Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2019

AU3EL07 / FT3EL06 / ME3EL01

Measurement & Instrumentation

Programme: B.Tech. Branch/Specialisation: AU/FT/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. Precision of an instrument is defined as **1**

(a) Closeness of output to the true value

(b) Change in output for every change in input

(c) Degree of freedom from random errors

(d) Both (a) and (b)

ii. Range or span of an instrument defines **1**

(a) Minimum value of quantity that the instrument is designed to measure

(b) Maximum value of quantity that the instrument is designed to measure

(c) Both minimum and maximum value of quantity that the instrument is designed to measure

(d) None of these

iii. The linear variable differential transformer transducer is **1**

(a) Inductive transducer (b) Non-inductive transducer

(c) Capacitive transducer (d) Resistive transducer

iv. Which of the following devices can be used for measuring torque? **1**

(a) Anaemometer (b) Dynamometer

(c) Thermometer (d) Vibrometer

v. Output of a bimetallic element will be _____ **1**

(a) Strain (b) Pressure

(c) Displacement (d) Voltage

P.T.O.

vi. Which of the following is used as indication instrument in a liquid expansion system? **1**
(a) Bellows (b) Bourdon tube
(c) Ammeter (d) Thermometer

vii. If the displacement is measured with strain gauge, then the number of strain gauge normally required are **1**
(a) One (b) Two (c) Three (d) Four

viii. What is meant by roughness? **1**
(a) Minute succession of hills of different height
(b) Minute succession of valleys and hills of different height and varied spacing
(c) Minute succession of valleys and hills of same height and same gap
(d) Minute succession of valleys of different depth

ix. The power needs of electrical transducers is _____ **1**
(a) Maximum (b) Minimum (c) Zero (d) Infinite

x. Mechanical transducers sense **1**
(a) Electrical changes (b) Physical changes
(c) Chemical changes (d) Biological changes

Q.2 i. Explain the errors in measurement. **2**
ii. Differentiate the Static calibration and dynamic calibration. **3**
iii. Explain the first order system with example. **5**
OR iv. Define the strain gauge electrical circuits with application. **5**

Q.3 i. Discuss the method to measurement of torque on rotating shafts. **4**
ii. Explain the working principle of Linear variable differential transformers (LVDT). **6**
OR iii. Discuss the Frequency measurement. **6**

Q.4 i. Discuss the measurement of temperature. **3**
ii. Explain the measurement of low pressure with suitable diagram. **7**
OR iii. Describe the Pressure differential meters. **7**

Q.5 i. Discuss the slip gauge and its application. **4**

ii. Discuss the function and application of profile-meters. **6**
OR iii. Discuss the measurement of various elements of threads. **6**

Q.6 Attempt any two:
i. Discuss the capacitive & inductive transducers. **5**
ii. Discuss the Smart sensors. **5**
iii. Describe the Single and three phase wattmeter's and energy meters. **5**

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Marking Scheme
AU3EL07 / FT3EL06 / ME3EL01
Measurement & Instrumentation

Q.1	i.	Precision of an instrument is defined as		**1**
	ii.	Range or span of an instrument defines (c) Both minimum and maximum value of quantity that the instrument is designed to measure		**1**
	iii.	The linear variable differential transformer transducer is (a) Inductive transducer		**1**
	iv.	Which of the following devices can be used for measuring torque? (b) Dynamometer		**1**
	v.	Output of a bimetallic element will be _____ (c) Displacement		**1**
	vi.	Which of the following is used as indication instrument in a liquid expansion system? (d) Thermometer		**1**
	vii.	If the displacement is measured with strain gauge, then the number of strain gauge normally required are (a) One		**1**
	viii.	What is meant by roughness? (b) Minute succession of valleys and hills of different height and varied spacing		**1**
	ix.	The power needs of electrical transducers is _____ (b) Minimum		**1**
	x.	Mechanical transducers sense _____ (b) Physical changes		**1**
Q.2	i.	Errors in measurement definition		**2**
	ii.	Definition of Static calibration	1.5 marks	**3**
		Definition of dynamic calibration	1.5 marks	
	iii.	First order system	3 marks	**5**
		Example	2 marks	
OR	iv.	Strain gauge electrical circuits	3 marks	**5**
		Application	2 marks	
Q.3	i.	Torque measurement explanation	2 marks	**4**
		Diagram	2 marks	
	ii.	Working principle of LVDT	4 marks	**6**
		Diagram	2 marks	
OR	iii.	Frequency measurement (any instrument)	4 marks	**6**
		Diagram	2 marks	
Q.4	i.	Measurement of temperature.		**3**
	ii.	Mc-load gauge explanation	4 marks	**7**
		Diagram	3 marks	
OR	iii.	Pressure differential meters	4 marks	**7**
		Diagram	3 marks	
Q.5	i.	Slip gauge	2 marks	**4**
		Its application	2 marks	
	ii.	Function of profile-meters	4 marks	**6**
		Application of profile-meters	2 marks	
OR	iii.	Any six nomenclature of threads		**6**
		1 mark for each	(1 mark * 6)	
Q.6		Attempt any two:		
	i.	Capacitive transducers	2.5 marks	**5**
		Inductive transducers	2.5 marks	
	ii.	Smart sensors configuration diagram	2 marks	**5**
		Explanation	3 marks	
	iii.	Wattmeter's	2.5 marks	**5**
		Energy meters	2.5 marks	

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