

Total No. of Questions: 6

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Enrollment No.....



Faculty of Engineering
End Sem (Even) Examination May-2019
ME3EM05 Sensors and 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. | Which sensor used to measure the displacement: | 1 |
| | (a) Thermometers (b) Thermocouple | |
| | (c) RTD (d) LVDT | |
| ii. | Which sensor used to measure the acceleration: | 1 |
| | (a) Strain gauge (b) Accelerometer | |
| | (c) RTD (d) LVDT | |
| iii. | Which sensor used to measure the pressure: | 1 |
| | (a) Strain gauge (b) Accelerometer | |
| | (c) Manometers (d) McLeod gauge | |
| iv. | Which sensor used to measure the vacuum: | 1 |
| | (a) Strain gauge (b) Accelerometer | |
| | (c) Manometers (d) McLeod gauge | |
| v. | Which sensor used to measure the temperature: | 1 |
| | (a) RTD (b) Accelerometer | |
| | (c) Gauge glass (d) McLeod gauge | |
| vi. | Which sensor used to measure the level: | 1 |
| | (a) RTD (b) Accelerometer | |
| | (c) Gauge glass (d) McLeod gauge | |
| vii. | _____ is a dimensionless number used in fluid mechanics to indicate whether fluid flow past a body or in a duct is steady or turbulent: | 1 |
| | (a) Reynolds number (b) Laminar flow | |
| | (c) Velocity profile (d) Turbulent flow. | |

P.T.O.

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- viii. The flow of a fluid when each particle of the fluid follows a smooth path, paths which never interfere with one another is known as: **1**
 (a) Reynolds number (b) Laminar flow
 (c) Velocity profile (d) Turbulent flow
- ix. A _____ consists of a cylinder or fluid motor that uses hydraulic power to facilitate mechanical operation: **1**
 (a) Pneumatic actuators (b) Hydraulic actuators
 (c) Solenoid (d) Globe valves.
- x. _____ are the devices used for converting pressure energy of compressed air into the mechanical energy to perform useful work: **1**
 (a) Pneumatic actuators (b) Hydraulic actuators
 (c) Solenoid (d) Globe valves.
- Q.2 i. State the purpose of using potentiometer in displacement sensor? **2**
 ii. What are the types of strain gauge? **3**
 iii. Explain the following in detail: **5**
 (a) IR Sensor (b) IR Proximity sensor.
- OR iv. Explain the following with suitable diagram in detail: **5**
 (a) Characteristics of Sensors (b) Accelerometers.
- Q.3 i. Define force. **2**
 ii. Define torque and pressure. **3**
 iii. Explain the procedure with diagram to measure the pressure using U tube and Well type manometers. **5**
- OR iv. Explain the following with suitable diagram in detail: **5**
 (a) Bourdon tubes (b) Bridgeman Gauge.
- Q.4 i. What are the units used to measure the temperature? **2**
 ii. Enlist the different types of thermometers. **3**
 iii. Draw and explain the float & displacer type level sensors. **5**
- OR iv. Explain the ultrasonic & microwave level sensors with diagram. **5**
- Q.5 i. Define fluid. **2**
 ii. Explain turbulent & laminar flow. **3**

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- iii. Explain the differential pressure flow meters and variable area flow meters with diagram. **5**
- OR iv. Explain the Electromagnetic flow meter and target flow meter. **5**
- Q.6 Write short note on any two:
- i. Pneumatic actuators. **5**
 ii. Hydraulic actuator **5**
 iii. I/P & P/I converters. **5**

Marking Scheme

ME3EM05 Sensors and Actuators

Q.1	i.	Which sensor used to measure the displacement: (d) LVDT	1
	ii.	Which sensor used to measure the acceleration: (b) Accelerometer	1
	iii.	Which sensor used to measure the pressure: (c) Manometers	1
	iv.	Which sensor used to measure the vacuum: (d) McLeod gauge	1
	v.	Which sensor used to measure the temperature: (a) RTD	1
	vi.	Which sensor used to measure the level: (c) Gauge glass	1
	vii.	_____ is a dimensionless number used in fluid mechanics to indicate whether fluid flow past a body or in a duct is steady or turbulent: (a) Reynolds number	1
	viii.	The flow of a fluid when each particle of the fluid follows a smooth path, paths which never interfere with one another is known as: (b) Laminar flow	1
	ix.	A _____ consists of a cylinder or fluid motor that uses hydraulic power to facilitate mechanical operation: (b) Hydraulic actuators	1
	x.	_____ are the devices used for converting pressure energy of compressed air into the mechanical energy to perform useful work: (a) Pneumatic actuators	1
Q.2	i.	Purpose of using potentiometer in displacement sensor	2
	ii.	Types of strain gauge	3
	iii.	Explain the following in detail: (a) IR Sensor (b) IR Proximity sensor.	5
OR	iv.	Explain the following with suitable diagram in detail: (a) Characteristics of Sensors (b) Accelerometers.	5
Q.3	i.	Define force.	2

	ii.	Define Torque Pressure.	1.5 marks 1.5 marks	3
	iii.	U tube manometers Well type manometers.	2.5 marks 2.5 marks	5
	OR	iv.	Explain the following with suitable diagram in detail: (a) Bourdon tubes (b) Bridgeman Gauge.	5 2.5 marks 2.5 marks
	Q.4	i.	Units used to measure the temperature	2
	ii.	Types of thermometers.		3
	iii.	Float type level sensors Displacer type level sensors	2.5 marks 2.5 marks	5
	OR	iv.	Ultrasonic level sensors with diagram Microwave level sensors with diagram.	5 2.5 marks
	Q.5	i.	Fluid.	2
	ii.	Turbulent Laminar flow	1.5 marks 1.5 marks	3
	iii.	Pressure flow meters with diagram Variable area flow meters with diagram.	2.5 marks 2.5 marks	5
	OR	iv.	Electromagnetic flow meter Target flow meter.	5 2.5 marks
	Q.6		Write short note on any two:	
	i.	Pneumatic actuators.		5
	ii.	Hydraulic actuator		5
	iii.	I/P & P/I converters.		5
