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Fourth Semester B.E. Degree Examination, June/July 2014
Mechanical Measurements and Metrology

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Briefly explain: i) International prototype metre
ii) Reference standard
iii) Wringing phenomenon
iv) Significance of wavelength standard (08 Marks)
- b. What are Airy points? Explain in detail. (04 Marks)
- c. Using NPL method, derive equation for calibrating end standards from line standards. (08 Marks)
- 2 a. What are the concepts of interchangeability and selective assembly? Which is advantageous? (06 Marks)
- b. Briefly explain: i) Go-gauges, ii) NO-GO gauges, iii) Gauge tolerance and wear allowance. (06 Marks)
- c. Determine the tolerance on the hole and shaft for a fit designated by 50H7g6; diameter step 50 to 80 mm; fundamental deviation for shaft = $-2.5 D^{0.34}$ in micron; IT6 = 10i and IT7 = 16i, $i = 0.45\sqrt{D} + 0.001D$ in micron. State the actual maximum and minimum sizes of the hole and shaft and maximum and minimum clearances. (08 Marks)
- 3 a. What are comparators? How do they differ from measuring instruments? (06 Marks)
- b. Explain the principle of sine bar. (06 Marks)
- c. Explain with sketch, the construction and working of LVDT. (08 Marks)
- 4 a. What is the principle of interferometry? How is it adopted in optical interferometer? (06 Marks)
- b. Derive an expression for the chordal tooth thickness of gear. (06 Marks)
- c. Explain 3-wire method of measuring effective diameter of screw thread. (08 Marks)

PART – B

- 5 a. What is the significance of measurement? (04 Marks)
- b. Explain the three stages of generalized measuring method using any one example. (08 Marks)
- c. Differentiate: i) Sensor and transducer ii) Primary and secondary transducer
iii) Accuracy and sensitivity iv) Error and correction (08 Marks)
- 6 a. What is the necessity of modifying devices? What are the advantages of electrical modifying devices? (06 Marks)
- b. Explain with a neat sketch, ballast circuit diagram. (06 Marks)
- c. With a block diagram, explain the working of an x-y plotter. (08 Marks)
- 7 a. Briefly explain how pressure can be measured with elastic transducer. (06 Marks)
- b. What are the methods of force measurement? Give examples. (06 Marks)
- c. Explain with a neat sketch proxy brake dynamometer. (08 Marks)
- 8 a. Explain the working principles of radiation pyrometer and thermocouple. (08 Marks)
- b. Briefly explain: i) Strain gauge material; ii) Strain gauge factor; iii) Thermocouple material. (12 Marks)

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