USN ☐☐☐☐☐☐☐☐☐☐

15MEB306

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Mechanical Measurements and Metrology

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Describe the type of errors encountered during the measurement process. **(08 Marks)**
  b. Three 100 mm end bars are measured on a level comparator by first wringing them together and comparing with 300 mm bar which itself has +0.03 mm error. Three bars together have total error of 0.064 mm less than the standard bar. Bar A is 0.02 mm larger than bar B and 0.025 mm longer than bar C. Determine the actual dimensions of all end bars. **(08 Marks)**

OR

2 a. With a neat sketch, explain the use of Auto collimator to measure squareness of surfaces. **(08 Marks)**
  b. Mention the availability of flip gauges in M112 set. Using M112 set slip gauges build dimensions (i) 52.498 mm (ii) 48.3275 mm. **(08 Marks)**

Module-2

3 a. With a common zero line, indicate and define the following terms for shaft and hole (i) Basic size (ii) Allowance (iii) Upper deviation (iv) Lower deviation. **(08 Marks)**
  b. Determine the actual dimensions to be provided for a shaft and hole of 90 mm size for H_8e_9 type fit. IT8 = 25 i, IT9 = 40i. FD for 'e' shaft = $-11D^{0.41}$ **(08 Marks)**

OR

4 a. Explain the construction and working of LVDT. **(08 Marks)**
  b. Explain the construction and working of Zeiss ultra optimeter. **(08 Marks)**

Module-3

5 a. What is best wire size? Derive an expression for best wire diameter in terms of pitch and thread angle. **(08 Marks)**
  b. Describe the use of David Brown tangent comparator for gear measurement. Calculate the dimension of the base tangent length over 3 teeth with module of 2.5 mm, 20° pressure angle and 30 teeth. **(08 Marks)**

OR

6 a. Explain the construction and working of laser interferometer. **(08 Marks)**
  b. Describe the working of cantilever type CMM. **(08 Marks)**

Module-4

7 a. Describe (i) Accuracy (ii) Precision (iii) Calibration (iv) Threshold **(08 Marks)**
  b. Explain the pressure sensitive elements used as mechanical transducers. **(08 Marks)**

OR

8 a. Explain the inherent problems in mechanical systems. **(08 Marks)**
  b. Describe the working of stylus type oscillograph. **(08 Marks)**

Module-5

9 a. Describe the construction and working of proving ring. **(08 Marks)**
  b. Describe the construction and working of prony brake. **(08 Marks)**

OR

10 a. Describe the construction and working of strain gauge load cell. **(08 Marks)**
   b. What is thermocouple? Explain the laws of thermocouple. **(08 Marks)**

* * * * *