

**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 of the following touch sensors is used in a cell phone?
(a) Follow sensor (b) Resistive touch sensors
(c) Capacitive touch sensor (d) Human sensor.
- (ii) In IoT, the analytics at the edge means
(a) transmission at low power (b) sending selective data
(c) sending meaningful data (d) both (b) and (c).
- (iii) In TCP/IP model, number of layers is
(a) seven (b) five (c) three (d) four.
- (iv) For a packet of length 10Kbits and a link speed of 100 Mbps, the transmission delay will be
(a) 0.1 milisecs (b) 1.0 milisecs
(c) 0.01 milisecs (d) none of these.
- (v) 802.15.4 standard focuses on
(a) low power transmission (b) ISM band
(c) extended battery life (d) all of these.
- (vi) Process of digitally signing softwares on an IOT device is called
(a) secure code (b) code signing
(c) digital signature (d) none of these.
- (vii) The M-BUS node capacity is
(a) 1000 (b) 250 (c) 79 (d) none of these.
- (viii) IPv4 supports a certain number of classes. Their number is
(a) 5 (b) 3 (c) 4 (d) 6.
- (ix) Energy harvesting is very important for IoT as
(a) batteries are of limited capacity (b) it is difficult to replace batteries
(c) network life is prolonged (d) all are true.

- (x) The location of the actuator is at the
 (a) sensing site (b) at the monitoring site
 (c) at some intermediate site (d) none of these.

Fill in the blanks with the correct word

- (xi) IoT has seen the convergence of IT and _____.
 (xii) In IPv6, total number of bits is _____.
 (xiii) Data analytics has _____ versions so far.
 (xiv) In IPv4, Class D supports the _____ mode of operation.
 (xv) Mechanical energy is converted to electrical energy using _____.

Group - B

2. (a) Which is the main component of the Internet layer? Draw the block diagram of a Router showing the different components. What is the difference between EEPROM and Flash memory? [[CO1](Understand/IOCQ)]
 (b) Explain the differences between Classes A, B and C as applicable to Internet addressing schemes (IPv4) with the help of suitable diagram. Why is the maximum number of host addresses reduced by 2? [[CO1](Compare/HOCQ)]
5 + 7 = 12
3. (a) What are the various types of deployment challenges associated with the IoT system? [[CO1,CO2](Analyse/IOCQ)]
 (b) Why collected data filtering and optimization of power consumption is necessary for IoT networks? What is the function of the actuators? [[CO1,CO2](Understand/IOCQ)]
4 + (6 + 2) = 12

Group - C

4. (a) Why is the IEEE 802.15.4 standard suitable for IoT based communication system? [[CO2](Apply/IOCQ)]
 (b) Explain the fundamental network topologies used in IEEE 802.15.4 standard. [[CO2](Remember/LOCQ)]
 (c) What are the influencing factors are considered to calculate the end-to-end delay. Why does queuing delay take place? [[CO2](Apply/IOCQ)]
4 + 4 + 4 = 12
5. (a) What is the difference between IEEE 802.15.4 full-function device (FFD) and reduced-function device (RFD)? [[CO3](Understand/LOCQ)]
 (b) What is the importance of edge analytics in IoT networks? Compare Analytics versions 2.0 and 3.0. [[CO3](Evaluate/IOCQ)]
6 + 6 = 12

Group - D

6. (a) What is 6LoWPAN? What are three functions provided by the 6LoWPAN adaptation layer? [[CO5](Understand/LOCQ)]
(b) What are the deployment challenges associated with 6LoWPAN? [[CO5](Analyse/IOCQ)]
6 + 6 = 12
7. (a) What is REST? Why is Roy Fielding credited for this architecture? What are the constraints of “RESTful” architecture? Explain them. [[CO4](Understand/IOCQ)]
(b) What is the driving thought behind development of ZigBee Smart Energy (SE) 2.0 as an improvement upon SE 1.0? What are the functions of “Registration” and “Authorization Server” in ZigBee SE 2.0? [[CO4](Remember/LOCQ)]
6 + 6 = 12

Group - E

8. (a) Justify how IoT can help immensely to make medical service network sector smart? [[CO6](Design/Analyse/HOCQ)]
(b) What are the differences between different EV connectors used in EV-charging system? [[CO6](Remember/LOCQ)]
(c) What are the IEC standard cases related to EV charging? [[CO6](Understand/LOCQ)]
6 + 3 + 3 = 12
9. (a) Show how IoT can reduce the loss incurred in a massive warehouse. The main reasons for wastage are: (i) Expiry of items without knowledge and (ii) A large number of warehouses in the complex. Design the schematic. [[CO6](Design/HOCQ)]
(b) Classify the ModBus transmission modes. Explain briefly. [[CO5](Remember/LOCQ)]
8 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	33.33	44.79	21.87

Course Outcomes (CO):

The completion of the course will ensure the following:

1. The students will know about IoT and the concept behind.
2. Students will be able to explain about the importance of radio transmission for IoT applications and different standards to match varying requirements, M2M area network, Physical Layers, IEEE 802.15.4 family of protocols.
3. They will be able to explain M2M protocols for Sensor networks and be able to apply knowledge for building and home automation.
4. The students will know about ZigBee and ZigBee smart energy protocols.
5. The students will know about next generation IP-based protocols like 6LoWPAN and RPL.
6. They should be able to analyze communication systems with ideas from Smart Grid and Electric Vehicle Charging projects.

*LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.

