Name:	
Enrolment No:	**UPES** UNIVERSITY WITH A PURPOSE

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, Dec 2019

Course: IOT Devices (Program Elective)
Program: B.Tech ECE   **Semester: V**
Course Code: ECEG 3020   **Time 03 hrs.**
Max. Marks: 100

Instructions: Attempt all questions.

SECTION A

S. No.		Marks	CO
Q 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?	5	CO1
Q 2	Define, discuss and compare the format of Internet Protocols IPV4 and IPV6?	5	CO1
Q 3	Discuss different types of Sensors used in IoT applications?	5	CO1
Q 4	Discuss the following terms with respect to Internet of Things (IoT): a) Wireless Sensor Network, b) Classification of objects/things, c) Classification of sensors.	5	CO2

SECTION B

Q 5	Compare the following wireless standards on the basis of their IEEE specifications, frequency band, nominal range, maximum number of cell nodes and channel bandwidth: a) Bluetooth; b) UWB; c) ZigBee; d) Wifi.	10	CO3
Q 6	Explain the basic architecture of IoT Network. What are the main internal components of an IoT device?	10	CO2
Q 7	Discuss (point-wise) all possible practical implications in IoT Governance?	10	CO4
Q 8	Discuss, how safeguarding of user data and privacy can be achieved in IoT?	10	CO4

SECTION-C

Q 9 A	Name all organizations and International Regulators that defines and governs IoT standards? Discuss the benefits of gaining standardization in IoT?	10	CO3
Q 9 B	Design an IoT System that can be used in **Patient Monitoring (Smart Hospitals)** to have the following features: 1. To log three vital parameters (pulse rate, blood pressure, body temperature) of a patient on cloud database, 2. To initiate an SMS alert to doctor(s), medical assistant(s) and family member(s) in case of medical emergency. Analyze and define the following for such a system: a) Technical specifications – choice of microcontroller, sensors and other peripheral/interfacing devices, b) Wireless standards that can be implemented for cloud connectivity and device-to-device communication, c) Appropriate network topologies for device-to-device communication, and d) Real-world design constraints.	10	CO3
Q 10	Assume that device A, B and C are within range of each other. Device D is within range of device C and device A transmits to device B. Refer the figure 1 for the MAC protocol that has been designed to facilitate smooth device-to-device communication in the IoT environment. *Figure 1: MAC Protocol for IoT Devices* a) Identify and define the working of the MAC protocol shown in figure 1. b) Identify the applications in which the above shown MAC protocol can be used. c) What is the level of synchronization required between devices for the shown MAC protocol? d) Explain the need of MAC protocol in device-to-device communication for a mesh network.	20	CO3