IOT FOR COMMUNICATION
(ECEN 3232)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) Which technologies help to reduce interference in wireless communication?
(a) Frequency hopping and spread spectrum techniques
(b) Increasing transmission power indefinitely
(c) Using a single frequency band for all devices
(d) Removing modulation techniques

(ii) What is the full form of the LPWAN?
(a) Low Protocol Wide Area Network
(b) Low Power Wide Area Network
(c) Long Protocol Wide Area Network
(d) Long Power Wide Area Network

(iii) What is the primary function of the Medium Access Control (MAC) layer in IEEE 802.15.4
(a) Managing error detection and correction at the physical layer
(b) Controlling access to the shared communication channel and handling frame delivery
(c) Routing data packets across multiple networks
(d) Converting analog signals into digital format

(iv) Which is not an IoT communication model?
(a) Request-Response
(b) Push-Producer
(c) Publish-Subscribe
(d) Exclusive Pair

(v) Which touch sensors are used in a cell phone?
(a) Follow sensor
(b) Resistive touch sensors
(c) Capacitive touch sensor
(d) Human sensor

(vi) What is the primary difference between ZigBee and IEEE 802.15.4?
(a) ZigBee is a communication standard, while IEEE 802.15.4 is only a hardware specification
(b) IEEE 802.15.4 includes network and security features, while ZigBee only defines the physical layer
(c) IEEE 802.15.4 provides only the physical and MAC layers, while ZigBee includes networking and application layers
(d) ZigBee and IEEE 802.15.4 are completely unrelated technologies

(vii) What is the primary purpose of Z-Wave technology?
(a) Long-range broadband communication for industrial automation
(b) Low-power wireless communication for home automation and smart devices
(c) High-speed data transmission in cellular networks
(d) Secure communication for military application

(viii) Which topology is used for ZigBee Smart Energy?
(a) Bus Topology (b) Ring Topology
(c) Star Topology (d) Any Topology

(ix) 6LoWPAN Adaption layer contains?
(a) Header compression (b) Fragmentation
(c) Layer 2 forwarding (d) All of these

(x) The Bluetooth technology operates in the ISM band at
(a) 2.4 to 2.485 GHz (b) 1.4 to 2.485 GHz
(c) 2.4 to 2.485 MHz (d) None of the above

Fill in the blanks with the correct word

(xi) The Internet of Things (IoT) primarily connects _____ to the Internet to enable smart interactions and automation.

(xii) Wireless M-BUS is primarily used for _____ applications in M2M communication.

(xiii) The main advantage of 6LoWPAN in IoT applications is its ability to transmit _____ over constrained networks efficiently.

(xiv) The bit length of the IPV6 is _____.

(xv) MQTT stands for _____.

Group - B

2. (a) Explain the concept of IoT in simple terms. *[(CO1, CO2) (Understand/LOCQ)]*
(b) Why is reliable radio communication important for IoT applications? *[(CO2) (Analyze/IOCQ)]*
(c) Assess the significance of M2M communication tools in the IoT ecosystem. *[(CO2) (Evaluate/HOCQ)]*

4 + 3 + 5 = 12

3. (a) Highlight the various types of deployment challenges associated with the IoT system. Explain briefly. *[(CO1)(Analyse/IOCQ)]*

(b) Why collected data filtering and optimization of power consumption is necessary for IoT-based sensors? *[(CO1)(Evaluate/HOCQ)]*

(c) Describe the significance of IoT actuators. *[(CO1)(Apply/IOCQ)]*

5 + 5 + 2 = 12

Group - C

4. (a) Evaluate the importance of the MAC layer in ensuring communication reliability in sensor networks. *[(CO3)(Analyse/HOCQ)]*

(b) Explain the challenges addressed by IEEE 802.15.4 in sensor networks. *[(CO3)(Understand/LOCQ)]*

6 + 6 = 12

5. (a) Define sensor in IoT. Explain the characteristics and usage of sensors in IoT. *[(CO4)(Remember/LOCQ)]*

(b) Explain the working principal of RFID. *[(CO4)(Evaluate/HOCQ)]*

(c) What is the significance of TCP/IP protocol in IoT communication systems? *[(CO3) (Analyse/IOCQ)]*

(1 + 4) + 3 + 4 = 12

Group - D

6. (a) What are the four layers of the M-BUS architecture? Briefly explain the working Scheme of M-BUS architecture. *[(CO5) (Understand/LOCQ)]*

(b) Explain how security is implemented in M-BUS. *[(CO3) (Apply/IOCQ)]*

(2 + 6) + 4 = 12

7. (a) What is REST? What are the constraints of "RESTful" architecture? Explain. *[(CO4) (Apply/IOCQ)]*

(b) What are the "registration" and "authorization server" functions in ZigBee SE 2.0? *[(CO4) (Remember/LOCQ)]*

6 + 6 = 12

Group - E

8. (a) IoT evolution calls for protocol testing and characteristics of various aspects. Explain briefly the importance of (i) Linked-Data (ii) Scalability (iii) Performance and (iv) Extensibility. *[(CO6)(Understand/IOCQ)]*

(b) How IoT can transform the healthcare sector into a smart system? *[(CO6) (Evaluate/HOCQ)]*

6 + 6 = 12

9. (a) Explain the concept of demand response in smart grid systems. How does IoT facilitate efficient energy management in smart grids? *[(CO6)(Analyse/IOCQ)]*

(b) What is the major communication protocols used in Electric Vehicle (EV) charging infrastructure? *[(CO6)(Remember/LOCQ)]*

7 + 5 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	35.42	38.54	26.04