Reg. No															

B.Tech DEGREE EXAMINATION, DECEMBER 2023

Seventh Semester

18CSE462J - INTRODUCTION TO IOT

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Which of the following IoT networks has a very short range? (A) Short Network (B) LPWAN (C) SigFox (D) Short-range Wireless Network	1	1	1
2.	Which of the following is not a fundamental component of an IoT system? (A) Sensors (B) Connectivity and data processing (C) User interface (D) Transformer	1	2	1
3.	Which layer is used for wireless connection in IoT devices? (A) Application layer (B) Network layer (C) Data Link layer (D) Transport layer	1	1	1
4.	Which of the following is used to capture data from the physical world in IoT devices? (A) Sensors (B) Actuators (C) Microprocessors (D) Microcontrollers	1	2	1
5.	What is the use of PWM signals in IoT development boards? (A) They are used by sensors to have analog input (B) They are used by sensors to have digital input (C) They are used by actuators to have analog input (D) They are used by actuators to have digital input	1	1	2
6.	Gateway software should be smart enough to handle _____ (A) GPS (B) Message (C) Logging (D) Sensors	1	1	2
7.	What is edge computing? (A) A new name for computing (B) Computing in cloud server (C) A type of computing that leaves network teams on edge (D) An architecture that processes data as close to its source as possible	1	1	2
8.	What technological advancement contributed to edge computing's popularity? (A) IoT (B) 5G (C) Cloud (D) 802.11ax, or Wi-Fi 6	1	2	2
9.	How many numbers of the element in the open IoT architecture? (A) Four elements (B) Five elements (C) Six elements (D) Seven elements	1	1	3
10.	Which of the following is the way in which an IoT device is associated with data? (A) Internet (B) Cloud (C) Automata (D) Network	1	1	3

11.	_____ allows the user to control electronic components. (A) Android API (B) RESTful API (C) MQTT API (D) CoAP API	1	1	3
12.	Edge computing expected to improve? (A) Response times (B) Save bandwidth (C) Both A and B (D) Increase round trip time	1	1	3
13.	MQTT stands for _____ (A) Message Queue Transport Things (B) Message Queue Telemetry Transport (C) Message Queue Telemetry Things (D) Message Queue Transport Telemetry	1	1	4
14.	Which protocol is lightweight? (A) SPI (B) CoAP (C) HTTP (D) MQTT	1	1	4
15.	Edge computing brings analytical computational resources close to the end users and therefore can _____ the responsiveness and throughput of applications (A) Decrease (B) Increase (C) Equal (D) Maximize	1	1	4
16.	JSON is a _____ for storing and transporting data. (A) Xml format (B) Text format (C) JavaScript (D) PHP format	1	1	4
17.	Standard ports of MQTT are _____ (A) I2C (B) SSL (C) USART (D) TCP/IP	1	1	5
18.	What is the most common physical layer used for Modbus Communication? (A) RS-232 (B) RS-485 (C) Ethernet (D) USB	1	1	5
19.	What is the maximum number of devices that can be connected to a single Modbus network? (A) 32 (B) 64 (C) 128 (D) 256	1	1	5
20.	How many data bytes can be written to a single holding register using Modbus function code 16? (A) 1 (B) 2 (C) 4 (D) 8	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Describe the IoT enabling Technologies with suitable examples	4	1	1
22.	Explain the primary role of an IoT gateway in an Internet of Things (IoT) ecosystem. Provide two key functions that IoT gateways perform and describe why they are essential for IoT deployments.	4	1	2
23.	Discuss the hierarchy followed in Edge, Fog and Cloud with suitable illustration.	4	1	2
24.	Discuss on industry control systems and their applications.	4	2	3
25.	Illustrate with an example how fault detection process in IoT.	4	2	4
26.	Analyze the performance of at-least three proximity networking technologies.	4	2	4
27.	Discuss the role of protocol buffer and JSON in IoT.	4	2	5

		Marks	BL	CO
	PART - C (5 × 12 = 60 Marks) Answer **all** Questions			
28.	(a) (i) Discuss the role of sensors in collecting data and actuators in executing actions in IoT systems. Provide examples of sensor types and their applications. (ii) Explain the importance of various connectivity technologies in IoT, including Wi-Fi, cellular networks, LPWAN (Low Power Wide Area Network), and Bluetooth. Discuss the factors that influence the choice of connectivity for specific IoT use cases.	12	1	1
	(OR)			
	(b) Discuss at least three prominent use cases where IoT technology is transforming industrial processes or operations. Examples could include predictive maintenance, smart factories, asset tracking, or supply chain optimization.			
29.	(a) Describe the data processing layers in IoT, including edge computing and cloud computing. Explain how these layers handle data generated by IoT devices, and discuss the advantages of processing data at the edge.	12	1	2
	(OR)			
	(b) (i) Define data streaming and its significance in modern data processing. Explain the fundamental difference between batch processing and data streaming. (ii) Identify and briefly describe the core components of a typical data streaming architecture.			
30.	(a) (i)Tabulate the Alternative IoT Reference Models. (ii) Describe the simplified IoT Architecture.	12	1	3
	(OR)			
	(b) Describe about Application Layer Protocols: (i) CoAP (ii) MQTT			
31.	(a) (i) Describe what REST is and how it works in the context of IoT. Explain the principles of RESTful architecture, including resources, HTTP methods, and statelessness. (ii) Discuss the advantages of using REST for IoT communication. Provide examples of IoT devices or applications that utilize RESTful APIs for data exchange. (iii) Explain how REST APIs enable interoperability and integration between different IoT devices and platforms. Highlight the role of standardization in RESTful IoT APIs.	12	2	4
	(OR)			
	(b) (i) Explain the significance of TCP/IP as the foundational protocol suite of the Internet for IoT. Describe the key protocols within TCP/IP, including IP addressing, TCP, and UDP. (ii) Discuss the challenges and considerations when using TCP/IP in IoT, especially in resource-constrained environments. Compare and contrast the use of TCP and UDP in IoT scenarios. (iii) Provide examples of how TCP/IP facilitates data transmission and control between IoT devices and cloud services. Discuss the reliability and security aspects of TCP/IP in IoT communication.			

32. (a) (i) Describe the fundamental characteristics of time series data, including time dependence, seasonality, trend, and noise. Explain how each of these components contributes to the overall behavior of time series data. 12 1 5
(ii) Discuss the importance of stationarity in time series analysis and its impact on modeling.

(OR)

(b) (i) Discuss the challenges and implications of noisy data, including inaccuracies, outliers, and errors. Provide examples of how noisy data can lead to misleading insights.
(ii) Explain the challenges associated with missing data, including biases and reduced sample size. Discuss how missing data can affect statistical analyses.

* * * * *