CBCS SCHEME

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18AE36

Third Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. What is metrology? List the objectives of metrology. **(10 Marks)**

b. Four end bars of basic length 100mm are to be calibrated using a standard bar of 400mm whose actual length is 399.9992mm. It was also found that lengths of bars B, C and D is comparison with A are +0.0002mm, +0.0004mm and -0.0001mm respectively and length of each one them put together in comparison with the standard bar is +0.0003mm longer. Determine the actual lengths of each end bars. **(10 Marks)**

OR

2 a. Write a brief note on International prototype meter with neat sketch. **(10 Marks)**

b. Two length bars of approximate 500mm are to be calibrated with the standard calibrated bar which is actually 0.0008mm less than a meter it is also found that bar B is 0.0002mm longer than bar A. The length of the two bar when put together is 0.0003mm longer than the calibrated standard bar. Determine the actual dimensional of each bar. **(10 Marks)**

Module-2

3 a. Explain the concept of compound tolerance with example in metrology. **(10 Marks)**

b. Determine the actual dimensional to be provided for a shaft and hole of 90mm size for H_8e_9 type clearance fit size 90mm falls in diameter step of 80-100mm value of tolerance for IT8 and IT9 are 25i and 40i. Value of F.D for 'e' type shaft is $-11D^{0.41}$. Design the G0 and No – G0 gauge as per present British system. **(10 Marks)**

OR

4 a. Explain the following with neat sketch
i) Plug gauge ii) Ring gauge **(10 Marks)**

b. Explain Taylor's principle of limit gauging with neat sketch. **(10 Marks)**

Module-3

5 a. Explain with neat sketch the construction and principle of working of Johanson Mikrokator. **(10 Marks)**

b. With neat sketch, explain Solex comparator. **(10 Marks)**

OR

6 a. Explain the working of LVDT with neat sketch, Also list out the advantages and disadvantages. **(10 Marks)**

b. Select the sizes angle gauges required to build the following :
i) 37° 16′ 42″
ii) 102° 8′ 42″ **(10 Marks)**

Module-4

7 a. Define error. Give the detailed classification of errors with example. (10 Marks)

b. Explain the following with neat sketch
   i) Bourdon tube
   ii) Diaphragm (10 Marks)

OR

8 a. Define transfer efficiency of a transducer, explain primary and secondary transducer with example. (10 Marks)

b. Discuss the block diagram of generalized measurement system with example for each stage elements. (10 Marks)

Module-5

9 a. Explain with neat sketch the construction and working principle of hydraulic dynamometer. (10 Marks)

b. Define thermocouple state and explain the laws governing the functions of thermocouple. (10 Marks)

OR

10 a. Explain the working of McLeod gauge. Also derive an expression to determine unknown pressure using McLeod gauge. (10 Marks)

b. Describe the construction and working of optical pyrometer with neat sketch. (10 Marks)

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