

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(MID SEMESTER EXAMINATION SP/2025)**

**CLASS: BTECH  
BRANCH: EEE**

**SEMESTER : VI  
SESSION : SP/2025**

**SUBJECT: EE447 MACHINE LEARNING**

**TIME: 02 Hours**

**FULL MARKS: 25**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

		CO	BL
Q.1(a) What are the basic stages in development of a machine learning model?	[2]	1,2,3	1,2
Q.1(b) Discuss at least three shortcomings faced in implementation of these techniques.	[3]	2,3	2,3
Q.2(a) What algorithm would you apply to find a most specific hypothesis? Explain with a suitable example.	[2]	1,2,3	2,4
Q.2(b) Explain the terms - Concept Learning, Hypothesis, Version Space.	[3]	2,3	1,2
Q.3(a) Bayesian reasoning provides a probabilistic approach to inference. Justify the statement with at least two reasons.	[2]	2,3	2,3,4
Q.3(b) Discuss the statistical terms - Mean, Variance and Standard Deviation and their significant role in machine learning.	[3]	1,2,3	1,2
Q.4(a) How are the terms, Maximum a Posteriori (MAP) and Maximum Likelihood Estimation (MLE) related and what is the difference between probability and likelihood?	[2]	2,3	2,3
Q.4(b) In a neighbourhood, 90% children were falling sick due flu and 10% due to measles and no other disease. The probability of observing rashes for measles is 0.95 and for flu is 0.08. If a child develops rashes, find the child's probability of having flu.	[3]	1,2,3	2,3,5
Q.5(a) How is Supervised learning applied in real-world problems? Mention some key matrices used for comparative analysis.	[2]	1,2,3	1,2
Q.5(b) Create a decision tree model for the following dataset of 14 instances obtained for the target variable <i>Play Tennis</i> with four attributes - Outlook, Temperature, Humidity, and Wind using entropy and information gain.	[3]	1,2,3	2,3,5

Day	Outlook	Temperature	Humidity	Wind	Play Tennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Sunny	Mild	High	Strong	No