REG.NO.:

SLOT: A2+ TA2

VIT®
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2025-2026

Programme Name & Branch : B.Tech. Computer Science and Engineering
Course Code and Course Name : BCSE401L - Internet of Things
Faculty Name(s) : Ushus Elizebeth Zachariah
Class Number(s) : VL2025260101707
Date of Examination : 05-10- 2025
Exam Duration : 90 minutes **Maximum Marks: 50**

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes:
  - CO3: Comprehend advanced IoT application and technologies from the basics of IoT.
  - CO5: Understand the challenges of IoT using privacy and security metrics.
  - CO6: Solve real-time problems and demonstrate IoT applications in various domains using prototype models.

Q. No	Question	Module	Marks	CO	BL
1.	a) A healthcare dataset contains patient information including Age and BMI (Body Mass Index), along with their Disease Risk classification. Using the KNN algorithm, classify the disease risk level for the patient aged 38 with a BMI of 26.0.where K=3.	3	5	3	3
	b) The following table presents the number of hours a student practiced coding (x) and their corresponding performance score (y) in a programming assessment, recorded across five sessions. Apply the least squares method to determine the linear regression equation of the form y = ax + b, and estimate the performance scores a student would likely achieve if they practiced for 5 and 11 hours.		5		
2.	Analyse the backpropagation algorithm in a neural network where neurons utilize the sigmoid activation function. Given that the actual output is 1 and the learning rate is 0.5, apply the algorithm to compute the values of g_1, g_2, g_3, out and the loss using mean squared error, also compute the gradient with respect to weight $W_{11}$and update it using the given learning rate.	3	10	3	3

Age (Years)	BMI (kg/m²)	Disease Risk
45	28.5	High Risk
30	22.0	Low Risk
50	31.2	High Risk
27	20.5	Low Risk
60	33.0	High Risk
35	24.0	Low Risk
38	26.0	?

x (practice hours)	2	4	6	7	9
y (performance score)	60	70	78	82	88

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	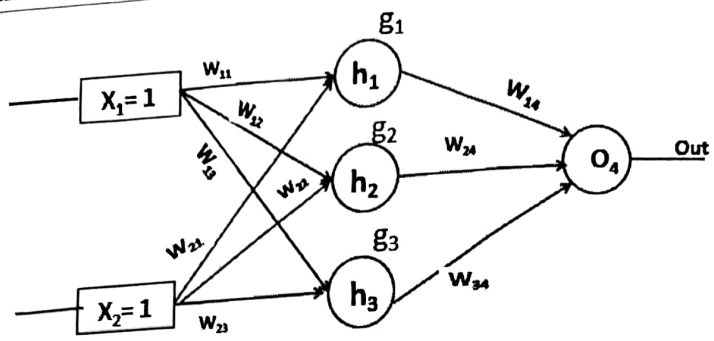							

W_{11}	W_{12}	W_{13}	W_{21}	W_{22}	W_{23}	W_{14}	W_{24}	W_{34}
-0.99	1.05	0.19	-0.43	-0.44	-0.30	0.18	1.11	-0.26

3.	Consider the elliptic curve $y^2 \equiv x^3 + ax + b \ (mod\ p_r)$ for a=1, b=6 and $p_r = 11$. The generator point g = (2, 7) and encoded message on the curve M = (5, 9). Assume that both the sender and receiver use a private key of 2 and choose a random value of k = 2. Perform encryption on the message M using elliptic curve cryptography and generate the corresponding cipher text.	4	10	5	2
4.	a)Imagine you are a cybersecurity analyst working for a digital land registry system that uses blockchain to store property ownership records. While reviewing the system, you learn that altering a single block would require immense computational power and consensus across the network. Based on this scenario, design a blockchain based solution that ensures data integrity and prevents unauthorized modifications, and explain how the structure of blockchain and its consensus mechanism contribute to making the system tamper-proof.	4	6	5	3
	b) Consider the dataset of 12 individuals with attributes such as Age, Gender, Zip code, and Salary. To ensure privacy before publishing, apply generalization and suppression techniques to achieve k-anonymity where k = 4. Present the anonymized dataset and explain your strategy.	4	4		

ID	Age	Gender	Zip code	Salary
1	28	Male	632001	₹45,000
2	34	Female	632003	₹60,000
3	29	Male	632002	₹50,000
4	42	Female	632004	₹75,000
5	45	Male	632005	₹80,000
6	38	Female	632006	₹55,000
7	52	Male	632007	₹90,000
8	55	Female	632008	₹95,000
9	60	Male	632009	₹85,000
10	62	Female	632010	₹88,000
11	33	Male	632011	₹52,000
12	36	Female	632012	₹58,000

5.	Consider the scenario where you work as an environmental technologist on a smart city initiative. You are assigned to monitor and mitigate urban air pollution. Design an IoT-based pollution control system that collects real-time data and triggers responsive actions. Your design should specify the necessary sensors, data analytics modules, and communication technologies. Justify how this system supports public health, regulatory compliance, and sustainable urban planning.	7	10	6	3

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