Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER-1 (NEW) EXAMINATION – WINTER 2016

Subject Code: 2710808 **Date:06/01/2017**

Subject Name: ADVANCED METROLOGY & EXPERIMENTAL TECHNIQUES

Time: 2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Discuss the need for high precision measurement.	**07**
	(b)	Discuss thermal aspects affecting accuracy.	**07**
Q.2	**(a)**	Enlist the types of errors. Discuss their causes.	**07**
	(b)	Discuss general considerations in Data analysis.	**07**
		OR	
	(b)	The resistance of a copper wire is governed by $R = R_0[1+\alpha(T-25)]$, where $R_0=8\Omega\pm0.25$ % is the resistance at 25^0 C, $\alpha = 0.004^0\ C^{-1} \pm 1$ % is temperature co-efficient of resistance and the temperature of wire is $T=35\pm1^0$ C. Calculate the resistance of wire and its uncertainty.	**07**
Q.3	**(a)**	Discuss experiment design factors.	**07**
	(b)	The following results are taken of a pressure using a pressure gauge: 2.97, 2.98, 2.99, 3.00, 3.01, 3.02, 3.03, 3.04, 3.05 Pascal Calculate Arithmetic mean, Average deviation, Standard deviation and variance.	**07**
		OR	
Q.3	**(a)**	Explain the use of probability distributions with suitable example.	**07**
	(b)	Explain different types of experiments.	**07**
Q.4	**(a)**	Explain how LASER interferometer can be used for distance measurement.	**07**
	(b)	Explain holographic interferometry principle. Explain real time interferometry.	**07**
		OR	
Q.4	**(a)**	Explain different configurations of Coordinate Measuring Machine	**07**
	(b)	Explain the displacement devices used in CMM.	**07**
Q.5	**(a)**	Discuss Histogram Concavity technique used for machine vision systems.	**07**
	(b)	Discuss significance of image enhancement in machine vision systems with suitable example.	**07**
		OR	
Q.5	**(a)**	Explain in detail the methods of image processing.	**07**
	(b)	What is image enhancement? Discuss its importance in machine vision systems with suitable example.	**07**

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