U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VII**

Branch: Mechanical Engineering **Duration: 3 hrs.**

Course Code: 22ME7PCMCT **Max Marks: 100**

Course: Mechatronics

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	***CO***	***PO***	**Marks**
1	a)		Define Mechatronics; Explain the classification of mechatronics	*CO1*	*PO1*	**06**
	b)		Discuss the components of Mechatronic system	*CO1*	*PO1*	**08**
	c)		Elaborate the key factors that govern the design of mechatronic system	*CO1*	*PO1*	**06**
			OR			
2	a)		Identify the elements of measurement system in the following i) A mercury in glass thermo meter ii) A bourdon pressure gauge	*CO1*	*PO1*	**06**
	b)		Distinguish between open loop and closed loop control systems	*CO1*	*PO1*	**06**
	c)		Discuss the functioning of mechatronic based automatic camera	*CO1*	*PO1*	**08**
			UNIT - II			
3	a)		Discuss the in detail the classification of transducers	*CO2*	*PO1*	**06**
	b)		Discuss with neat sketch the working principle of a sensor used for the measurement of proximity & displacement for non - conducting objects	*CO2*	*PO1*	**06**
	c)		Explain S-R flip-flop as a contact bounce eliminator	*CO2*	*PO1*	**08**
			OR			
4	a)		Explain the performance terminologies of transducers in detail	*CO2*	*PO1*	**10**
	b)		Explain the working principle of Pyroelectric sensor with a neat sketch	*CO2*	*PO1*	**06**
	c)		Write short notes on factors to be considered for the selection of a sensor	*CO2*	*PO1*	**04**
			UNIT - III			
5	a)		Define Signal Conditioning; Discuss the significance of signal conditioning process with necessary examples	*CO3*	*PO1*	**10**

		b)	Derive an expression for the voltage gain factor of differential amplifier	*CO3*	*PO1*	**07**
		c)	An inverting amplifier has an input resistance of 2 kilo ohms. Determine the feedback resistance needed to give a voltage gain of 100	*CO3*	*PO1*	**03**
			OR			
	6	a)	Explain PWM technique with example.	*CO3*	*PO1*	**05**
		b)	Explain the working principle of counter method analog to digital converter	*CO3*	*PO1*	**07**
		c)	Realize 4:1 Multiplexer by highlighting minimum two applications	*CO3*	*PO1*	**08**
			UNIT - IV			
	7	a)	Explain the working principle of a thyristor along with V-I characteristics	*CO4*	*PO2*	**08**
		b)	A thyristor device can be fired with dv/dt of 170 V / μs. If the capacitive current flowing through the junction is 5 mA, calculate the equivalent capacitance of the depletion layer	*CO4*	*PO2*	**04**
		c)	Explain with the help of the block diagram and Torque – speed characteristics, the speed regulation of a D.C motor	*CO4*	*PO2*	**08**
			OR			
	8	a)	Distinguish between thyristors and triacs	*CO4*	*PO2*	**05**
		b)	Discuss two major methods of chopper control techniques	*CO4*	*PO2*	**08**
		c)	A chopper circuit drives an inductive load from 220 d.c. supply. The load resistance is 4. If the average load current is 30 A and the operating frequency is 400 Hz compute ON period and OFF period of chopper	*CO4*	*PO2*	**04**
		d)	A thyristor having equivalent capacitance of junction layer of revered biased junction as 35 pF, has a capacitive current of 5 mA. Calculate the value of dv/dt that can trigger the device	*CO4*	*PO2*	**03**
			UNIT - V			
	9	a)	Define Artificial Intelligence and explain different types of AI	*CO5*	*PO1*	**10**
		b)	Discuss AI based pick and place robot	*CO5*	*PO1*	**10**
			OR			
	10	a)	Discus different types of reasoning used in AI	*CO5*	*PO1*	**10**
		b)	Discuss AI based hard disc drive	*CO5*	*PO1*	**10**

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