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B.M.S.College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**

Course Code: 24AM5PEIOT **Max Marks: 100**

Course: Internet of Things

Instructions: 1.Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

				CO	PO	Marks
			UNIT - I			
1	a)		Explain key IoT Architectural drivers.	CO1	PO1	**06**
	b)		Distinguish between Industrial Operational Technology (OT) Network and Enterprise Information Technology (IT) Network.	CO1	PO1	**06**
	c)		A large farm aims to optimize crop production and resource usage (water and fertilizers) by implementing a smart agriculture system which involves real-time monitoring of environmental conditions and automated control of irrigation. Apply one M2M IoT standardized architecture to design the smart agriculture system.	CO2	PO1	**08**
			OR			
2	a)		Write a note on the following: i) Smart Creatures ii) Smart Home	CO1	PO1	**06**
	b)		"Privacy and Interoperability are one of the key challenges that IoT is currently facing". Justify the statement.	CO1	PO1	**06**
	c)		Analyze the roles and responsibilities of the Information Technology (IT) and Operational Technology (IT) in the Internet of Things (IoT) Reference Model.	CO2	PO1	**08**
			UNIT - II			
3	a)		Distinguish between Sensors and Actuators.	CO2	PO2	**06**
	b)		Identify the limitations of smart objects in Wireless Sensor Networks(WSN).	CO1	PO1	**06**
	c)		Explain different communication criteria to be considered to connect smart objects.	CO2	PO2	**08**

			OR			
	4	a)	Identify the pros and cons of wireless based solution to IoT.	*CO2*	*PO2*	**06**
		b)	Elaborate Zigbee IP Protocol Stack.	*CO1*	*PO1*	**06**
		c)	Explain different classes of constrained devices in IoT.in detail	*CO2*	*PO2*	**08**
			UNIT - III			
	5	a)	Compare IoT Protocol Stack utilizing 6LoWPAN and Internet Protocol (IP) Protocol Stack.	*CO2*	*PO2*	**06**
		b)	A company is developing a smart home system where various devices such as smart thermostats, security cameras, door locks, and lighting systems need to communicate with each other and a centralized control app. The team is debating whether to use a custom protocol or adopt the IP suite for communication between devices. Elucidate why IP suite is advantageous for IoT communication.	*CO2*	*PO2*	**08**
		c)	Describe the technique used to forward packets over multiple hops in 6LoWPAN.	*CO2*	*PO2*	**06**
			OR			
	6	a)	Identify the main factors applicable to IPv4 andIPv6 support in an IoT solution.	*CO2*	*PO2*	**06**
		b)	A logistics company that has implemented an IoT system to monitor its delivery fleet. Each vehicle is equipped with IoT sensors that collect data such as location, fuel consumption, temperature, and engine health. The system processes this data in real-time to optimize routes, ensure timely maintenance, and improve fuel efficiency. Recently it is noticed that the data-processing platform is becoming slow due to the growing number of vehicles and the increased amount of data being generated. The delays are affecting the decision-making process, causing suboptimal routing, missed deliveries, and higher operational costs. Assess the critical role of optimization at various layers of IP stack for IoT based logistics system.	*CO2*	*PO2*	**08**
		c)	Describe the major challenges for IoT connectivity by constrained nodes and constrained networks.	*CO2*	*PO2*	**06**
			UNIT - IV			
	7	a)	Explain different Denial-of-Service (DoS) attacks in Network Layer.	*CO1*	*PO1*	**05**
		b)	A university's online learning platform encounters periodic service failures, impacting students and faculty. After a thorough	*CO2*	*PO2*	**07**

			investigation, the IT team discovers that the disruptions are caused by an attack targeting the Link Layer. Analyze the scenario and identify the potential attack vectors that could be contributing to the service outages.			
		c)	A smart city initiative integrates IoT sensors and AIML systems to optimize traffic management. IoT devices like cameras and vehicle sensors collect data on traffic flow, congestion, and accidents. This data is fed into AIML models, which analyse patterns in real-time and provide recommendations to reroute vehicles, manage traffic lights, and reduce congestion. The city experiences a significant traffic jam despite the system working as usual. On inspection, the operations team finds that the AIML model made incorrect predictions due to corrupted or incomplete data from IoT devices. i) Describe the challenges that arise when integrating IoT systems with AIML models for real-time decision-making. ii) How could the AIML system be improved to handle incomplete or corrupted IoT data effectively?	*CO2*	*PO3*	**08**
			OR			
	8	a)	Explain different types of DoS attacks in Physical Layer.	*CO1*	*PO1*	**06**
		b)	Describe how adversarial attacks specifically target IoT systems, and what are the potential consequences for their security and functionality?	*CO2*	*PO2*	**08**
		c)	A smart farming system integrates IoT sensors and AIML algorithms to monitor soil moisture, predict crop yields, and optimize irrigation schedules. The system relies on IoT devices to send real-time data to the AIML models for processing and decision-making. The farm manager notices the system recommending over-irrigation, which leads to water wastage and increased operational costs. After investigating, they find that the IoT sensor data has been tampered with. i) Analyze the scenario and provide possible vulnerabilities in the IoT system that could have led to this issue. ii) Provide necessary measures that can be implemented to secure the IoT devices and prevent such incidents in the future.	*CO2*	*PO2*	**06**
			UNIT - V			
	9	a)	A city plans to implement an IoT-connected roadway system to monitor traffic flow, manage congestion, and improve road safety. The system will involve smart traffic lights, vehicle sensors, and environmental sensors to collect data. It will also provide real-time alerts to drivers about traffic conditions and accidents. Provide a solution for IoT-connected roadways using IoT architecture and functional components.	*CO3*	*PO3*	**08**
		b)	Illustrate Smart citylayered architecture with a neat sketch.	*CO2*	*PO2*	**06**

		c)	Design a smart fleet management system for a city that optimizes vehicle usage and fuel consumption while ensuring timely delivery of services during peak hours. Describe the types of sensors, controls, and automation features that can be implemented to improve efficiency, reduce emissions, and enhance fleet performance.	*CO3*	*PO3*	**06**
			OR			
	10	a)	Design a comprehensive IoT system to control traffic signals in a city scenario.	*CO3*	*PO3*	**08**
		b)	Describe how security is provided at the street layer in the Smart city IoT system.	*CO2*	*PO2*	**06**
		c)	Design a smart parking system for a city that optimizes space utilization and reduces traffic congestion while ensuring convenient parking availability during peak hours.	*CO3*	*PO3*	**06**

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