



VIT

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

SLOT: A2 + TA2

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

Programme Name & Branch : B.Tech & CSE
Course Code and Course Name : BCSE401L & Internet of Things
Faculty Name(s) : Ushus Elizebeth Zachariah
Class Number(s) : VL2025260101707
Date of Examination : 17-08-2025
Exam Duration : 90 minutes

Maximum Marks: 50

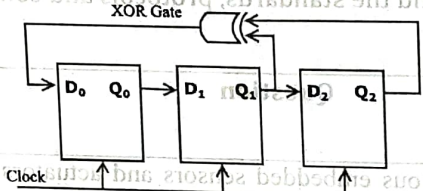
General instruction(s):

- 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:
 - CO1: Describe layers of IoT and IoT devices used for various applications.
 - CO2: Understand the standards, protocols and communication models of IoT.

Q. No	Question	M	CO	BL
1.	In a smart home system, various embedded sensors and actuators work together to automate entry and maintain indoor comfort. When a person approaches the front door, a sensor detects their presence and activates a motorized actuator that controls the door lock mechanism. Another sensor captures the visitor's facial features and performs identity verification. Inside the home, a sensor monitors ambient temperature and triggers an actuator to adjust heating or cooling based on preset preferences. Considering this context, Identify the types of sensors and corresponding actuators involved. For each sensor and actuator, explain its working principle, mention common variants, and differentiate sensors and actuators in terms of their functionality.	10	1	2
2.	A multinational company has offices in India, Germany, and the US. Each office is connected to a different Internet Service Provider (ISP). The company wants to ensure that data packets between these offices take the most efficient route across the internet. The IT team observes that routing decisions are influenced not by shortest physical paths but by policies and agreements between ISPs. They also notice that routing tables include Autonomous System (AS) numbers and path attributes. Based on the this scenario i. Identify the protocol responsible for determining the best path between these geographically distributed networks, considering ISP policies and AS-level routing. ii. Explain the working of this protocol, including its key features, types, path selection mechanism, and how it differs from intra-domain routing protocols.	10	1	2
3.	a) Given the IP address 192.168.20.0/27, answer the following: i. Identify the class of the IP address and its default subnet mask. ii. Write the subnet mask for /27 in both decimal and binary formats.	8	1	3



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

	iii. Calculate the number of subnets created when using a /27 mask. iv. Determine the number of IP addresses and usable host addresses per subnet. v. For the first two subnets, list the Network ID, Broadcast Address, and Usable Host Range. vi. Explain briefly why the number of usable hosts is less than the total number of IP addresses.			
	b) Shorten the IPv6 address ABCD:0000:FFFF:00CE:34AC:A000:0524:0000 using standard IPv6 compression rules.	2		
4.	a) Consider the 3-stage linear feedback shift register shown in Fig. 1, where the XOR output of the second (Q1) and third (Q2) stages is fed back to the input of the first stage (Q0). Assuming an initial state of 111, generate the complete pseudo-noise (PN) sequence. Also, verify any two standard properties of a PN sequence.		2	2
	 Fig 1. PN Sequence generator	6		
	b) With the help of neat block diagrams, explain the DSSS-based modulation and demodulation process used in IEEE 802.15.4.		4	
5.	A company is developing a smart greenhouse system with two distinct communication requirements: (1) the central controller must continuously receive real-time temperature and humidity data from multiple battery-powered sensors, and (2) the controller must send targeted commands to individual actuators, such as activating a specific irrigation valve or adjusting a particular vent.		2	2
	Considering these requirements, suggest whether MQTT or CoAP is more suitable for each of the above tasks in the greenhouse system. Justify your answer by comparing their application-layer features, message formats, and overall suitability for constrained IoT environments.	10		
