End-Term Examination
(CBCS)(SUBJECTIVE TYPE)(OffLine)
Course Name: B.TECH, Semester:5th
(December, 2024)

Subject Code: BAM 301	Subject: Optimization Techniques and Decision Making
Time :3 Hours	Maximum Marks :60

Note:Q1 is compulsory. Attempt one question each from the Units I, II, III & IV.

Q1		(2.5*8 =20)	CO Mapping
	a) State associated Issues with Iterative Methods.	2.5	1
	b) What are the complementary slackness conditions?	2.5	1
	c) Explain Curvature Analysis.	2.5	2
	d) State disadvantages of Newton's Method.	2.5	2
	e) What is Bias-Variance tradeoff?	2.5	3
	f) Differentiate overfitting and underfitting.	2.5	3
	g) What are the "positive ideal solution" and "negative ideal solution" in the TOPSIS method?	2.5	4
	h) What is the role of the kernel in Support Vector Machines?	2.5	4
	UNIT I		**CO Mapping**
Q2	The manager of an oil refinery must decide on the optimal mix of two possible blending processors of which the input and output production runs as follows-	(10)	1

Process	Input	Input	Output	Output
	Crude A	Crude B	Gasoline X	Gasoline Y
1.	6	4	6	9
2.	5	6	5	5

	The maximum amounts available of Crude A and B are 250 units and 200 units respectively. Market demand shows that atleast 150 units of Gasoline X & 130 units of Gasoline Y must be produced. The profits per production run from Process 1 & Process 2 are Rs.4 and Rs.5 respectively. Formulate the problem for maximizing the profit.		
Q3	Minimize the quadratic function using Steepest Descent Method. $f(x)=x^2+4x+4$	(10)	1
	UNIT II		**CO Mapping**
Q4	Explain the concept of lagrange variables. Find minimum value of the objective function $f(x,y)=x^2+y^2$ subject to: x+y=1, using Lagrange variables method.	(10)	2
Q5	What is the advantage of the Quasi Newton Method over Newton Method? Minimize the function using the Quasi Newton Method. $f(X)=x^2+2x+1$ starting from an initial guess of $x_0=0$ and Take $\alpha=1$.	(10)	2

	UNIT III		CO Mapping
Q6	Explain K Nearest Neighbors Algorithm with an example.	**(10)**	**3**
Q7	Define Prescriptive Analytics? What are its types and differentiate between them?	**(10)**	**3**
	UNIT IV		**CO Mapping**
Q8	Explain k-means algorithm. For the given data, compute two clusters using K-means algorithm for clustering where initial cluster centers are (1.0, 1.0) and (5.0, 7.0). Execute for two iterations.	**(10)**	**4**
Q9	(a) What is a Markov Decision Process (MDP), and why is it important in reinforcement learning? (b) What is reinforcement learning? Write its applications.	**(10)**	**4**

Table in Q8:

Record No	R1	R2	R3	R4	R5	R6	R7
A	1	1.5	3	5	3.5	4.5	3.5
B	1	2	4	7	5	5	4.5