

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI**  
(END SEMESTER EXAMINATION)

CLASS: BTECH  
BRANCH: ALL

SEMESTER : VI  
SESSION : SP/2023

SUBJECT: IT340 MACHINE LEARNING

TIME: 3 Hours

FULL MARKS: 50

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
- 

- Q.1(a) Illustrate the machine learning process with the help of diagram. [5] CO1 K1  
Q.1(b) The height of boys and girls are given in Table 1. [5] CO3 K2

Table1: Sample data

Height of Boys( $X_i$ )	of	65	70	75	78
Height of Girls( $y_i$ )	of	63	67	70	73

Fit a suitable line of best fit for the above data. Also find the coefficient and slope of the line.

- Q.2(a) Illustrate the algorithm for logistic regression with example. [5] CO1 K3  
Q.2(b) Assess a student's performance during of study and predict whether a student will get a job offer or not in his final year of the course. The training dataset T is given in Table 2. Apply ID3 decision tree and do the computation for one iteration and draw the decision tree after one iteration. [5] CO3 K2

Table 2: Dataset T

S.No	CGPA	Instructiveness	Practical Knowledge	Communication skills	Job Offer
1	$\geq 9$	Yes	Very good	Good	Yes
2	$\geq 8$	No	Good	Moderate	Yes
3	$\geq 9$	No	Average	Poor	No
4	$< 8$	No	Average	Good	No
5	$\geq 8$	Yes	Good	Moderate	Yes
6	$\geq 9$	Yes	Good	Moderate	Yes
7	$< 8$	Yes	Good	Poor	No
8	$\geq 9$	No	Very good	Good	Yes
9	$\geq 8$	Yes	Good	Good	Yes
10	$\geq 8$	Yes	Average	Good	yes

- Q.3(a) Illustrate the working of Recurrent neural network. Also state the difference between neural network and Recurrent Neural network. [5] CO4 K3  
Q.3(b) The MLP consists of an input layer, hidden layer and an Output layer. The input layer has 4 neurons, the hidden layer has 2 neurons and the output has a single neuron. Train the MLP by updating the weights and biases in the network upto one iteration. [5] CO5 K2  
The supporting data is given below.

X1	X2	X3	X4	O <sub>desired</sub>
1	1	0	1	1

$x_1=1, x_2=1, x_3=0, x_4=1, w_{15}=0.3, w_{16}=0.1, w_{25}= -0.2, w_{26}=0.4, w_{35}=0.2, w_{36}= -0.3, w_{45}=0.1, w_{46}=0.4, w_{57}= -0.3, w_{67}= 0.2, \theta_5=0.2, \theta_6=0.1, \theta_7= -0.3.$

- Q.4(a) Describe the EM algorithm for clustering. [5] CO3 K3 4
- Q.4(b) Describe the single linkage steps for clustering. Consider the array of points as shown in Table 3. [5] CO2 K2 4

Table 3: dataset

Object	X	Y
0	1	4
1	2	8
2	5	10
3	12	18
4	14	28

Apply single linkage clustering and draw the dendrogram.

- Q.5(a) Illustrate the concept and ensemble methods present the algorithm with the help of diagram [5] CO3K3 5
- Q.5(b) State the difference between bagging and boosting. Illustrate the bagging algorithm. [5] CO5K1 5

:::::01/05/2023 M:::::