U.S.N.										

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

Autonomous Institute Affiliated to VTU

August 2024 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Electronics and Instrumentation Engineering **Duration: 3 hrs.**
Course Code: 23EI3PCSMT **Max Marks: 100**
Course: Sensors and Measurement Techniques

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

REAPPEAR EXAMS 2023-24

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)		Enumerate the advantages of Electronic instruments over mechanical and electrical instruments	*CO1*	*PO1*	**05**
	b)		A 0-150 V voltmeter has a guaranteed accuracy of 1 percent of full scale reading. The voltage measured by this instrument is 75 V. Calculate the limiting error in percent.	*CO1*	*PO1* *PO3*	**05**
	c)		With the help of well-labeled diagrams representing the voltages and currents in the balanced bridge at steady-state, derive the expression for unknown parameters of Maxwell Inductance Capacitance Bridge.	*CO1*	*PO1* *PO2*	**10**
			UNIT – II			
2	a)		Explain the working of Pyro-electric sensor and justify how a change in temperature (heating or cooling) leads to the generation of a voltage with relevant figures.	*CO1* *CO2*	*PO1* *PO2*	**08**
	b)		Describe how hygristors can be used to measure humidity with the suitable diagrams	*CO2* *CO3*	*PO1*	**06**
	c)		Derive the voltage developed between electrodes in piezoelectric sensor formed by applying electrodes to a polled crystalline material	*CO2* *CO3*	*PO1* *PO3*	**06**
			OR			
3	a)		Derive the output equation of the capacitor working as a water level sensor. Explain the related concept and give the sensor capacitance with relevant sketches.	*CO1*	*PO1*	**07**
	b)		With a neat circuit diagram, explain the principle behind the working of the LVDT sensor.	*CO3*	*PO1* *PO2*	**07**

		c)	Describe the basic principle of an optical liquid level detector that utilizes the change in refractive index	*CO3* *CO4*	*PO1*	**06**
			UNIT - III			
	4	a)	Explain how a fiber-optic interferometric microphone translates the movement of the copper diaphragm into a change in light intensity	*CO3* *CO4*	*PO1* *PO5*	**08**
		b)	Chilled-mirror dew-point sensor with an optical bridge is considered as accurate method of measurement. Justify the statement with suitable diagram.	*CO3*	*PO1* *PO2*	**08**
		c)	Explain how microphones are different from hydrophones	*CO4*	*PO1*	**04**
			OR			
	5	a)	Enumerate the advantages of semiconductor materials for radiation detection	*CO3* *CO4*	*PO1*	**05**
		b)	Describe the concept and purpose of a lithium-drifted detector with suitable diagram	*CO3*	*PO1* *PO3*	**07**
		c)	Describe the overall process of how the PhotoMultiplier Tube (PMT) amplifies the weak light signal from the scintillator into a measurable electrical current.	*CO5*	*PO1*	**08**
			UNIT – IV			
	6	a)	Explain the general structures of contact and non-contact type temperature sensors with diagrams	*CO5*	*PO1*	**06**
		b)	Suggest the correct connection of a thermocouple to an electronic circuit comprising of a semiconductor reference sensor (LM35DZ).	*CO5* *CO6*	*PO1*	**08**
		c)	Describe the method of Fluoroptic method of temperature measurement with relevant diagrams.	*CO5*	*PO1*	**06**
			UNIT – V			
	7	a)	Explain the concept of electrical guarding, including the driven shield method. How does this approach reduce leakage current reaching the input terminal?	*CO5* *CO6*	*PO1* *PO2*	**06**
		b)	Explain the two-wire 20-mA analog data transmission with diagram.	*CO6*	*PO1*	**06**
		c)	What is the purpose of an interface circuit and why is it needed between a sensor and a processing device?	*CO5* *CO6*	*PO1* *PO5*	**08**

REAPPEAR EXAMS 2023-24

****