

CBCS SCHEME - Make-Up Exam

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BCS/BIS602

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025 Machine Learning

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1				M	L	C																																			
Q.1	a.	Illustrate the knowledge pyramid and distinguish between the terms: Data, Information, Knowledge and Intelligence.	10	L2	CO1																																				
	b.	Discuss descriptive statistics with the explanation of fundamental concepts of data types. List the types of data based on variables.	10	L2	CO1																																				
OR																																									
Q.2	a.	Why is machine learning needed for business organization? List out and explain the types of machine learning.	10	L2	CO1																																				
	b.	Define Central Tendency. What are the measures of central tendencies? Why are central tendency and dispersion measures important for data miners?	10	L2	CO1																																				
Module – 2																																									
Q.3	a.	Discuss the raw operation required to facilitate the application of Gaussian Elimination method. Solve the following set of equations using Gaussian Elimination method: $2x_1 + 4x_2 = 6$ $4x_1 + 3x_2 = 7$	10	L3	CO2																																				
	b.	Consider the training dataset of 4 instances shown in following Table -1 . It contains the details of the performance of students and their likelihood of getting a job offer or not in the final semester. Apply the Find- s Algorithm to generate the final hypothesis. Table : 1 <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th>CGPA</th><th>Interaction</th><th>Knowledge</th><th>Skill</th><th>Thinking</th><th>Interest</th><th>Job Offer</th></tr> </thead> <tbody> <tr> <td>≥9</td><td>Yes</td><td>Excellent</td><td>Good</td><td>Fast</td><td>Yes</td><td>Yes</td></tr> <tr> <td>≥9</td><td>Yes</td><td>Good</td><td>Good</td><td>Fast</td><td>Yes</td><td>Yes</td></tr> <tr> <td>≥8</td><td>No</td><td>Good</td><td>Good</td><td>Fast</td><td>No</td><td>No</td></tr> <tr> <td>≥9</td><td>Yes</td><td>Good</td><td>Good</td><td>Slow</td><td>No</td><td>Yes</td></tr> </tbody> </table>	CGPA	Interaction	Knowledge	Skill	Thinking	Interest	Job Offer	≥9	Yes	Excellent	Good	Fast	Yes	Yes	≥9	Yes	Good	Good	Fast	Yes	Yes	≥8	No	Good	Good	Fast	No	No	≥9	Yes	Good	Good	Slow	No	Yes	10	L3	CO2	
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Q.4	a.	Consider the same set of instances from the training dataset shown in Table -1 and generate version space as consistent hypothesis.	10	L3	CO2																																				
	b.	What are the four basic steps in the Machine Learning Process? Discuss Model performance and Model complexity in Model selection. List out some of the approaches used for selecting a Machine Learning Model.	10	L2	CO2																																				

Module – 3

Q.5	a.	Consider the student performance training dataset of 8 instances shown in Table – 2 which describes the performance of individual students in a course and their CGPA obtained in the previous semester. Independent attributes are – CGPA, Assessment and Project, Target variable is ‘Result’ that takes two values ‘pass’ or Fail’. Based on the performance of a student, classify whether a student (6.1, 40, 5) will pass or Fail. Assign K = 3 Table : 2	10	L3	CO3																																													
		<table><tr><th>Sl.NO.</th><th>CGPA</th><th>Assessment</th><th>Project</th><th>Result</th></tr><tr><td>1</td><td>9.2</td><td>85</td><td>8</td><td>Pass</td></tr><tr><td>2</td><td>8</td><td>80</td><td>7</td><td>Pass</td></tr><tr><td>3</td><td>8.5</td><td>81</td><td>8</td><td>Pass</td></tr><tr><td>4</td><td>6</td><td>45</td><td>5</td><td>Fail</td></tr><tr><td>5</td><td>6.5</td><td>50</td><td>4</td><td>Fail</td></tr><tr><td>6</td><td>8.2</td><td>72</td><td>7</td><td>Pass</td></tr><tr><td>7</td><td>5.8</td><td>38</td><td>5</td><td>Fail</td></tr><tr><td>8</td><td>8.9</td><td>91</td><td>9</td><td>Pass</td></tr></table>	Sl.NO.	CGPA	Assessment	Project	Result	1	9.2	85	8	Pass	2	8	80	7	Pass	3	8.5	81	8	Pass	4	6	45	5	Fail	5	6.5	50	4	Fail	6	8.2	72	7	Pass	7	5.8	38	5	Fail	8	8.9	91	9	Pass			
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	b.	List and explain various types of regression methods. What are the limitation of regression methods?	10	L2	CO3																																													
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Q.6	a.	Consider the same training data set given in Table -2. Use weighted K-NN and determine the class of Test Instance (7.6, 60,8), Assign k = 3.	10	L3	CO3																																													
	b.	How does the structure of a decision tree help in classifying a data instance? Discuss the advantages and disadvantages of decision tree.	10	L2	CO3																																													
Module – 4																																																		
Q.7	a.	Compare biological neuron and artificial neuron. Illustrate Mc Culloch and Pitts mathematical model of an artificial neuron.	10	L2	CO3																																													
	b.	What is meant by Probabilistic based learning? Explain Maximum A Posteriori (MAP) h_{MAP} and Maximum likelihood (ML), h_{ML} .	10	L2	CO4																																													
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Q.8	a.	Define activation function. List some of the linear and non linear activation function and explain any two.	10	L2	CO4																																													
	b.	Illustrate Artificial Neural Network structure. List and explain types of Artificial Neural Networks.	10	L2	CO4																																													
Module – 5																																																		
Q.9	a.	Define and distinguish between classification and clustering. List out the application and challenges of clustering Algorithms.	10	L2	CO5																																													
	b.	Consider the following set of data given in Table – 3. Cluster it using K – means algorithm with the initial value of object 2 and 5 with the coordinate values (4,6) and (12,4) as initial seeds. <table><tr><th>Objects</th><th>X-Coordinate</th><th>Y- Coordinate</th></tr><tr><td>1</td><td>2</td><td>4</td></tr><tr><td>2</td><td>4</td><td>6</td></tr><tr><td>3</td><td>6</td><td>8</td></tr><tr><td>4</td><td>10</td><td>4</td></tr><tr><td>5</td><td>12</td><td>4</td></tr></table>	Objects	X-Coordinate	Y- Coordinate	1	2	4	2	4	6	3	6	8	4	10	4	5	12	4	10	L3	CO5																											
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Q.10	a.	How is reinforced Learning different from supervised and unsupervised Learning methods? What are the components of reinforced Learning? Explain.	10	L2	CO5																																													
	b.	Elucidate Q-Learning algorithm. How Q- Learning is different for SARSA Learning? Explain.	10	L2	CO5																																													