Roll No: ----------

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination – December, 2017

Program/course: B.Tech EE (IoT) | **Semester – III**
Subject: Introduction to IoT | **Max. Marks : 100**
Code : CSIB230 | **Duration : 3 Hrs**
No. of page/s: 2

Note: 1) Mention Roll No at the appropriate place in the question paper.
2) Answers should be brief and concise.
3) All questions are compulsory.

Section A (4Q×5M=20 Marks)

1. List the four most popular frequencies used by Radio Frequency Identification (RFID) technology? Discuss the RFID tags from Class 0 to Class 5 on the basis of their types and working capabilities?

2. Define, discuss and compare the format of Internet Protocols IPV4 and IPV6?

3. Discuss different types of Sensors used in IoT applications?

4. Discuss the following terms with respect to Internet of Things (IoT):
   a) Ubiquitous networking
   b) Converged network
   c) Cloud Computing
   d) Wireless Sensor Network
   e) Classification of objects/things.

Section B (5Q×8M=40 marks)

5. Define (with block diagram) the main internal components of an IoT device?

6. Discuss different layers (with diagram) of an IoT device (IoT Protocol Stack)?

7. Define components of a typical sensing node of a WSN with its block diagram.

8. Discuss (point-wise) all possible practical issues in IoT Governance?

9. Discuss, how safeguarding of user data and privacy can be achieved in IoT?

Section C (2Q×20M=40 marks)

10. [A] Table 1 shows the smart environment application domains for which an IoT application is to be planned. Fill the details that can contribute in design process of these applications.

	Smart Home/Office	Smart Retail	Smart City
Network Size Users			
Energy			
Internet connectivity			
Data management			
IoT Devices			
Bandwidth requirement			
Example testbeds			

Table 1: Smart environment application domains

[B] Design an IoT based application for ***any one*** of the three domain areas as shown in Table 1. Provide all details of your design along with supporting diagram.

11. Design an IoT System that can be used in Patient Monitoring (Smart Hospitals)? Analyze the following:
    a. Features and specifications,
    b. Wireless standards that can be implemented,
    c. Appropriate network topologies, and
    d. Real-world design constraints.

**** End of Ques. Paper ****

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Section A (4Q×5M=20 Marks)

1. Discuss (point-wise) the technical constraints of a feasible IoT based sensor network?

2. Differentiate between IoT and M2M?

3. Who will govern IoT? Will there be sufficient powers for regulatory authorities to effectively counter-balance large corporations who wish to develop IoT? Discuss briefly.

4. Discuss the following terms with respect to Internet of Things (IoT):
   a) Classification of objects/things;
   b) Classification of sensors;
   c) Cloud Computing
   d) Wireless Sensor Network
   e) Converged network.

Section B (5Q×8M=40 marks)

5. What is a benefit of using a layered model for network communications? Explain the layered architecture of OSI Reference Model, with the functioning of each layer.

6. Define Internet of Things? Draw and explain the basic architecture of IoT Network.

7. Discuss and compare various wired and wireless technologies used in IoT?

8. Discuss (point-wise) all possible legal implications in IoT Governance?

9. Discuss, how safeguarding of user data and privacy can be achieved in IoT?

Section C (2Q×20M=40 marks)

10. [A] Table 1 shows the smart environment application domains for which an IoT application is to be planned. Fill the details that can contribute in design process of these applications.

	Smart Agriculture/Forest	Smart Water	Smart transportation
Network Size Users			
Energy			
Internet connectivity			
Data management			
IoT Devices			
Bandwidth requirement			
Example testbeds			

Table 1: Smart environment application domains

[B] Design an IoT based application for any one of the three domain areas (shown in Table 1). Provide all details of your design along with supporting diagram.

11. Design an IoT System that can be used in Home Security (Smart Homes)? Analyze the following:
    a. Features and specifications,
    b. Wireless standards that can be implemented,
    c. Appropriate network topologies, and
    d. Real-world design constraints.

**** End of Ques. Paper ****