Name: Enrolment No:	ⱲUPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

Course: Sensor Actuators and Loops   **Semester: I**
Program: M. Tech ARE   **Time   : 03 hrs.**
Course Code: ECEG7024   **Max. Marks: 100**

Instructions: Attempt all the questions. Assume any missing data.

SECTION A
(5Qx4M=20Marks)

S. No.	Answer all the questions	Marks	CO
1	Why RISC architecture is suitable for a 32-bit microcontroller? Compare it with CISC and highlight the differences	4	CO1
2	What is the difference between NTC and PTC type measurements	4	CO3

3	Illustrate the basic requirement, in terms of type of GPIO pins to interface the following with a microcontroller
	    i) Analog temperature sensor
	    ii) A DC motor
	    iii) A BLDC motor
	    iv) A seven segment display
	    v) A LCD display
		4	CO1

4	Enlist the sensor/actuator required in car dashboard for the following
	    i) Seat belt ON/OFF
	    ii) Automatic sensing of rain and actuating wiper
	    iii) Measuring outdoor temperature and displaying inside the car
		4	CO2

5	In ARM7 what is the role of Thumb and Jazelle modes	4	CO4

SECTION B
(4Qx10M= 40 Marks)

Q	Answer all the questions	Marks	CO
6	What are the different applications of a potentiometer? Differentiate the working of rotary and linear potentiometers	10	CO4
7	Interface 8 LED is at GPIO of a microcontroller. Write a C program with algorithm and flow-chart to display a minimum of 8 different patterns. Assume a controller of your choice from AVR, ARM7 or STM32	10	CO3
8	Illustrate different characteristics of embedded systems with an example for each	10	CO3
9	Highlight the differences between the following. i) Optical vs inductive proximity sensors	10	CO2

	ii) Absolute vs Incremental encoders		
	OR		
	Highlight the differences between the RTD, thermocouple and Thermistor		
	SECTION-C **(2Qx20M=40 Marks)**		
Q	Answer all the questions	**Marks**	**CO**
10	Design a real-time temperature monitoring system by connecting temperature sensor and LCD with microcontroller. Display the instantaneous calibrated value of temperature on LCD. Draw the complete flowchart along with algorithm and the C code. Assume a controller of your choice from AVR, ARM7 or STM32	**20**	**CO4**

11	In the design of an embedded computing application, highlight the importance of the following with examples
	    i) Harvard vs Von-Neumann architecture
	    ii) Use of LVDT for industrial applications
	    iii) DC vs Stepper motor
	    iv) Use of L293D for motors
	OR
	In the design of an embedded computing application, highlight the importance of the following with examples
	    i) Flash memory
	    ii) Contrast adjustment method for LCD
	    iii) Timers and Counters in microcontrollers
	    iv) Use of temperature sensors for industrial applications
	    v) Use of 8-bit, 16-bit and 32-bit microcontrollers
		20	**CO3**