SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)
(Accredited by NAAC with "A+" Grade & ISO 9001 : 2008 Certified Institution)

QUESTION BANK (DESCRIPTIVE)

Subject with Code : TRANSDUCERS AND SENSORS(23EC0442)
Course & Branch: B. Tech –Common to all
Year & Semester: IV- B. Tech. & I-Semester **Regulation:**R23

UNIT –I

1.	List any two applications of an LVDT.	**[L1][CO1][2M]**
2.	Define Gauge factor	**[L1][CO1][2M]**
3.	Differentiate between active and passive transducers.	**[L2][CO1][2M]**
4.	Define strain in strain gauge	**[L1][CO1][2M]**
5.	State the piezoelectric effect.	**[L1][CO1][2M]**

1	a)	Explain the Dynamic characteristics of the measurement system.	**[L2][CO1][3M]**
	b)	Explain the various Static characteristics of the measurement system.	**[L2][CO1][7M]**
2		Describe the construction and working principle of LVDT with a neat diagram	**[L2][CO1][10M]**
3	a)	Define transducer? Explain classification of transducers	**[L2][CO1][6M]**
	b)	Explain the advantages of electrical transducer	**[L2][CO1][4M]**
4		Describe the construction and working principle of piezo electric transducers	**[L2][CO2][10M]**
5		Explain the construction and principle of operation of resistive strain gauge with neat sketch and list out its applications.	**[L2] [CO1] [10M]**
6		Explain general configuration and its functional description of measuring instrument	**[L2][CO1[10M]**
7		What is a capacitive transducer? Classify capacitive transducers and explain any two types with neat sketches and applications	**[L2][CO1][10M]**
8		What is an RVDT? Explain its construction and principle of operation, advantages, disadvantages, and industrial applications	**[L2][CO1][10M]**
9	a)	Explain the working principles of vibrometers, with neat diagrams	**[L2][CO1][5M]**
	b)	Explain the operation of accelerometers used in vibration measurement systems. Discuss their practical applications.	**[L2][CO1][5M]**
10		Explain various errors existing in the instrumentation	**[L2][CO1][10M]**

UNIT –II

TEMPERATURE TRANSDUCERS

1	Define temperature calibration.	**[L1][CO2]**	**[2M]**
2	State the working principle of a bimetallic thermometer.	**[L1][CO2]**	**[2M]**
3	What is Seebeck effect and write the Seebeck effect equation used in thermocouples.	**[L1][CO2]**	**[2M]**
4	Draw the characteristics of NTC and PTC thermistors	**[L2][CO2]**	**[2M]**
5	Define a Hall Effect transducer.	**[L1][CO2]**	**[2M]**

1	**a**	Explain temperature standards and classify them with suitable examples.	**[L2][CO2]**	**[5M]**
	b	Describe the calibration procedure of a temperature measuring instrument.	**[L2][CO2]**	**[5M]**
2	**a**	Describe the working principle of fluid expansion type temperature transducers.	**[L2][CO2]**	**[5M]**
	b	Explain the construction and working of thermometer with neat diagram.	**[L2][CO2]**	**[5M]**
3		Briefly explain the construction and operating principle of a bimetallic strip temperature transducer and discuss its applications.	**[L2][CO2]**	**[10M]**
4		What is thermistor? Explain working and operating characteristics of thermistors.	**[L2][CO2]**	**[10M]**
5		Explain the construction and operation of a Resistance Temperature Detector (RTD) with a suitable diagram.	**[L2][CO2]**	**[10M]**
6		With a neat diagram, explain the Seebeck effect and discuss the working principle, of thermocouples.	**[L3][CO2]**	**[10M]**
7	**a**	Describe the working principle of a Hall Effect transducer with a suitable diagram.	**[L2][CO2]**	**[5M]**
	b	Briefly explain digital transducers with a neat block diagram.	**[L2][CO2]**	**[5M]**
8		Define proximity device. Explain the construction and working mechanism of proximity sensor with neat diagram.	**[L2][CO2]**	**[10M]**
9		What is biosensor? Explain the working of biosensors with a neat block diagram. Discuss its applications.	**[L2][CO2]**	**[10M]**
10	**a**	Briefly explain about smart sensor with a neat block diagram.	**[L2][CO2]**	**[5M]**
	b	With a neat diagram, explain the working principle of a piezoelectric sensor.	**[L2][CO2]**	**[5M]**

UNIT –III

FLOW TRANSDUCERS

1.	State Bernoulli's principle and write its mathematical equation.	**[L1] [CO3] [2M]**
2.	Define the continuity equation and explain its significance in flow measurement.	**[L2] [CO3] [2M]**
3.	What is a Rotameter? Mention any two advantages of a Rotameter.	**[L1] [CO3] [2M]**
4.	Define an Electromagnetic Flow Meter and mention its principle of operation.	**[L1] [CO3] [2M]**
5.	Differentiate between an Orifice Plate and a Venturi Tube with respect to pressure loss and construction.	**[L2] [CO3] [2M]**

1	a)	Explain Bernoulli's theorem and derive the continuity equation used in flow measurement systems.	**[L2] [CO3] [5M]**
	b)	A fluid flows through a pipe of diameter 20 cm at a velocity of 4 m/s. Determine the velocity of flow in a section where the diameter reduces to 10 cm using the continuity equation.	**[L3] [CO3] [5M]**
2		Explain the construction, working principle, advantages, disadvantages, and applications of an Orifice Plate flow meter with a neat sketch.	**[L2] [CO3] [10M]**
3	a)	Explain the construction and operation of a Nozzle Plate flow meter with a neat diagram.	**[L2] [CO3] [5M]**
	b)	Compare Orifice Plate and Nozzle Plate flow meters in terms of pressure loss, accuracy, and applications.	**[L4] [CO3] [5M]**
4		Describe the construction and working principle of a Venturi Tube. Derive the expression for discharge through a Venturi meter.	**[L2] [CO3] [10M]**
5	a)	Explain the principle of operation and construction of a Rotameter with a neat sketch.	**[L2] [CO3] [5M]**
	b)	Discuss the factors affecting the performance and accuracy of a Rotameter.	**[L4] [CO3] [5M]**
6		Explain the construction, working principle, advantages, and applications of Anemometers used for flow measurement.	**[L2] [CO3] [10M]**
7	a)	Explain the principle and construction of an Electromagnetic Flow Meter with a neat diagram.	**[L2] [CO3] [5M]**
	b)	A conducting liquid flows through an electromagnetic flow meter having an electrode spacing of 0.1 m and magnetic flux density of 0.4 T. If the flow velocity is 3 m/s, determine the induced emf.	**[L3] [CO3] [5M]**
8		Explain the construction and working of an Impeller Meter. Discuss its advantages and limitations.	**[L2] [CO3] [10M]**
9	a)	Explain the principle and operation of a Turbine (Turbid) Flow Meter with a neat sketch.	**[L2] [CO3] [5M]**
	b)	Compare Turbine Flow Meter and Electromagnetic Flow Meter with respect to principle, accuracy, and applications.	**[L4] [CO3] [5M]**
10		Compare Orifice Plate, Venturi Tube, Rotameter, and Electromagnetic Flow Meter based on construction, operating principle, pressure loss, accuracy, and applications.	**[L4] [CO3] [10M]**

UNIT –IV

PRESSURE TRANSDUCERS

1	What is Pressure Transducer?	**[L1][CO5]**	**[2M]**
2	What are the limitations of U-tube manometer?	**[L1][CO5]**	**[2M]**
3	List any two advantages of Diaphragm gauges	**[L1][CO5]**	**[2M]**
4	State the working principle of a Bourdon tube	**[L2][CO5]**	**[2M]**
5	Define Elastic transducer	**[L1][CO5]**	**[2M]**

1	**a**	State the standards of pressure transducers and explain them briefly	**[L2][CO5]**	**[5M]**
	b	What is the necessity of calibration of pressure transducers and write the calibration Procedure	**[L1][CO5]**	**[5M]**
2	**a**	What are the different types of pressure transducers? Explain Briefly	**[L1][CO5]**	**[5M]**
	b	How does a piezometer measures the pressure of liquid?	**[L2][CO5]**	**[5M]**
3		Describe the construction and working of U-Tube Manometer.	**[L3][CO5]**	**[10M]**
4		With a neat diagram Describe the Operation of a Well-type manometer	**[L2][CO5]**	**[10M]**
5		Classify the Elastic transducers and Explain the construction and working of Bourdon tube	**[L2][CO5]**	**[10M]**
6		Explain the construction and working of strain gauge pressure transducer	**[L3][CO5]**	**[10M]**
7		Describe the construction and Operation of Diaphragm Pressure Transducer	**[L3][CO5]**	**[10M]**
8		Explain the construction and working of Bellows type pressure gauge	**[L2][CO5]**	**[10M]**
9		What is the working principle of capacitive type pressure transducer ? Explain the construction and operation	**[L2][CO5]**	**[10M]**
10	**a**	Explain high pressure measurement by using Bridgman gauge	**[L2][CO5]**	**[5M]**
	b	Write a short note on Thermal conductivity gauge	**[L1][CO5]**	**[5M]**

UNIT –V

FORCE AND SOUND TRANSDUCERS

1.	Define a pneumatic load cell.	**[L1] [CO5] [2M]**
2.	Explain Pascal's law used in hydraulic load cells.	**[L2] [CO5] [2M]**
3.	Calculate the pressure generated when a force of 5000 N is applied on an area of 0.002 m^2.	**[L3] [CO5] [2M]**
4.	Differentiate between proving ring and load cell.	**[L4] [CO5] [2M]**
5.	Assess the advantages of gyroscopes in navigation systems.	**[L5] [CO5] [2M]**

1	a)	Define a proving ring and identify its major components.	**[L1] [CO5] [5M]**
	b)	Discuss the working principle of a proving ring with a neat sketch.	**[L2] [CO5] [5M]**
2		Compare hydraulic and pneumatic load cells with respect to construction, working principle, advantages, and applications.	**[L2] [CO5] [10M]**
3	a)	State Pascal's law and discuss its significance in hydraulic load cells.	**[L2] [CO5] [5M]**
	b)	A hydraulic load cell has a piston area of 0.0015 m^2 and is subjected to a force of 6 kN. Determine the pressure developed.	**[L3] [CO5] [5M]**
4		With a neat diagram, discuss the construction and operation of a pneumatic load cell.	**[L2] [CO5] [10M]**
5		Analyse the construction and working of an octagonal ring dynamometer for force measurement.	**[L4] [CO5] [10M]**
6	a)	Differentiate the measurement of vertical and horizontal forces in an octagonal ring dynamometer.	**[L4] [CO5] [5M]**
	b)	Explain the positioning of strain gauges at 50.4° and 90° and how they minimize cross-sensitivity between the two force measurements.	**[L4] [CO5] [5M]**
7		Analyse the principle of angular momentum in gyroscopes and examine their role in navigation systems.	**[L4] [CO5][10M]**
8	a)	Illustrate the construction and operation of a gyroscope.	**[L2] [CO5] [5M]**
	b)	Assess the advantages and limitations of gyroscopes in practical applications.	**[L5] [CO5] [5M]**
9		Discuss the characteristics of sound and their significance in sound measurement systems.	**[L2] [CO5] [10M]**
10		A force of 12 kN is applied to a hydraulic load cell having an effective area of 0.002 m^2. Calculate the pressure developed and discuss the operating principle of the load cell.	**[L3] [CO5] [10M]**