UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December/January 2021

Course: Industrial IoT Applications   **Semester: III**
Program: B. Tech All (SoE)   **Time 03 hrs.**

Course Code: MRIO0203   **Max. Marks: 100**

Instructions:

1. **Attempt all the questions (Theory, Numerical, Case study etc.) on A4 size blank sheets.**
2. **Attempt all questions serially as per question paper.**
3. **Answer should be neat and clean. Draw a free hand sketch for circuits/tables/schematics wherever required.**
4. **You are expected to be honest about each attempt which you make to progress in life**

SECTION A (5 X 4 = 20 Marks)

S. No.	Answer all questions	Marks	CO
Q 1	In RTOS, define state, task and task manager	4	CO3
Q 2	What are the different debugging and modelling techniques available in embedded systems?	4	CO4
Q 3	Differentiate between NTC (Negative Temperature Coefficient) and PTC (Positive Temperature Coefficient) with respect to a thermistor	4	CO1
Q 4	Define kernel in RTOS. Also list the different types of kernels	4	CO1
Q 5	Categorize applications of a Wireless Sensor Networks with respect to monitoring. Give an example for each	4	CO4

SECTION B (4 X 10 = 50 Marks)

Q 6	Differentiate between supervised and unsupervised machine learning with examples	10	CO3
Q 7	In brief, explain how machine learning can be integrated with IIoT for the following applications i) Automotive and Transportation ii) Manufacturing Industries iii) Building and Home automation iv) Oil and Gas Industries	10	CO4
Q 8	In detail explain the technical features of Xbee. Enlist the different applications where Xbee can be used more efficiently than its counter parts.	10	CO4
Q 9	What are the different scheduling algorithms used in RTOS. Explain each in brief	10	CO2

SECTION C (2 X 20 = 20 Marks)

Q 10	Design and RTOS such that it should have three motors and three switches having ON and OFF position and
	    i) Scan the switches for every 10 millisecond and turn the motors ON/OFF accordingly
	    ii) Add one pressure sensor and check the pressure for every 50 millisecond
	    iii) If pressure is greater than 50psi, open a valve and close it as soon as pressure drops to 90psi or below
		20	**CO 3**

Q 11	In the design of Short-range and Long-range wireless protocols, explain and differentiate between
	    i) LoRa WAN
	    ii) Xbee or Zigbee
	    iii) Wi-Fi
	    iv) Bluetooth
		20	**CO4**