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

   (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) What is a firewall in computer networks?
         (a) A system designed to prevent unauthorized access
         (b) A web browser
         (c) The physical boundary of network
         (d) The operating system.

   (iv) What is the standard length of MAC address?
         (a) 16 bits   (b) 32 bits   (c) 48 bits   (d) 64 bits.

   (v)   Which one of these is not a data link layer technology?
         (a) Bluetooth   (b) UART   (c) Wi-Fi   (d) HTTP.

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

   (vii) WPA is a security mechanism in
         (a) WiFi   (b) Cloud   (c) Bluetooth   (d) Ethernet.

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

   (ix) A collection of conductors which connects more than one device is called
         (a) Cable   (b) Power line
         (c) Transmission line   (d) Bus.

   (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?

   (b) The development of IoT is seeing the rapid convergence of information and communications technology- explain this statement.

   (4 + 4) + 4 = 12

3. (a) Describe the fundamental characteristics of IoT and explain each of them. What is energy harvesting? How can energy be harvested for IoT devices from RF?

   (b) IoT solutions generally comprise a number of modules. Briefly describe their functions.

   (4 + 3) + 5 = 12

Group – C

4. (a) Why is it important that IoT should have a common architecture?

   (b) What is "IoT – A" reference model? Draw the block diagram and explain the functions of the models.

   (2 + 2) + 8 = 12

5. What is the function of iCore architecture? Draw a block diagram. What are the functions of the Service Level and CVO level?

   (2 + 4 + 6) = 12

Group – D

6. (a) Define interoperability. Explain Technical, Syntactical and Semantic interoperability.

   (b) Describe at least three IoT technical interoperability challenges and their rationale.

   6 + 6 = 12

7. (a) What are the differences between active churn, passive churn and expected churn? Where is this concept of churn used?

   (b) When is Linear Regression analysis model required? Show mathematically how Customer Lifetime Value (CLV) can be modelled using RFM predictors. What are decision trees? What are the key decisions to build a tree using algorithms like CART or CHAID?

   4 + 8 = 12

Group – E

8. (a) How can IoT play an important role in public safety and protection of environment? Explain.

   (b) How can IoT make transport and mobility sector smart?

   6 + 6 = 12

9. 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.

   12