INTERNET OF THINGS (IOT) AND APPLICATIONS
(ECEN 6132)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

    (i)   In IoT, T stands for:
            (a) Thing   (b) Things   (c) Total   (d) Technology.

    (ii)   By 2020, the number of internet connected things are expected to reach
            between:
            (a) 5 billion and 10 billion   (b) 10 billion and 20 billion
            (c) 26 billion and 50 billion   (d) 10 billion and 26 billion.

    (iii)   Which layer is called a port layer in OSI model?
            (a) Session   (b) Application   (c) Presentation   (d) Transport.

    (iv)   Ping command is used:
            (a) To know about network speed   (b) To test storage device
            (c) To test whether a host is reachable (d) None of these.

    (v)   Fuzzy logic is a form of:
            (a) Hexa state logic   (b) Two valued logic
            (c) Binary set logic   (d) Many valued logic.

    (vi)   Which of the following languages is preferred for IoT analytics?
            (a) S   (b) Python   (c) R   (d) all of these.

    (vii)   The network layer concerns:
            (a) Bits   (b) Frames   (c) Packets   (d) None of these.

    (viii) Network topology with a central hub or switch is:
            (a) Mesh   (b) Token Ring   (c) Star   (d) Token Bus.

    (ix)   In Wireless ad hoc network:
            (a) Access point is not required   (b) Node number is limited
            (c) Access point is a must   (d) Single hop communication is common

(x)   LTE stands for:
(a) Long Term errors   (b) Long Term evolution
(c) Lengthy Terminal Estimation   (d) Long Term Estimates

Group – B

2. (a)   IoT is a new revolution of the internet — explain this statement. What are the three enabling technologies for IoT? What is meant by contextual information? [(CO1)(Remember/LOCQ)]
    (b)   The development of IoT is seeing the rapid convergence of information and communications technology- explain this statement. [(CO1)(Understand/IOCQ)]
                                                                                6 + 6 = 12

3. (a)   Describe the fundamental characteristics of IoT and explain each of them. [(CO2)(Understand/IOCQ)]
    (b)   Why is energy harvesting so critical for sensor based IoTs? How can energy be harvested for IoT devices? Give a few examples. [(CO3)(Analyze/IOCQ)]
                                                                            4 + (3 + 5) = 12

Group – C

4. Why is it important that IoT should have a common architecture? What is the " IoT – A" reference model? Draw the block diagram and explain the functions of the Four functional models. [(CO2)(Understand/IOCQ)]
                                                                                (4 + 8) = 12

5. (a)   Show the difference between OSI model and the TCP/IP model for layers. [(CO2)(Remember/LOCQ)]
           Differentiate between: (i) EEPROM and (ii) FLASH memory. [(CO2)(Remember/LOCQ)]
    (b)   Write down the equation for total end-to-end delay in a IoT network. Why do Queuing delay and Processing delay take place? [(CO2)(Understans/IOCQ)]
                                                                            (2 + 4) + 6 = 12

Group – D

6. (a)   For Iot, security is requirements are very tight. Explain the following aspects:
           (i) Non-repudiation; (ii) Forward secrecy, (iii) Backward secrecy and (iv) Freshness of data. [(CO3)(Analyze/IOCQ)]
    (b)   For security analysis, IoT is considered a three domain structure. Name those and explain the operations of them along with a diagram. [(CO3)(Remember/LOCQ)]
                                                                                4 + 8 = 12

7. (a)   Mention and explain at least 5 security challenges faced in IoT networks. [(CO2)([Remember/LOCQ)]

(b)   Show the IoT security structure with a neat diagram. Explain the functions of Sensor domain, Fog domain and Cloud domain. [(CO2)(Understand/IOCQ)]

4 + 8 = 12

Group – E

8.   IoT evolution calls for protocol testing and characteristics of various aspects.
Can you explain the importance of (i) Linked-Data, (ii) Scalability, (iii) Performance and (iv) Extensibility? If so, explain briefly all four. [(CO3)(Understand/IOCQ]

12

9.   (a)   How can IoT play an important role in public safety and protection of environment? Explain. [(CO4)(Create/HOCQ)]

(b)   How can IoT make transport and mobility sector smart? [(CO5)(Create/HOCQ)]

6 + 6 = 12

_____

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	27.1%	60.4%	12.5%

Course Outcomes (CO):
At the end of the course, the students will be able to:
1. Understand different protocols.
2. Analyze IoT architecture.
3. Design applications based on IoT.
4. Create sensor based applications.
5. Develop new applications.
6. Compare different IoT use

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

Department & Section	Submission link:
ECE	https://classroom.google.com/w/Mzk5MTIzNTQzNTA4/tc/NDY0MDA2NTM0ODA1