GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3162005   **Date:14-07-2023**
Subject Name:Electro Mechanical Measurement and Instruments
Time:10:30 AM TO 01:00 PM   **Total Marks:70**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Define the following terms: (i) Experiment (ii) Measurement (iii) Instrumentation.	**03**
	(b)	Compare direct measurement and indirect measurement methods with suitable examples.	**04**
	(c)	Give detail classification of measuring instrument.	**07**
Q.2	**(a)**	Explain requirement of signal conditioning in measurement with suitable example.	**03**
	(b)	What is tertiary measurement? Explain it with any one example.	**04**
	(c)	Explain hand speed tachometer as generalized measurement system and explain function of each component.	**07**
		OR	
	(c)	Explain construction and working of RVDT with neat sketch.	**07**
Q.3	**(a)**	Briefly explain working of mercury in glass thermometer.	**03**
	(b)	With schematic diagram explain working of optical torsion meter.	**04**
	(c)	Define the following terms for a measuring instrument: (i) Threshold (ii) Repeatability (iii) Reproducibility (iv) Dead Zone (v) Backlash (vi) Accuracy (vii) Resolution	**07**
		OR	
Q.3	**(a)**	Briefly describe the factors which affect the measuring process.	**03**
	(b)	Write a short note on piezoelectric accelerometer.	**04**
	(c)	What is the function of dynamometer? Explain working and construction of eddy current dynamometer with sketch.	**07**
Q.4	**(a)**	Define zero drift, span drift and zonal drift.	**03**
	(b)	For a measurement system compare time domain analysis with frequency domain analysis with suitable examples.	**04**
	(c)	What are the different standard inputs for studying the dynamic response of a measuring system? Explain in detail.	**07**
		OR	
Q.4	**(a)**	Write a short note on Hysteresis.	**03**
	(b)	Explain any four dynamic characteristics of a measuring instrument.	**04**
	(c)	By using a micrometer screw the following readings were taken while measuring the diameter of a shaft in mm. 25.34, 25.38, 25.56, 25.47, 25.42, 25.44, 25.53, 25.48, 25.40, 25.59 Assuming that only random errors are present, calculate the following: (i) Arithmetic mean (ii) Average Deviation (iii) Standard deviation (iv) Variance	**07**

Q.5 **(a)** Differentiate between static error and static correction. **03**

(b) What are the major points to be considered for setting the primary standards? **04**

(c) What are the sources of errors? Explain in detail. **07**

OR

Q.5 **(a)** What are the advantages of PMMC instrument? **03**

(b) A bourdon tube pressure gauge indicates output between 0.0 bar and 50.0 bar. The gauge shows the value of 12.6 bar for a given input of 12.7 bar. Determine the values of absolute error and correction. Also express the error as a function of true value and full-scale deflection. **04**

(c) Give detail classification of transducers with examples. **07**

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