Name: **Enrolment No:**	

UPES

End Semester Examination, December 2023

Course: Sensors-Actuator Loops **Semester: I**
Program: M.Tech (Robotics Engineering) **Time : 03 hrs.**
Course Code: ECEG7024 **Max. Marks: 100**

Instructions: Answer all the sections

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Distinguish between sensors, transducers and actuators	**4**	**CO1**
Q 2	Illustrate the potentiometer and its principles	**4**	**CO1**
Q 3	Explore the torque-slip and torque-speed characteristics of the three phase induction motors.	**4**	**CO2**
Q 4	Demonstrate the effect of temperature on the sensor whose measured electrical resistance varies with changes in strain.	**4**	**CO3**
Q 5	Discuss the interfacing of touch sensor, which measures the touch based on electrical disturbance from a change in capacitance with the microcontroller.	**4**	**CO4**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Examine the flowmeters utilized in heavy industries for metering, measurement and control of most steam, gas and liquid flow based on the principle of von Karman effect (OR) Examine the flowmeters utilized to measure velocity of the liquid with ultrasound technology and ideal for use in applications where it is not possible or desirable to insert a probe into the fluid, such as in food and pharmaceutical processing.	**10**	**CO1**
Q 7	Demonstrate the actuating devices and their types which are governed by Faraday's law of Electromagnetic induction and used in applications such as protective relays in circuit breakers	**10**	**CO2**

Q 8	Analyze the Motor equations of motors having electric current source as unidirectional with flow of charge in one direction and their characteristics.	**10**	**CO2**
Q 9	Discuss the principle of sensing devices used in an industrial setup to help engineers understand a machine's stability and enable them to monitor for any unwanted forces/vibrations by the measurement of the vibration, or acceleration of motion, of a structure. Execute the interfacing of these devices with microprocessors.	**10**	**CO3**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	Explore the sensing devices utilized to measure the amount of force exerted over an area along with its various and their utilization in real life	**20**	**CO3**
Q 11	Analyze the design of the interface circuits that require analog and digital signals as inputs and execute their interfacing with the microcontroller. (OR) Analyze the design of the IC sensors used as critical component for determination of overall heat transfer coefficients with temperature difference measurements and the sensors utilized to measure and monitor the amount of water present in the surrounding air and their interfacing with the microcontroller.	**20**	**CO4**