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Code No. : 16502 AS N

**VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD**  
**B.E. (CBCS: Mech. Engg.) VI-Semester Advanced Supplementary Examinations, July-2019**

**Metrology and Instrumentation**

Time: 3 hours

Max. Marks: 70

*Note: Answer ALL questions in Part-A and any FIVE from Part-B*

**Part-A (10 × 2 = 20 Marks)**

1. Define and differentiate precision and accuracy.
2. What is the maximum recommended angle to which a sine bar can be set?
3. What is the mathematical formula of depth from addendum to pitch circle and theoretical chordal tooth thickness in chordal tooth thickness method?
4. Identify the importance of a Straight Edge in checking the straightness.
5. Classify the different types of materials used in Thermocouples for Temperature measurement.
6. What are different methods available for temperature measurement?
7. Explain the torque measurement with transmission type of dynamometer?
8. Identify the types of Piezo electric crystals which can be used as Piezo electric transducers for Force measurement.
9. What are the different methods/ instruments available for pressure measurement?
10. Explain the elements of diaphragm gauge?

**Part-B (5 × 10 = 50 Marks)**

- 11.a) Distinguish between Line and End standards of measurement with suitable examples. [4]
- b) The tolerances for a hole and shaft assembly having a nominal size of 50 mm are as follows:  $+0.021 -0.040$  Hole = 40  $+0.000$ mm and shaft = 40  $-0.075$ mm Determine (a) maximum and minimum clearances (b) tolerances on shaft and hole (c) allowance (d) MML of hole and shaft (e) type of fit [6]
- 12.a) Define the effective diameter of a screw thread? Derive the expression for the effective diameter and best-size wire in a two-wire method? [6]
- b) A metric screw thread is being inspected using the two-wire method in order to measure its effective diameter and the following data is generated: Pitch = 1.25mm, diameter of the best-size wire = 0.722mm, and distance over the wires = 25.08mm. Determine the effective diameter of the screw thread. [4]
- 13.a) What are the different electrical methods for temperature measurement? Explain each in detail. [6]
  - i) Electrical resistance thermometers, Thermistors
  - ii) Thermo electric effect-Thermocouple.
- b) Explain the various types of errors in measurement system? [4]
- 14.a) What is the necessity for measurement of torque? Write about electrical torsion meter? [4]
- b) Explain the construction and working of LVDT. [6]

- 15.a) How the measurement of acceleration can be done by Piezo-electric type accelerometer? [4]
- b) What are the different mechanical gauges available for pressure measurement? Write about bourdon gauge? [6]
- 16.a) Explain the construction and working of following instruments with neat diagram [5]
- Vernier height gauge.
  - Depth micrometer
- b) Explain the following methods of quantifying surface roughness: (a) Rz value, (b) RMS value, and (c) Ra value. [5]
17. Answer any *two* of the following: [5]
- With a neat sketch explain bimetallic thermometer? [5]
  - What are the different types of bonded strain gauges? Explain any two of them. [5]
  - Explain about bellow gauges with its advantages and disadvantages? [5]

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