Tabu Search.	2	*K3*	*CO5*
21.	List out the types of neural networks commonly used for optimization purposes.	2	*K2*	*CO6*
22.	Write the basic concept of fuzzy optimization.	2	*K1*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Describe the relationship between the constraint surface and the feasible region.	*11*	*K2*	*CO1*
		OR			
	b)	Distinguish between linear and non-linear optimization problems. Give examples.	*11*	*K2*	*CO1*
24.	a)	Compare simplex, revised simplex and dual simplex methods of linear programming optimization in terms of their procedures, advantages and disadvantages.	*11*	*K2*	*CO2*
		OR			
	b)	Explain how changes in the objective function coefficients affect the optimal solution.	*11*	*K2*	*CO2*
25.	a)	Illustrate the steps of the Golden Section method for finding the minimum of a function.	*11*	*K3*	*CO3*
		OR			
	b)	Expose a real-world engineering problems where non-linear optimization is applicable.	*11*	*K3*	*CO3*
26.	a)	Determine a step-by-step description of how Simulated Annealing would solve a basic numerical optimization problem.	*11*	*K3*	*CO4*
		OR			
	b)	Distinguish a sample numerical result where Genetic Algorithm is applied to a real-world optimization problem.	*11*	*K3*	*CO4*
27.	a)	Explain the working of the Tabu Search algorithm and how it differs from other local search methods in solving combinatorial optimization problems.	*11*	*K3*	*CO5*
		OR			
	b)	Evaluate the Particle Swarm Optimization algorithm.	*11*	*K3*	*CO5*
28.	a)	Elaborate a scenario where a neural network is used for optimization or function approximation.	*11*	*K3*	*CO6*
		OR			
	b)	Discuss the role of fuzzy logic in solving optimization problems.	*11*	*K3*	*CO6*