Third Semester B.E. Degree Examination, June/July 2016
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. Define metrology. What are the objectives of metrology? **(06 Marks)**
     b. Define the following: (i) Line standard   (ii) End standard   (iii) Wave length standard **(06 Marks)**
     c. Build up a length of 35.4875 and 92.357 mm using M112 set. Use protector slips of 2.5 mm each. **(08 Marks)**

2   a. With a neat sketch explain, (i) Clearance fit   (ii) Interference fit   (iii) Transition fit. **(09 Marks)**
     b. Determine the dimensions of the shaft and hole for a fit 30 H_8/d_{10} and sketch the fit, diameter 30 falls in the range 18 – 30, upper deviation for 'd' shaft is - $16D^{0.44}$
       $i = 0.45D^{\frac{1}{3}} + 0.001D$. Tolerance for $IT_8 = 25i$. Tolerance for $IT_{10} = 64i$. **(11 Marks)**

3   a. Explain Johansson Mikrokator with sketch. **(06 Marks)**
     b. What are the advantages and disadvantages of mechanical comparators? **(06 Marks)**
     c. With neat sketch, explain LVDT. State its advantages and disadvantages. **(08 Marks)**

4   a. Explain how the straightness can be measured by using auto collimator. **(08 Marks)**
     b. Explain the 3 wire method of measuring the effective diameter of screw thread. **(08 Marks)**
     c. Define the following: i) Addendum   ii) Pitch **(04 Marks)**

PART – B

5   a. Define measurement. With a neat block diagram, explain the generalized measurement system. **(10 Marks)**
     b. Define accuracy and hysteresis. **(03 Marks)**
     c. Differentiate between active transducer and passive transducer. **(03 Marks)**
     d. Explain capacitive type transducer. **(04 Marks)**

6   a. What are the inherent problems which occur when mechanical devices used as modifying devices, briefly explain. **(05 Marks)**
     b. Explain stylus type oscillograph with neat sketch. **(06 Marks)**
     c. Explain with a circuit diagram: (i) Ballast circuit   (ii) Simple current sensitive circuit. **(09 Marks)**

7   a. Sketch and explain unequal arm balance for the measurement of force. **(04 Marks)**
     b. Give the classification of dynamometers. Sketch and explain Proney Brake dynamometer. **(08 Marks)**
     c. Explain with neat sketch, McLeod gauge used for pressure measurement. **(08 Marks)**

8   a. State the laws of thermocouple. **(04 Marks)**
     b. Sketch and explain mechanical strain gauge. **(08 Marks)**
     c. Give the different type of bonding materials to attach strain gauges and state the desirable characteristics of bonding materials. **(04 Marks)**
     d. What are the advantages and disadvantages of thermocouple? **(04 Marks)**

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