Name:

Enrolment No:

UPES

End Semester Examination, May 2024

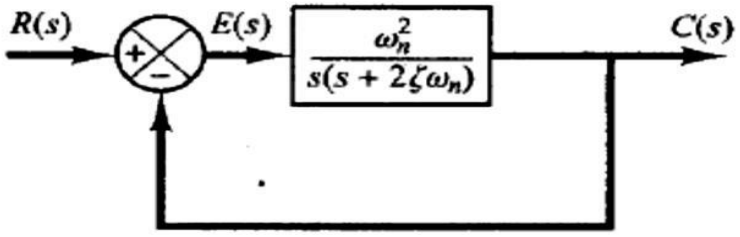
Course: Process Instrumentation and Control Engineering **Semester: VIII**

Program: B.Tech (Fire & Safety Engineering) **Time: 03 hrs.**

Course Code: ECEG 4039 **Max. Marks: 100**

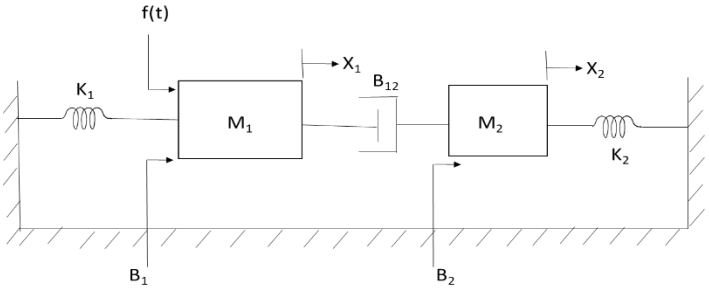
Instructions: All questions are compulsory to attempt.

SECTION A
(5Qx4M=20Marks)

S. No.	Answer all the questions.	Marks	CO
Q 1	Brief about the factors that needed while selecting the measuring device.	**4**	**CO2**
Q 2	Compare and contrast a thermocouple with a thermistor as a temperature transducer	**4**	**CO3**
Q 3	A thermocouple gives the following readings for temperature. Determine its sensitivity. Temperature (^oC): 5, 8, 11, 14, 17 Voltage (mV): 0.3, 0.5, 0.7, 0.9, 1.1	**4**	**CO2**
Q 4	For the block diagram shown in fig. 1. Find the value of transfer function Classify the system output behavior based on the value of damping ratio. 	**4**	**CO3**
Q 5	List any five commonly used input signals for control loop testing.	**4**	**CO2**

SECTION B
(4Qx10M= 40 Marks)

Q 6	Explain the working of a pitot tube with the help of a diagram. What is the mathematical expression used for estimation of velocity using a pitot tube?	**10**	**CO4**
Q 7	Between a pneumatic and a hydraulic controller which one more accurate? List comparative features of the two types of controllers.	**5x2= 10**	**CO3, CO5**

Q 8	Give classifications of industrial controllers. Which controller is best suited for a process which requires frequent shut-down and start-ups and why?	**5x2= 10**	**CO1**
Q 9	Explain the following terms: (i) Active measuring instrument (ii) Passive measuring instrument (iii) Sensitivity of an instrument (iv) Zero drift OR Explain a simple thermal system with the help of a diagram and define capacitance and resistance of a thermal system.	**10**	**CO3**
SECTION-C (2Qx20M=40 Marks)			
Q 10	Mention any one graphical method to perform frequency response analysis. What is a Bode plot? Explain in detail the procedure to obtain the magnitude plot, phase plot, and to determine the gain margin and phase margin from the Bode plot.	**20**	**CO2**
Q 11	Explain the terms with suitable diagram: (i) Speed of Response (ii) Fidelity (iii) Measuring Lag (iv) Dynamic Error (v) Sensitivity OR Write the differential equations governing the mechanical system shown in fig. and determine its transfer function.  	**4x5= 20**	**CO4**