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

Course: IOT Devices (Open Elective)
Program: B.Tech (Electrical, Mining, Mechanical, FSE, Aerospace, Mechatronics, Chemical, APE-Gas, PSE, Civil, Geo-Informatics, ADE, Geo-Sciences, etc.)   **Semester: V**
Course Code: ECEG 3202   **Time 03 hrs.**
Max. Marks: 100

Instructions: Attempt all questions.

SECTION A

S. No.		Marks	CO
Q 1	Elucidate in brief the criteria used to select network media? Which two Internet connection options do not require that physical cables be run on the building?	5	CO1
Q 2	Name any four protocols used for serial and parallel data transmission. Also, compare the advantages of serial vs. parallel data transmission.	5	CO1
Q 3	Can we reasonably translate our experiences and emotions into algorithms? Justify briefly with an example.	5	CO1
Q 4	Discuss the following terms with respect to Internet of Things (IoT): a) Ubiquitous networking, b) Converged network, c) Cloud Computing.	5	CO2

SECTION B

Q 5	Discuss the selection criteria of the following parameters in IoT devices: a) Type of sensors/actuators to be used, b) Type of communication interface, c) Amount of data to be captured and transmitted, d) Frequency of data transportation.	10	CO3
Q 6	Discuss the significance and working of IEEE 802.15.4 protocol in relation with IoT devices?	10	CO2
Q 7	Discuss and define the components of a complete IoT system. Explain with diagram?	10	CO4
Q 8	Elucidate about protocol standardization for IoT. Also, discuss all possible issues with IoT Standardization.	10	CO4

	SECTION-C		

Q 9 A	Calculate the life-time of the sensing node running on Four Alkaline AA Batteries of 700 mAh each and consuming the power on the basis of the following:
	   a) Sensing node is running in full-active mode for 10 hours per day and consuming 110 mW power during full-active mode;
	   b) Sensing node is running in idle mode for 10 hours per day and consuming 60 mW power during idle mode;
	   c) Sensing node is running in sleep mode for 4 hours per day and consuming 150 μW power during sleep mode.
		10	**CO3**

Q 9 B	Design an IoT System that can be used in **Smart Garbage Disposable System (Smart Cities)** to have the following features:
	   1. To detect overflow of large-sized community dustbins,
	   2. To log the details of waste clearance (from large-sized community dustbins) in cloud database for remote monitoring.
	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 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*	**10**	**CO3**
Q 10 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.	**10**	**CO3**