CBCS SCHEME

USN ☐☐☐☐☐☐☐☐☐☐

17AE36

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Measurement and Metrology

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a. Define term metrology, state and explain the objectives of metrology.   **(08 Marks)**
     b. Explain the following standards :
        i)   Primary standard
        ii) Secondary standard
        iii) Working standard.   **(12 Marks)**

OR

2   a. Discuss the procedure for the calibration of end bar.   **(10 Marks)**
     b. Build up a length of 58.975mm using M112 set using two protector slips.   **(10 Marks)**

Module-2

3   a. Explain with neat sketch plug gauge.   **(08 Marks)**
     b. Determine the type of fit after deciding the fundamental deviations and tolerances in the following :
        Fit ϕ 70H$_9$e$_7$ diameter step (50 -80)
        Fundamental deviation for e shaft $= -11D^{0.41}$
        IT 7 = 16i   IT 9 = 40i
        $i = 0.45\sqrt[3]{D} + 0.001D$ **(12 Marks)**

OR

4   a. State and explain Taylor's principle of gauge design.   **(08 Marks)**
     b. Calculate dimensions of plug and ring gauges to control the production of 50mm shaft and hole pair of H$_7$d$_8$ as per IS specification.
        The following assumption may be made : 50mm lies in diameter step of 30 and 50mm and the upper deviation for 'd' shaft is given by $-16D^{0.44}$ and lower deviation for hole H is zero tolerance limit (microns) $= 0.45\sqrt[3]{D} + 0.001D$ and IT6 = 10i and above IT6 grade the tolerance magnitude is multiplied by 10 at each fifth step.   **(12 Marks)**

Module-3

5   a. Define comparator. Give the difference between compotator and measuring instruments.   **(10 Marks)**
     b. Explain with neat sketch Pneumatic comparator.   **(10 Marks)**

OR

6   a. Derive an expression for best wire size for 3 wire method of screw thread measurement.   **(12 Marks)**
     b. Explain gear tooth measurement using gear tooth verner caliper.   **(08 Marks)**

Module-4

7 a. Discuss with block diagram generalized measurement system with example. For each stage element. **(08 Marks)**

   b. Explain following :
      i) Sensitivity
      ii) Accuracy and precession
      iii) Hysteresis
      iv) Load effect. **(12 Marks)**

OR

8 a. Define transducer. Mention any five mechanical and five electrical transducers. **(08 Marks)**

   b. Explain following :
      i) Spiral spring
      ii) Bellows
      iii) Bourdon tube
      iv) Torsion bar. **(12 Marks)**

Module-5

9 a. Define following terms:
      i) Absolute pressure
      ii) Atmospheric pressure
      iii) Gauge pressure
      iv) Vacuum **(12 Marks)**

   b. Write difference between hydraulic and mechanical brakes. **(08 Marks)**

OR

10 a. Write a short note on the construction of resistance thermometer. **(10 Marks)**

    b. Describe the construction and working of Electrical strain gauge. **(10 Marks)**

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