USN ☐☐☐☐☐☐☐☐☐☐

Third Semester B.E. Degree Examination, Dec.2014/Jan.2015
Mechanical Measurements & Metrology

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. What are the objectives of metrology? What is the necessity of standard for murcury system? **(08 Marks)**
   b. Briefly explain : i) International prototype metre   ii) Wringing phenomenon
      iii) Wavelength standard **(08 Marks)**
   c. Build dimension 35.4875 mm using M112 slip gauge set. **(04 Marks)**

2 a. Differentiate between i) Measuring device and gauge ii) Clearance fit and interference fit
      iii) Hole basis system and shaft basis system. **(06 Marks)**
   b. What are the concepts of interchangeability and selective assembly? **(04 Marks)**
   c. Design plug gauge for the following data:
      Fit % 90 H8e9, 90 mm falls in the diameter steps of 80 – 100, value of tolerance
      unit $= 0.45\sqrt[3]{D}+0.001D$, value of tolerance for IT8 and IT9 grades are 25i and 40i,
      Fundamental deviation for 'e' type shaft is $-11D^{0.41}$. Use present British system. **(10 Marks)**

3 a. What are comparators? How do they differ from measuring instruments? **(04 Marks)**
   b. Explain with a neat sketch, the construction and working of LVDT. **(08 Marks)**
   c. Explain with a neat sketch, the Johnson's Mikrokator. **(08 Marks)**

4 a. What are the uses of i) Sine centre   ii) Clinometer iii) Angle gauges **(06 Marks)**
   b. Explain 3-wire method of measuring effective diameter of screw thread. **(06 Marks)**
   c. How do you measure the tooth thickness of a spur gear using a gear tooth vernier caliper? **(08 Marks)**

PART – B

5 a. Explain the 3 stages of generalized measurement system with an example. **(08 Marks)**
   b. Define : i) Calibration   ii) Hysteresis   iii) Loading effect **(06 Marks)**
   c. Differentiate : i) Sensor & transducer   ii) Primary and Secondary transducer
      iii) Accuracy & Sensitivity **(06 Marks)**

6 a. With a neat diagram, explain the working principle of a CRO. **(10 Marks)**
   b. With a block diagram, explain the working of an X-Y plotter. **(10 Marks)**

7 a. Explain with a sketch, the working of Mcleod gauge. **(08 Marks)**
   b. Explain with a neat sketch, the working of hydraulic dynamometer. **(06 Marks)**
   c. With a neat sketch, explain the working principle of proving ring. **(06 Marks)**

8 a. What are thermocouples? State the laws of thermocouple. **(06 Marks)**
   b. Sketch and explain the working principle of optical pyrometer. **(08 Marks)**
   c. Write a note on strain gauge factor. **(06 Marks)**

* * * * *