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140410 Paper Id:

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

Time: 3 Hours

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

SECTION A

1. Attempt all questions in brief.

- 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:

- 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

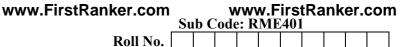
3. Attempt any *one* part of the following:

- 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:

- a) Write short notes on
 - Johansson's Microkrator i.
 - ii. Accelerometer





$2 \ge 7 = 14$

Total Marks: 70

 $7 \ge 3 = 21$

$7 \ge 1 = 7$

 $7 \times 1 = 7$





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- 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:

- 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:

- 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:

- a) For a platinum resistance thermometer, the resistance at 22°C is 130 Ω the resistance coefficient for temperature for wire is $0.004\Omega/\Omega^{\circ}C$ find the resistance at 40°C and temperature at which resistance will 8.5 Ω .
- b) A strain gauge is bounded to a 0.2m long workpiece that has a cross sectional area of 6cm^2 and $\text{E} = 210 \text{GN/mm}^2$ 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.

 $7 \times 1 = 7$

$7 \ge 1 = 7$

 $7 \ge 1 = 7$