Reg. No.																

Question Paper Code	14015

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Fifth Semester

Artificial Intelligence and Data Science

20AIPC504 – IoT AND SENSORS TECHNOLOGIES

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Identify the main power source used in IoT devices. a) Battery b) Solar panel c) Wired power supply d) All of the above	1	K1	CO1
2.	Select the primary benefit IoT offers to businesses by enabling real-time monitoring and automation: a) Increased manual labor b) Higher operational costs c) Enhanced operational efficiency d) Reduced use of sensors	1	K2	CO1
3.	Distinguish the key difference between M2M and IoT technologies. a) M2M operates over IP networks; IoT is point-to-point b) M2M is device-to-device; IoT integrates devices with cloud and human interaction c) IoT does not use communication protocols d) M2M uses advanced sensors only	1	K2	CO2
4.	Select the communication technology known for low power consumption and long range in IoT. a) Wi-Fi b) ZigBee c) LoRaWAN d) Bluetooth	1	K1	CO2
5.	Outline the views covered by the ETSI IoT architecture model. a) Physical and logical views only b) Functional, deployment, and operational views c) Security protocols and hardware interfaces d) Marketing and business views	1	K1	CO3
6.	Select the primary design principle of SOA that ensures minimal dependency between software components for better scalability and flexibility. a) Tight coupling b) Loose coupling c) Centralized control d) Direct interfacing	1	K2	CO3
7.	Which of the following correctly describes the function of ADC and DAC? a) ADC converts digital signals to analog signals, DAC converts analog signals to digital signals. b) ADC converts analog signals to digital signals, DAC converts digital signals to analog signals. c) Both ADC and DAC convert digital signals only. d) ADC amplifies signals, DAC diminishes signals.	1	K2	CO4
8.	List two sensors used for temperature measurement in IoT applications. a) Thermistor, DHT11 b) PIR sensor, Ultrasonic sensor c) ADC, DAC d) Motion sensor, USB sensor	1	K2	CO4
9.	Determine the suitable microcontroller platform for IoT projects with Wi-Fi connectivity. a) Arduino Uno b) ESP8266 c) Raspberry Pi 2 d) PIC Microcontroller	1	K2	CO5
10.	Devise an IoT system for monitoring air quality in urban areas. Which combination of sensors and communication method will you use? a) Temperature sensor, Bluetooth b) Gas sensor, LoRaWAN c) Motion sensor, Wi-Fi d) Humidity sensor, ZigBee	1	K2	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	Name two types of control units used in IoT devices and briefly describe their functions.	2	K1	CO1
12.	Mention two communication technologies used in IoT and state one key advantage of each.	2	K1	CO1
13.	Define Machine to Machine (M2M) communication and give one example.	2	K1	CO2
14.	Explain one key feature that distinguishes IoT from traditional M2M systems.	2	K2	CO2
15.	List the four main views of an IoT reference architecture.	2	K1	CO3
16.	What does API-based IoT architecture mean?	2	K1	CO3
17.	Name two microcontroller platforms commonly used for IoT prototyping.	2	K1	CO4
18.	Describe the role of SPI and I2C interfaces in IoT microcontroller communication.	2	K2	CO4
19.	Give two examples of sensors used in temperature and motion detection for IoT applications.	2	K2	CO5
20.	Explain the function of an actuator in an IoT system.	2	K1	CO5
21.	Describe two key benefits of integrating IoT solutions in urban traffic management systems.	2	K2	CO6
22.	What are the benefits of using LoRaWAN in urban IoT deployments?	2	K1	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Describe the key components of an IoT device. Explain the role of sensors, control units, and communication modules with relevant examples.	11	K2	CO1
		OR				
	b)	Discuss various communication technologies used in IoT and analyze their suitability for different applications like smart cities and healthcare.	11	K2	CO1
24.	a)	Discriminate between Machine to Machine (M2M) communication and IoT technologies. Provide use cases highlighting their distinctions.	11	K3	CO2
		OR				
	b)	Compare and contrast the IoT communication technologies RFID, Bluetooth, ZigBee, Wi-Fi, and LoRaWAN with respect to their frequency bands, data rates, coverage ranges, power consumption, network topologies, and typical application domains. Which technology would you recommend for a city-wide smart lighting system, and why?	11	K3	CO2
25.	a)	Explain the IoT reference architecture with suitable diagrams. Describe the major functional layers including perception, network, data processing (middleware), application, business, and security layers. Discuss key components and their roles in enabling a scalable and secure IoT ecosystem.	11	K2	CO3
		OR				
	b)	Compare and contrast ETSI and IETF IoT architectural models, focusing on their functional and deployment views.	11	K2	CO3
26.	a)	Explain the construction and working principles of serial communication interfaces in microcontrollers: UART (serial), SPI, and I2C.Compare these interfaces in terms of number of signal lines, communication speed, master-slave configurations, and typical application scenarios.	11	K2	CO4
		OR				
	b)	Explain the role of the 6LoWPAN protocol in enabling IPv6 communication over low-power wireless personal area networks in IoT. Discuss its key features, header compression mechanism, and how it supports device integration in IoT systems.	11	K2	CO4

27.	a)	Explain the construction and working principle of the Temperature and Humidity Sensor DHT11.	*11*	*K2*	*CO5*
		OR			
	b)	Design a communication system between a microcontroller and external devices using Bluetooth and USB interfaces. Discuss the hardware connections, configuration steps, data transmission methods, and potential challenges. Illustrate your answer with example use cases where both wireless and wired communication are beneficial.	*11*	*K2*	*CO5*
28.	a)	Urban transport and logistics face common problems such as traffic congestion, inefficient route planning, delayed deliveries, and lack of real-time cargo monitoring, leading to higher costs and reduced customer satisfaction. Apply IoT technologies to design a comprehensive system that enhances route management, optimizes delivery efficiency, and monitors cargo conditions. Describe the essential IoT components, communication technologies, data collection methods, and expected benefits of your proposed solution.	*11*	*K3*	*CO6*
		OR			
	b)	Air pollution is a critical environmental challenge adversely affecting human health and ecosystems. Traditional air quality monitoring methods are often expensive and lack real-time coverage. Apply the principles of IoT to design a real-time air quality monitoring system. Discuss the choice of sensors, communication technologies, data management, and alert mechanisms. Explain how this system can help authorities and citizens monitor and respond to air pollution effectively.	*11*	*K3*	*CO6*