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BTECH
(SEM IV) THEORY EXAMINATION 2018-19
MEASUREMENT AND METROLOGY

Time: 3 Hours ***Total Marks:70***

Notes: *Assume any Missing Data.*

SECTION A

1. Attempt all questions in Brief. **2x7=14**

(a) Differentiate between precision and accuracy.
(b) Define Full interchange ability.
(c) What do you understand by Erratic Error?
(d) Name the materials used for Piezoelectric Transducer.
(e) A vernier scale consists of 25 divisions on 12 mm spacing and the main scale has 24 divisions on 12 mm. What is the least count?
(f) Compare correction and correction factor.
(g) Write the need of laser in interferometers.

SECTION B

2. Attempt any three of the following: **7x3=21**

(a) Explain Different types of CMM based on its construction.
(b) Describe the different types of error and its causes.
(c) With neat sketch Explain working principle of Laser Doppler Velocimetry.
(d) Explain the working principle of an AC laser interferometer with a neat diagram.
(e) With a neat diagram, discuss the working of liquid in glass thermometer.

SECTION C

3. Attempt any one part of the following: **7x1=7**

(a) Why are comparators used in metrology? Describe, with the help of a sketch, the essential features of a JOHANSSON MIKROKATOR.
(b) What is a profile projector? Can it be used to check the profile of the lion emblem usually embossed on a rupee coin? If so, how?

4. Attempt any one part of the following: **7x1=7**

(a) Define the terms "Primary texture" and "Secondary texture". Describe construction and working principle of an instrument used for measurement of surface texture.
(b) Describe and Drive the formula for the three wire method of finding the effective diameter of screw threads.

5. Attempt any one part of the following: **7x1=7**

(a) A hole and shaft have a basic size of 30 mm and have a clearance fit with maximum clearance of 0.04 mm and minimum clearance of 0.02 mm. The Hole tolerance is to be 1.5 times the shaft clearance.
Determine limits for both hole and shaft using;
i) A Hole Basis System.
ii) A Shaft basis System.

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(b) Calculation the tolerance, fundamental deviations and limits of sizes for the shaft designated as 40 H8/ f7. Standard tolerance for IT7 is 16i and IT8 is 25i. Where 'i' is the standard tolerance unit. Upper deviation for 'f' shaft is $-5.5D^{0.41}$, 40 mm lies in the diameter range 30 – 50 mm.

6. Attempt any one part of the following: 7x1=7

(a) Briefly discuss Static and Dynamic response characteristics, explain each in detail.

(b) What does mean by elastic transducer? Describe an elastic transducer for Force measurement.

7. Attempt any one part of the following: 7x1=7

(a) With neat diagram explain the construction and working principle of the Bi-Metallic Strip.

(b) With a suitable example explain the various elements of generalised measurement system.

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