Name:		
Enrolment No:		

UPES
End Semester Examination, December 2023

Course: Instrumentation and Control   Semester: VII
Program: B.Tech. – Mechanical Engg   Time   : 03 hrs.
Course Code: ECEG4036   Max. Marks: 100

Instructions: All questions are to be answered

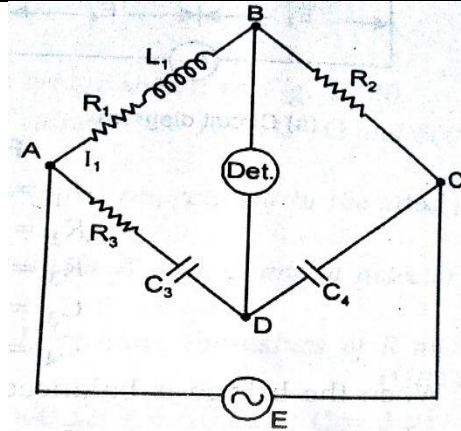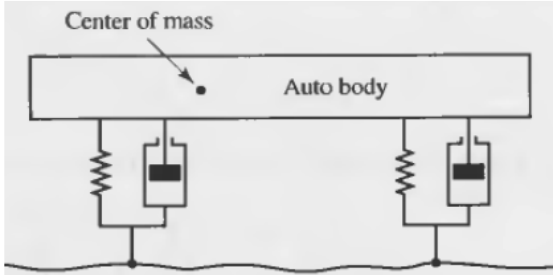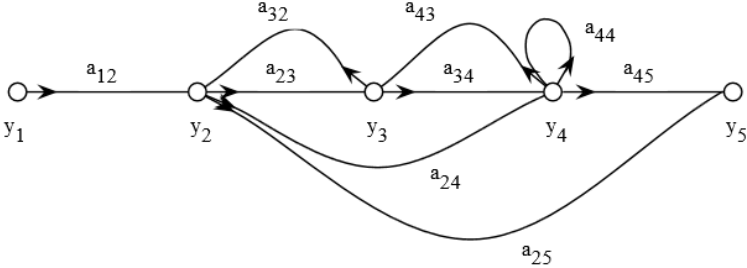|	SECTION A (5Qx4M=20Marks)		
S. No.		**Marks**	**CO**
Q 1	Enumerate the statement "Un – Calibrated Measuring instrument do not have any sanctity"	4	CO1
Q 2	Describe the working principle of a Ph meter	4	CO1
Q 3	Illustrate the Various Temperature transducers and their applicability	4	CO1
Q 4	A potentiometer is provided with 50 turns per mm. The gearing arrangement is such that the motion of the main shaft by one resolution crosses 4 resolutions. Determine the potentiometer's resolution.	4	CO1
Q 5	Describe the working principle of Ultrasonic flowmeter	4	CO1
	SECTION B (4Qx10M= 40 Marks)		

Q 6	The bridge shown in Figure: 1 is used to measure the properties of a sample of a sheet at 2 kHz. At balance, arm AB is the test specimen; arm BC is R_2 =100Ω; arm CD is C_4 = 0.1 µF and arm DA is R_3 =834Ω in series with C_3 = 0.124 µF.
	    1. Name the bridge and list the parameters that can be used by this bridge.
	    2. Derive the expression for the measurement of unknown variables.
	    3. Calculate the effective impedance of specimen under test conditions.
	    4. Calculate the Q factor of the specimen under test.
		10	CO4

Figure:1

Q 7	Use Op-Amp to design a
	   i) Follower
	   ii) Integrator
		10	CO4

Q 8	Find the transfer function C(s)/R(s) for the block diagram given in figure 2 using block diagram reduction technique. Fig. 2	10	CO4
Q 9	A strain gauge with a gauge factor of 2 is subjected to stress of 1000 kg/cm2. E = 2 × 106 kg/cm2. Calculate the percentage change in resistance of the strain gauge. Find Poisson' s ratio. **OR** A copper resistor having a resistance of 15 Ω at 20°C is used to indicate the temperature of a machine. Determine the limiting value of resistance k if the maximum temp is 175°C. Th e temperature coefficient. (T.C.) = 0.00425 at 20°C.	10	CO4

SECTION-C **(2Qx20M=40 Marks)**

Q 10	Develop a mathematical model of below mentioned Automobile suspension system. Center of mass — Auto body	20	CO5
Q 11	Signal flow graph is given for a system in figure 3, find the transfer function using Mason's gain formula. Fig. 3	20	CO4