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B. TECH.
(SEM IV) THEORY EXAMINATION 2017-18
MEASUREMENT AND METROLOGY

Time: 3 Hours *Total Marks: 70*

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.** **2 x 7 = 14**

a) Define Metrology.

b) What is sensitivity?

c) Explain function of sensors.

d) List some of the instruments for temperature measurement.

e) Define Zero Error.

f) Differentiate between sensor and transducer.

g) Define range and span. What is the difference between both?

SECTION B

2. **Attempt any *three* of the following:** **7 x 3 = 21**

a) Explain with a block diagram the generalized measurement system, showing its various stages with suitable example.

b) Define various types of sensors and along with their applications, advantages, and limitations.

c) Enlist some of the pressure measuring devices for low pressure. Discuss the working principle of McLeod Pressure Gauge.

d) Define Interferometry. On what principles interferometry works? Discuss some of the applications and usage of Interferometry.

e) What is CMM? Explain with a neat sketch its constructional features. Discuss types of CMM. Also explain its applications and advantages.

SECTION C

3. **Attempt any *one* part of the following:** **7 x 1 = 7**

a) Explain Taylor's principle of gauge design. Determine the dimensions of hole and Shaft for a fit 30H7/hg. Also determine the allowance and maximum clearance.

b) Explain in brief:

i. Limits Fits and Tolerance.

ii. Comparators.

4. **Attempt any *one* part of the following:** **7 x 1 = 7**

a) Write short notes on

i. Johansson's Microkrator

ii. Accelerometer

iii. Strain rosettes.

b) With a neat sketch explain the construction and working of optical pyrometers. Discuss its significance in measurement.

5. Attempt any *one* part of the following: 7 x 1 = 7

a) Describe the constructional details of Autocollimator. How it is useful in finding straightness, flatness and roundness of a surface?

b) Elaborate with neat sketch:

i. Hole basis system.

ii. Shaft basis system.

6. Attempt any *one* part of the following: 7 x 1 = 7

a) Classify different types of strain gauges and their application. Explain the working of Wheatstone bridge under balanced and unbalanced conditions?

b) Discuss in brief

i. Stroboscope

ii. Thermistor

iii. Seismic instruments

7. Attempt any *one* part of the following: 7 x 1 = 7

a) For a platinum resistance thermometer, the resistance at 22°C is 130Ω the resistance coefficient for temperature for wire is 0.004Ω/Ω°C find the resistance at 40°C and temperature at which resistance will 8.5Ω.

b) A strain gauge is bounded to a 0.2m long workpiece that has a cross sectional area of $6cm^2$ and E = $210GN/mm^2$ and unstrained resistance is 240Ω and G.F = 2.2. When load is applied the resistance of this plate changes by 0.013Ω. Calculate the change in length and the force applied.