The Yenepoya Institute of Arts, Science, Commerce and Management
A Constitute Unit of Yenepoya (Deemed to be University)
IV Semester BCA Question Bank 2025
Introduction to Internet of Things
BCA402T

UNIT 1

Question Number	Question
1	What is the primary goal of the Internet of Things (IoT)? a. To enable machines to perform manual tasks **b. To connect devices and enable communication over the internet** c. To make data gathering impossible d. To build a new version of the internet
2	The term "IoT" stands for: a. Information on Technology b. Internet of Technology **c. Internet of Things** d. Integrated of Things
3	Which of the following best describes the Conceptual Framework of IoT? **a. An architectural view that helps in understanding the network architecture** b. The process of connecting devices without any standards c. A system that doesn't need inter-device communication d. A framework used for wireless communication only
4	In the IoT system architecture, which layer is responsible for data collection and interaction with physical devices? **a. Perception layer** b. Network layer c. Application layer d. Data processing layer

5	Which architectural view focuses on the interaction between IoT devices and the system as a whole? a. Logical view **b. Conceptual view** c. Physical view d. Data view
6	Which technology behind IoT allows devices to exchange data with minimal power consumption? a. Bluetooth **b. Zigbee** c. Wi-Fi d. 5G
7	Which technology is primarily used for long-range, low-power communication in IoT devices? a. Zigbee **b. LoRaWAN** c. NFC d. Bluetooth
8	What is one of the main sources of IoT data? a. Only data from the internet **b. Physical sensors and actuators** c. Social media d. Personal interactions
9	M2M communication is best described as: a. Communication between people and machines **b. Communication between two or more machines without human intervention** c. Communication between machines and the cloud d. Communication between devices using Wi-Fi
10	Which of the following is an example of IoT in healthcare? a. Smart thermostat systems **b. Wearable fitness trackers** c. Smart refrigerators d. Automated traffic systems

11	IoT can help in: a. Reducing the amount of data being processed b. Minimizing the use of sensors **c. Automating processes and gathering real-time data** d. Making devices fully autonomous without human input
12	Which of the following is a key feature of connected devices in IoT/M2M systems? a. Manual intervention for data analysis b. High power consumption **c. Continuous communication and interaction with other devices** d. No need for cloud integration
13	In the IoT/M2M system layers, which layer is responsible for the storage and analysis of collected data? a. Perception layer b. Network layer c. Application layer **d. Data processing layer**
14	Which of the following communication technologies is best suited for real-time, low-latency applications in IoT? **a. 5G** b. Wi-Fi c. Zigbee d. LoRaWAN
15	One of the main design principles for connected devices is: a. Complexity **b. Affordability and ease of use** c. Use of only wired networks d. Limited communication capability
16	Which of the following is an example of a design principle for IoT/M2M systems? a. Limited device interaction b. High-cost devices for better performance **c. Standardization in communication protocols** d. Inability to scale

17	Which communication technology is most commonly used for short-range, high-speed data transfer in IoT? a. Bluetooth b. Zigbee c. NFC **d. Wi-Fi**
18	What is the main purpose of data enrichment and consolidation in IoT systems? a. To store data for long-term retention **b. To process data and add context for better decision-making** c. To increase the amount of data being collected d. To reduce the amount of data being transmitted
19	Ease of designing connected devices in IoT systems is often achieved by: a. Using custom hardware for each device **b. Standardized protocols and frameworks** c. Integrating only complex devices d. Limiting the number of devices in the network
20	Which layer in the IoT architecture handles the communication between devices and the cloud or central processing system? a. Perception layer **b. Network layer** c. Application layer d. Data processing layer
21	Which of the following is an example of an IoT device used in smart homes? **a. Smart thermostat** b. Automated assembly line c. Autonomous drone d. Smart agricultural system
22	Which IoT technology provides low-power, long-range communication? a. NFC b. Wi-Fi c. Zigbee **d. LoRaWAN**

23	What does M2M stand for in IoT? **a. Machine-to-Machine** b. Machine-to-Man c. Man-to-Machine d. Mobile-to-Machine
24	Which of the following is an example of a business application of IoT? a. Automatic traffic light control b. A smart refrigerator in a home c. A wearable device for fitness tracking **d. An industrial robot on a factory floor**
25	How can IoT benefit industries such as manufacturing? a. By reducing the number of devices needed **b. By automating real-time monitoring and control** c. By requiring manual data analysis d. By decreasing system interconnectivity
26	What is the primary purpose of the perception layer in the IoT architecture? a. Data storage and retrieval **b. Physical interaction with devices and sensors** c. Data processing and analysis d. Application interface management
27	Which of the following is NOT a design principle for IoT/M2M systems? a. Affordability b. Standardization **c. Over-engineering** d. Ease of integration
28	Which communication technology is ideal for large-scale, low-power, and low-bandwidth IoT applications? a. Zigbee **b. LoRaWAN** c. NFC d. Bluetooth

29	Which of the following factors is NOT typically considered when designing IoT systems for ease of use? **a. High power consumption** b. User-friendly interface c. Standard communication protocols d. Scalability
30	Which of the following is an example of data consolidation in IoT? a. Sending raw data directly to the cloud without processing **b. Merging and analyzing data from multiple IoT sensors for a comprehensive view** c. Distributing data to multiple locations without any analysis d. Storing data on devices and never sending it to the cloud

5 Marks Questions	
Question Number	**Question**
1	What is IoT? Explain the characteristics of IoT.
2	Write and explain the Four modes of data gathering.
3	Explain the data management and consolidation functions.
4	Write a note on i) Data enrichment and ii) Data Dissemination.
5	Explain a simple IoT conceptual framework with an example.
6	Explain the major components of IoT.
7	Write a short note on WSN.
8	Explain the Features of M2M Communication.
9	Explain M2M architecture with a neat diagram.
10	Explain wired and wireless communication technologies.
11	Define: a. Sensors b. Control Unit c. WSN d. WSN nodes e. M2M Communication

5 Marks Questions	
12	List and assess the key sources that contribute to the development of IoT prototypes and products.
13	Differentiate between IoT and M2M communication.
14	Explain any 5 wireless communication technologies.
15	Explain any 5 wired communication technologies.

10 Marks Questions	
Number	**Question**
1	Explain the architectural view of IoT with a diagram.
2	Explain the IoT conceptual framework for the enterprise and services with an example.
3	Explain the following IoT examples and mention the relative IoT framework equation: Umbrella, Street light.
4	Explain the following: a. Sensors and Types of sensors, b. Control units.
5	Explain the modified OSI model for the IoT/M2M systems proposed by IETF.
6	Analyze the ITU-T reference model and evaluate its role and effectiveness in IoT systems.
7	Examine the ETSI M2M domain architecture and assess its high-level capabilities, along with its correspondence to the six layers of the modified OSI and the four layers of the ITU-T reference model.
8	Evaluate the IoT architecture, analyzing its key components and layers, and discuss their impact on the functionality and performance of IoT systems.
9	Analyze the key technologies behind IoT and evaluate how they enable connectivity and communication within IoT devices.

10 Marks Questions	
10	Provide a detailed comparison between IoT and M2M communication, focusing on their core differences in terms of architecture, protocols, applications, and real-world examples.

15 Marks Questions	
Question Number	**Question**
1.a	Explain the architectural view of IoT with a diagram.
1.b	Explain the major components of IoT.
2.a	Analyze the ITU-T reference model and evaluate its role and effectiveness in IoT systems.
2.b	Write a short note on WSN.
3.a	Explain the IoT conceptual framework for enterprises and services with an example.
3.b	Write and explain the four modes of data gathering.
4.a	Explain the IoT examples of an umbrella and street light, mentioning the relative IoT framework equation for each.
4.b	Explain the features of M2M communication.

Unit -2

Question Number	Question
1	What is the primary function of a sensor? a. To store data **b. To collect data from the environment** c. To transmit data d. To process data
2	Which of the following is an example of a digital sensor? a. Thermistor b. Light-dependent resistor (LDR) c. Temperature sensor with analog output **d. Infrared (IR) sensor with digital output**
3	An actuator is a device that: a. Senses changes in the environment b. Converts digital signals to analog signals **c. Performs actions based on sensor data** d. Transmits data to other devices
4	Which of the following is NOT a key feature of RFID technology? a. Uses radio waves for communication b. Works without requiring line of sight **c. Requires a physical connection between devices** d. Utilizes tags for identification
5	Wireless sensor networks (WSN) are primarily used for: a. Transmitting radio signals **b. Real-time data collection and transmission** c. Storing large volumes of data d. Processing large amounts of information
6	Participatory sensing technology primarily involves: a. Remote sensing in industrial applications **b. Data collection from users via mobile devices** c. Using sensors to detect environmental pollutants d. Satellite-based data transmission

7	The primary characteristic of embedded platforms for IoT is: a. They are used only for data storage b. They are energy-inefficient **c. They are small, low-power devices** d. They require complex user interfaces
8	Which of the following is a popular hardware platform for building IoT projects? a. Raspberry Pi b. BeagleBone **c. Arduino** d. Intel Galileo
9	NetArduino is an IoT development platform based on: a. Raspberry Pi b. Intel Galileo **c. Arduino** d. BeagleBone
10	The Raspberry Pi is commonly used in IoT projects because it: **a. Has a small form factor** b. Is compatible with sensors and actuators c. Requires no programming knowledge d. Is only used for communication
11	Which of the following platforms is a single-board computer commonly used in IoT applications? a. Arduino **b. Raspberry Pi** c. BeagleBone d. Intel Galileo
12	ARM Cortex processors are known for: a. Their high energy consumption b. Their ability to handle complex computations **c. Their low power consumption** d. Their limited processing speed
13	Which platform is known for its ability to work with both hardware and software for IoT applications? a. Arduino **b. Raspberry Pi** c. BeagleBone

	d. Intel Galileo
14	The Arduino platform is based on which type of microcontroller? a. ARM **b. AVR** c. Intel d. MIPS
15	NetArduino is an IoT platform that primarily integrates: a. Sensors b. Wireless communication **c. Both sensors and wireless communication** d. Storage devices
16	Which of the following IoT platforms is most commonly used for education and prototyping? a. Raspberry Pi b. BeagleBone **c. Arduino** d. Intel Galileo
17	RFID tags are commonly used in IoT for: **a. Tracking inventory** b. Environmental monitoring c. User identification d. Data storage
18	A wireless sensor network (WSN) typically involves: a. High-power communication devices b. A small number of sensors **c. A network of low-power sensors** d. Large data centers
19	Which of the following is an advantage of using participatory sensing in IoT? a. Reduces data storage costs **b. Increases user participation in environmental monitoring** c. Enhances sensor accuracy d. Requires fewer network nodes
20	Which of the following is NOT a feature of embedded systems for IoT? a. Real-time operation b. Low power consumption

	c. Complex interfaces d. Limited processing power
21	The BeagleBone platform is primarily used for: a. IoT connectivity b. Simple educational projects **c. Complex industrial applications** d. Data storage and processing
22	A key feature of RFID systems is their ability to: a. Transmit data over long distances b. Store data in a central database **c. Identify objects without direct contact** d. Require complex setups
23	Which IoT platform supports a variety of sensors and actuators via GPIO pins? a. Raspberry Pi **b. Arduino** c. BeagleBone d. Intel Galileo
24	Which of the following is a popular embedded operating system used for IoT applications? a. Linux b. Windows c. Android **d. FreeRTOS**
25	Participatory sensing relies heavily on: a. Remote sensing **b. User-generated data** c. Centralized data collection d. Pre-existing environmental sensors
26	Which of the following platforms is typically used for embedded applications that require low power consumption? a. Raspberry Pi **b. Arduino** c. BeagleBone d. Intel Galileo

27	The Beagle Bone board primarily uses which type of processor? **a. ARM** b. x86 c. RISC d. AVR
28	What is the primary use of a sensor in a wireless sensor network? a. Storing data b. Transmitting data **c. Detecting environmental changes** d. Powering the network
29	What kind of data can RFID tags store? a. Digital files b. Audio and video files **c. Identification data** d. Sensor readings
30	Which of the following platforms is typically used for embedded applications that require low power consumption? a. Raspberry Pi **b. Arduino** c. BeagleBone d. Intel Galileo

5 Marks Questions	
Question Number	**Question**
1	Define Sensor? Explain its role in the IoT system.
2	Differentiate between analog and digital sensors.
3	What is the significance of RFID tags, and what are the different types of RFID tags?
4	What are the potential challenges and concerns associated with RFID technology?
5	What is radio frequency identification (RFID) technology? How is it utilized in IoT systems?

5 Marks Questions	
6	Explain the difference between passive, active, and semi-passive RFID tags. Provide examples of applications for each type.
7	What is Participatory sensing technology, and explain how it works?
8	Define wireless sensor network? Explain its components.
9	Describe how IIoT technology is used in optimizing the bicycle manufacturing process?
10	What are the advantages and limitations of using Raspberry Pi for IoT applications compared to other platforms?
11	Write a note on: Arduino, NetArduino, Raspberry Pi, Beagle Bone, Intel Galileo.

10 Marks Questions	
Question Number	**Question**
1	Describe different types of sensors used in IoT and their applications.
2	Define Actuator? Explain any 5 actuators.
3	Define Sensor? Explain any 5 Sensors.
4	Define RFID technology and explain how it works.
5	Explain the 3 major components of the RFID system.
6	Describe the components of an RFID system and their functions with a neat diagram.

15 Marks Questions	
Question Number	**Question**

15 Marks Questions	
1	Describe the components of an RFID system and their functions with a clear diagram, and explain the different types of tags.
2	Define an actuator and explain in detail the working principles of any five types of actuators, providing examples for each.
3	What is a sensor? Describe any five types of sensors and explain their working principles with examples.

UNIT 3

Question Number	Question
1	What is the main issue in wireless medium access for IoT devices? a. High energy consumption b. Limited bandwidth **c. Interference and collisions** d. Low data rate
2	Which of the following is a key challenge in the Medium Access Control (MAC) protocol for wireless communication? a. Error correction **b. Channel allocation** c. Data transmission speed

	d. Signal encryption
3	What is the primary function of a MAC protocol in wireless communication? a. Data aggregation **b. Coordination of access to the shared communication medium** c. Data encryption d. Node discovery
4	Which of the following MAC protocols is used to improve wireless communication efficiency in IoT? a. CSMA/CA b. ALOHA c. Polling **d. TDMA**
5	Which of the following is a key consideration when deploying wireless sensor nodes? a. Power consumption b. Communication range c. Physical environment **d. All of the above**
6	Which type of communication technique does the MAC protocol use to avoid collisions in IoT? a. Polling **b. CSMA/CA** c. Collision detection d. FDM
7	In wireless sensor networks, which is responsible for routing data from one sensor node to another? a. MAC protocol **b. Routing protocol** c. Data aggregation d. Node discovery
8	Which of the following is a common routing protocol for wireless sensor networks? a. AODV **b. RPL** c. OSPF d. RIP

9	What does the RPL protocol in wireless sensor networks mainly focus on? a. Security b. Low power consumption **c. Efficient data routing** d. Low latency
10	What is a primary concern in routing protocols for IoT? a. High data rates b. Interference between nodes **c. Power consumption** d. Signal strength
11	Which of the following is an advantage of using data aggregation in IoT? **a. Reduces network traffic** b. Increases energy consumption c. Decreases communication range d. Increases the complexity of the system
12	What is the main goal of data aggregation in IoT systems? a. To enhance security **b. To reduce redundant data transmission** c. To ensure data consistency d. To speed up data transmission
13	Which of the following is a typical method used for data aggregation in wireless sensor networks? **a. Averaging data from multiple sensors** b. Encrypting data from each sensor c. Compression of sensor data d. Sending raw data from each sensor
14	Which of the following protocols is designed for data dissemination in wireless sensor networks? a. AODV b. DSRC **c. Epidemic protocol** d. RPL

15	What is the main advantage of using node discovery in IoT networks? a. Power conservation **b. Ensures efficient routing of data** c. Reduces data collision d. Provides efficient energy management
16	Which of the following is the correct order of the steps involved in wireless sensor network communication? a. Data aggregation → Node discovery → Routing → Data dissemination **b. Node discovery → Routing → Data aggregation → Data dissemination** c. Routing → Node discovery → Data aggregation → Data dissemination d. Data dissemination → Routing → Data aggregation → Node discovery
17	What is the main objective of sensor deployment in IoT? a. To increase signal interference b. To reduce sensor overlap **c. To ensure maximum network coverage** d. To reduce the communication range
18	Which method is typically used for sensor node deployment in large-scale IoT applications? a. Manual deployment **b. Random deployment** c. Pre-configured deployment d. Static deployment
19	Which factor is crucial for the efficiency of a wireless sensor network? a. Frequency hopping **b. Proper node deployment** c. High bandwidth d. High power consumption
20	What role does data dissemination play in wireless sensor networks? a. Ensures security of transmitted data **b. Helps in distributing data across the network efficiently** c. Ensures that only authorized devices can access the data d. Increases network redundancy

21	Which of the following is a common issue with wireless communication in IoT? a. High energy efficiency **b. Data collision** c. Perfect signal range d. High communication speed
22	In wireless medium access, what is the function of the backoff time in protocols like CSMA/CA? a. To ensure the node can start transmitting data immediately **b. To prevent collisions by delaying transmission attempts** c. To increase signal strength d. To reduce power consumption
23	What is the advantage of using TDMA (Time Division Multiple Access) in MAC protocols for IoT? a. It reduces the need for network synchronization **b. It allows multiple devices to transmit at different times without interference** c. It increases the complexity of data aggregation d. It reduces power consumption
24	Which of the following challenges does node discovery address in wireless sensor networks? a. Communication range extension **b. Node identification and location determination** c. Power consumption reduction d. Data encryption
25	What is the benefit of using wireless routing protocols in IoT? a. Increases the security of the communication network **b. Ensures that data can reach the intended destination efficiently** c. Reduces the number of nodes in the network d. Ensures that there is no power consumption
26	Which routing protocol is best suited for low-power wireless networks? a. DSDV **b. RPL** c. AODV d. OLSR

27	What is the primary advantage of using data aggregation in IoT systems? **a. Reduces the amount of redundant data being sent** b. Increases the complexity of network protocols c. Increases communication costs d. Reduces security risks
28	Which of the following methods is used for data dissemination in a large network of IoT sensors? **a. Flooding** b. Routing tables c. Polling d. Aggregation
29	Which MAC protocol is most commonly used for energy-efficient communication in wireless IoT networks? a. CSMA/CD b. TDMA c. ALOHA **d. CSMA/CA**
30	Which of the following is a typical strategy for improving the performance of wireless sensor networks in IoT? a. Increasing node density b. Using low-power protocols c. Optimizing node discovery **d. All of the above**

5 Marks Questions	
Question Number	**Question**
1	What are the critical factors to consider when designing and choosing Medium Access Control (MAC) protocols for Internet of Things (IoT) devices?
2	Define routing protocols in the context of wireless sensor networks

5 Marks Questions	
	(WSNs).
3	Explain the different categories of routing protocols.
4	Outline the factors to consider when deploying sensors in a wireless sensor network.
5	Define data aggregation and its significance in wireless sensor networks.
6	Describe different data aggregation techniques employed in WSNs.
7	Write a note on i) CSMA ii) TDMA.

10 Marks Questions	
Question Number	**Question**
1	Analyze the main challenges encountered in wireless medium access and evaluate their impact on communication systems.
2	Compare and contrast the different categories of MAC protocols in IoT, and justify which category is most suitable for a specific IoT application.

Unit -4

Question Number	Question
1	What is the primary function of the Arduino platform? a. Data analysis **b. IoT application development** c. Web design d. Image processing
2	Which of the following is a component of the Arduino platform? **a. Microcontroller** b. Wi-Fi chip c. Storage device d. Bluetooth module
3	What does the Arduino IDE stand for? **a. Integrated Development Environment** b. Integrated Digital Environment c. Internal Development Environment d. Interactive Device Environment
4	Which programming language is primarily used in Arduino? a. Python b. Java **c. C/C++** d. Ruby
5	What is the primary function of an Arduino microcontroller? a. Collect data from sensors b. Process data from external devices c. Control external actuators **d. All of the above**
6	Which of the following is the default port for programming Arduino boards via USB? **a. COM port** b. Serial port c. Parallel port d. USB port

7	Which of the following Arduino platforms is commonly used for basic IoT projects? **a. Arduino Uno** b. Arduino Mega c. Arduino Nano d. Arduino Due
8	What is the function of the void setup() function in Arduino code? **a. Defines the initial conditions of the program** b. Runs continuously c. Closes the program d. Initializes the hardware interface
9	What is the purpose of the void loop() function in Arduino programming? a. It initializes the program b. It runs the program once **c. It repeatedly executes code** d. It defines hardware settings
10	Which programming environment does Arduino use to write code and upload it to the board? a. Eclipse **b. Arduino IDE** c. Visual Studio d. NetBeans
11	What is an Arduino emulator used for? a. To debug Arduino code **b. To run Arduino code without hardware** c. To improve Arduino performance d. To simulate IoT sensors
12	Which of the following is a valid method of uploading code to Arduino? a. USB connection b. Bluetooth c. Wi-Fi **d. All of the above**

13	How are libraries used in Arduino programming? **a. To simplify code for sensors and modules** b. To increase storage space c. To enhance security features d. To monitor Arduino performance
14	Which of the following is an example of an external library that can be used in Arduino? **a. Servo library** b. Windows library c. JavaScript library d. .NET library
15	What does the #include directive in Arduino code do? a. Includes external hardware **b. Includes external libraries** c. Initializes a new variable d. Initializes a new program
16	How can you add a new library in Arduino IDE? **a. Use Sketch > Include Library > Manage Libraries** b. Manually edit the code c. Use File > Open d. Add a new directory to the project folder

17	Which of the following is the correct way to define a pin for output in Arduino?
	a. pinMode(13, INPUT);
	b. pinMode(13, OUTPUT);
	c. digitalWrite(13, HIGH);
	d. digitalRead(13);

18	What does the digitalWrite() function do in Arduino programming? **a. Writes a digital value to a pin** b. Reads the digital value of a pin c. Initializes the input pin d. Initializes the output pin

19	Which Arduino board is ideal for handling complex IoT applications? a. Arduino Uno b. Arduino Mega **c. Arduino Due** d. Arduino Nano
20	What kind of projects can be built with Arduino and IoT technologies? a. Home automation systems b. Industrial control systems c. Environmental monitoring systems **d. All of the above**
21	What is the role of an actuator in an Arduino-based IoT system? a. To collect environmental data b. To process data **c. To perform actions based on sensor data** d. To display data on a screen
22	Which of the following programming functions is used to initialize Arduino hardware? **a. setup()** b. loop() c. begin() d. start()
23	What kind of data is typically sent from Arduino to an IoT cloud service? **a. Sensor readings** b. Control signals c. Binary data d. Audio signals

24	How do you control the brightness of an LED in Arduino?
	a. digitalWrite(pin, LOW);
	b. analogWrite(pin, value);
	c. digitalRead(pin);
	d. analogRead(pin);

25	What is the delay() function in Arduino used for? a. To stop the program **b. To introduce a time delay** c. To initialize a variable d. To check for hardware errors
26	Which Arduino board supports Wi-Fi for IoT projects? a. Arduino Uno b. Arduino Nano **c. Arduino Uno Wi-Fi** d. Arduino Mega
27	What does the Arduino IDE's "Verify" button do? a. It uploads the code to the Arduino board **b. It checks the code for errors** c. It runs the program on the board d. It resets the Arduino
28	How do you connect external sensors to the Arduino? a. Via Bluetooth **b. Using the GPIO pins** c. Through USB ports d. Using Wi-Fi
29	Which of the following functions is used to read a sensor's analog value in Arduino? a. digitalRead() b. analogWrite() **c. analogRead()** d. digitalWrite()
30	What is the main advantage of using libraries in Arduino programming? a. They make the code more complex **b. They simplify sensor and actuator control** c. They increase the size of the code d. They prevent errors in hardware setup

5 Marks Questions	
Question Number	**Question**
1	What are the basic elements of the Arduino programming language, and how are they used to control hardware peripherals?
2	Explain the key components of Arduino IDE.
3	Explain the following with examples: i) pinMode() ii) digitalRead.
4	Explain the following with examples: i) AnalogWrite() ii) PWM pins.
5	Explain how to set up and use the Arduino Integrated Development Environment (IDE) for programming Arduino boards.
6	Explain the LED Blink with circuit diagram, code, and procedure.
7	Explain the LED Fade with circuit diagram, code, and procedure.

10 Marks Questions	
Question Number	**Question**
1	Explain the Anatomy of Arduino Uno with a neat diagram.
2	Design an Arduino program to control an LED based on ambient light conditions using an LDR sensor and Arduino microcontroller.

10 Marks Questions	
3	Write a circuit diagram and code to interface a 16x2 LCD with I2C communication to an Arduino microcontroller and display a custom message on the screen.
4	Design an Arduino program to control an LED based on ambient light conditions using an LDR sensor and Node MCU microcontroller.
5	Write a circuit diagram and code to set up the DHT11 humidity sensor on an Arduino microcontroller and display the temperature and humidity readings on the Serial Monitor.

15 Marks Questions	
Question Number	**Question**
1	Explain the LED Blink and Fade with circuit diagram, code, and procedure.
2	Explain how to interface a NodeMCU board with an ultrasonic sensor to measure distance accurately? Please outline the necessary connections between the NodeMCU and the ultrasonic sensor, as well as the steps involved in programming the NodeMCU to read data from the sensor and calculate the distance.

15 Marks Questions	
3	Explain how to interface an Arduino board with an ultrasonic sensor to measure distance accurately? Please outline the necessary connections between the Arduino and the ultrasonic sensor, as well as the steps involved in programming the Arduino to read data from the sensor and calculate the distance.
4	Design an Arduino program to detect obstacles using an IR sensor. The task involves creating a system where the NodeMCU microcontroller interprets data from the IR sensor to identify the presence or absence of an obstacle.
5	Design an Arduino program to detect obstacles using an IR sensor. The task involves creating a system where the Arduino microcontroller interprets data from the IR sensor to identify the presence or absence of an obstacle.

UNIT 5

Question Number	Question
1	What is one of the major development challenges in IoT? a. High power consumption b. Secure communication protocols c. Data storage limitations **d. Software complexity**
2	Which of the following is a security challenge in IoT? a. Data encryption b. Interoperability between devices c. Limited cloud storage **d. Data access control**

3	Which of the following IoT applications is used for monitoring energy consumption? a. E-health **b. Smart metering** c. City automation d. Home automation
4	What does the IoT application in E-health primarily focus on? a. Energy management **b. Patient monitoring** c. City traffic control d. Security in healthcare
5	Which of the following is a key component in city automation? a. Autonomous vehicles b. Smart meters **c. Intelligent transportation systems** d. E-health systems
6	In automotive IoT applications, which device is primarily responsible for real-time vehicle data collection? **a. Smart sensors** b. GPS trackers c. Mobile phones d. Wearable devices
7	Which of the following is an essential component in home automation? **a. Smart locks** b. Smart meters c. Autonomous cars d. E-health devices
8	What is the main objective of smart cards in IoT applications? a. Energy management **b. Payment transactions** c. Traffic monitoring d. Security in healthcare

9	What does IoT communication with hardware modules typically involve? a. Audio processing **b. Data transmission** c. Video streaming d. Network management
10	Which of the following devices is primarily used to communicate IoT data? a. Smartphones b. Laptops c. Tablets **d. All of the above**
11	How can data from IoT devices be transmitted to the cloud? a. By using Bluetooth b. By using cellular networks c. By using Wi-Fi **d. All of the above**
12	Which technology is commonly used to design smart street lights in smart cities? a. RFID **b. Zigbee** c. Bluetooth d. GPS
13	Which of the following is a major challenge when designing IoT devices for smart cities? a. Device miniaturization **b. Interoperability of devices** c. Low energy consumption d. High data transmission speed
14	What is the main function of a smart metering system in IoT? a. Smart grid management b. Water management **c. Automated billing and energy consumption monitoring** d. Health monitoring

15	Which of the following is true about security challenges in IoT applications? a. They can be fully solved with current encryption methods b. IoT security risks are reduced by using secure hardware only **c. Authentication and data integrity are key challenges** d. IoT security challenges do not involve data privacy
16	What role does data privacy play in IoT security? a. Ensuring that data is stored on local devices only **b. Protecting sensitive user data from unauthorized access** c. Limiting data processing d. Speeding up data transmission
17	Which of the following protocols is commonly used for IoT communication? a. HTTP **b. MQTT** c. FTP d. All of the above
18	Which of the following is a key challenge in IoT application design? **a. Device interoperability** b. High-quality video streaming c. Data storage management d. Data transmission speed
19	What is the key benefit of home automation in IoT? a. Improved security b. Real-time healthcare monitoring c. Energy efficiency **d. All of the above**

20	What role do sensors play in automotive IoT applications? a. They detect vehicle speeds b. They monitor vehicle location c. They collect data related to the vehicle's environment **d. All of the above**
21	Which of the following is a benefit of integrating smart cards with IoT applications? a. Real-time data collection **b. Secure transaction processing** c. Energy-efficient communication d. Environmental monitoring
22	Which challenge is associated with integrating IoT applications in smart cities? a. Power consumption management b. Data interoperability c. High data processing needs **d. Ensuring security and privacy**
23	What is the primary challenge in securing IoT applications? a. Real-time processing of data **b. Lack of standard security protocols** c. Difficulty in integrating sensors d. High power consumption
24	Which IoT-based application is used to monitor health conditions remotely? a. Smart metering **b. E-health** c. City automation d. Automotive applications
25	In smart street lighting, how is energy efficiency typically achieved? **a. By using smart sensors that adjust lighting based on real-time conditions** b. By using solar energy c. By reducing the number of streetlights d. All of the above

26	Which of the following devices is critical in communicating data from IoT hardware modules to end-users? a. Microcontroller b. Smartphones **c. Cloud servers** d. Wearables
27	Which technology is often used for the communication between IoT devices in automotive applications? **a. CAN bus** b. Zigbee c. Bluetooth d. Wi-Fi
28	Which IoT application is related to the management and monitoring of city infrastructure? a. Smart metering **b. City automation** c. E-health d. Automotive applications
29	What is the primary benefit of using IoT in automotive applications? a. Improved fuel efficiency **b. Real-time data collection for vehicle diagnostics** c. Autonomous driving d. Improved air quality
30	What is the key challenge in developing IoT-based smart cities? a. Lack of internet connectivity **b. Integration of multiple technologies** c. High energy consumption d. Complex user interfaces

5 Marks Questions	
Question Number	**Question**

5 Marks Questions	
1	How can IoT technology be leveraged to design smart street lighting systems in smart cities?
2	What are the common IoT devices and protocols used in home automation systems?
3	What are the main security concerns in IoT ecosystems, and what strategies can be employed to mitigate risks such as data breaches, device hijacking, and unauthorized access?
4	What are the primary development challenges encountered in creating IoT solutions? Explain in detail.
5	Describe the impact of IoT on healthcare and provide examples of IoT applications in the healthcare industry.
6	Explain the following IoT applications: E-health (5m), City Automation (5m), Home Automation (5m), Smart Cards (5m).

10 Marks Questions	
Question Number	**Question**
1	Explain the role of Internet of Things (IoT) in E-health applications. How does IoT improve healthcare services, and what are the challenges faced in implementing IoT in healthcare?
2	Explain how the Internet of Things (IoT) is used in city automation. Highlight the key components and applications of IoT in smart cities, and explain how it contributes to sustainability, traffic management, and resource optimization.

10 Marks Questions	
3	Describe the concept of home automation using Internet of Things (IoT). Explain how IoT technologies are integrated into home automation systems to enhance convenience, security, and energy efficiency.
4	Explain the role of smart cards in IoT applications. How do IoT-enabled smart cards enhance security, payment systems, and access control? Discuss the potential benefits and limitations of using smart cards in IoT-based systems.
5	Identify and explain in detail the primary development challenges faced when creating IoT solutions.
6	What are the key security challenges associated with the Internet of Things (IoT)? Explain the risks and measures to mitigate these security concerns.