

Enrollment No.....



Faculty of Engineering
End Sem (Even) Examination May-2022

ME3EM05 Sensor & Actuators

Programme: B.Tech.

Branch/Specialisation: ME

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. Function of transducer is to convert- 1
 (a) Electrical signal into non-electrical quantity
 (b) Non-electrical quantity into electrical signal
 (c) Electrical signal into mechanical quantity
 (d) All of these
- ii. The linear variable differential transformer transducer is- 1
 (a) Inductive transducer (b) Non-inductive transducer
 (c) Capacitive transducer (d) Resistive transducer
- iii. The instruments used for the measurement of pressure is/are- 1
 (a) Bellows (b) Diaphragms
 (c) Fiber optic pressure sensors (d) All of these
- iv. Operation of thermocouple is governed by _____. 1
 (a) Peltier effect (b) Seebeck effect
 (c) Thomson effect (d) All of these
- v. Optical pyrometer is used to measure- 1
 (a) Light Intensity (b) Low temperature
 (c) High temperature (d) Both (a) and (c)
- vi. The electromagnetic flow meter must be- 1
 (a) Mounted vertically
 (b) Mounted horizontally
 (c) Rotated at constant speed to develop proper emf
 (d) Can be mounted in any position
- vii. Which of the following represents Reynolds number for laminar flow? 1
 (a) Less than 2000 (b) Greater than 4000
 (c) Infinite (d) None of these

P.T.O.

- viii. Which of the following represents the correct relation between flow rate and area of pipe? 1
 (a) Direct proportionality (b) Inverse proportionality
 (c) Equal (d) None of these
- ix. What is the function of a butterfly valve? 1
 (a) On/ off control (b) Flow regulation
 (c) Pressure control (d) Hydraulic control
- x. In globe valves, the flow rate control is determined by _____. 1
 (a) Size of the opening (b) Lift of the valve plug
 (c) Pressure difference (d) Gravity
- Q.2 i. What is sensor? 2
 ii. List and explain the characteristics of sensor. 3
 iii. What is an LVDT? What are the parameters that can be measured by this? Describe with neat diagram and output characteristics the principle of its construction and operation. 5
- OR iv. Explain the construction and working principle of potentiometer. 5
 Evaluate its application as motion sensor.
- Q.3 i. Define gauge factor of strain gauge. 2
 ii. List the different type of manometers for pressure measurement and explain the U tube manometer detail. 8
- OR iii. Draw the diagram of McLeod gauge and explain its working in detail. 8
- Q.4 i. What is thermocouple? Explain the working principle of thermocouple. 3
 ii. Summarize the construction, principle, working of thermistor and its resistance temperature characteristics. 7
- OR iii. Explain Ultrasonic Liquid Level Measurement System in detail. 7
- Q.5 i. What is Reynolds number, how we can identify turbulent & laminar flow. 4
 ii. Draw the diagram of turbine flow meter and explain its working. 6
- OR iii. Explain any one method of humidity measurement with diagram. 6
- Q.6 Write short note on any two:
 i. Control Valve. 5
 ii. Pneumatic actuators. 5
 iii. I/P & P/I converters. 5

Marking Scheme
ME3EM05 Sensor & Actuators

Q.1	i.	Function of transducer is to convert-		1
		(b) Non-electrical quantity into electrical signal		
	ii.	The linear variable differential transformer transducer is-		1
		(a) Inductive transducer		
	iii.	The instruments used for the measurement of pressure is/are-		1
		(d) All of these		
	iv.	Operation of thermocouple is governed by _____.		1
		(b) Seebeck effect		
	v.	Optical pyrometer is used to measure-		1
		(c) High temperature		
Q.2	vi.	The electromagnetic flow meter must be-		1
		(d) Can be mounted in any position		
	vii.	Which of the following represents Reynolds number for laminar flow?		1
		(a) Less than 2000		
	viii.	Which of the following represents the correct relation between flow rate and area of pipe?		1
		(a) Direct proportionality		
	ix.	What is the function of a butterfly valve?		1
		(b) Flow regulation		
	x.	In globe valves, the flow rate control is determined by _____.		1
		(b) Lift of the valve plug		
Q.2	i.	Definition of sensor		2
	ii.	List of sensors		3
		0.5 mark for each name (0.5 mark * 3)	1.5 marks	
		Characteristics of sensor	1.5 marks	
	iii.	Definition of LVDT	1 mark	5
		Parameter can be measured	0.5 mark	
		Diagram	1 mark	
		Characteristics	0.5 mark	
		Construction and operation.	2 marks	
	OR iv.	Principle of potentiometer.		5
		Construction	1 mark	
		Working Principle	3 marks	
		Application	1 mark	

Q.3	i.	Definition of gauge factor of strain gauge.		2
	ii.	List different type of manometers for pressure measurement		8
			2 marks	
OR		Diagram	2 marks	
		Explanation	4 marks	
	iii.	McLeod gauge and explain		8
		Diagram	4 marks	
		Explanation of its working	4 marks	
Q.4	i.	Thermocouple		3
		Principle	2 marks	
		Explain	1 mark	
	ii.	Thermistor		7
		Construction	1 mark	
		Principle	1 mark	
		Working	3 marks	
OR		Characteristics.	2 marks	
	iii.	Ultrasonic Liquid Level Measurement System		7
		Diagram	3 marks	
		Explanation	4 marks	
Q.5	i.	Definition of Reynolds number	2 marks	4
		Difference b/w turbulent & laminar flow	2 marks	
	ii.	Diagram of turbine flow meter	2 marks	6
		Its working	4 marks	
OR	iii.	Any one method of humidity measurement	4 marks	6
		Diagram	2 marks	
Q.6		Write short note on any two:		
	i.	Control Valve.		5
		As per explanation		
	ii.	Pneumatic actuators.		5
		As per explanation		
	iii.	I/P & P/I converters.		5
		As per explanation		
