15118

B. Tech 4th Semester Examination

Metrology and Interchangeability (OS)

ME-4001

Time : 3 Hours   **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt Five questions in all selecting atleast one question from each section A, B, C and D of the question paper. All sub-parts of section E are compulsory. All questions carry equal marks.

SECTION - A

1. (a) State at least three important characteristics of line standard and end standard.

    (b) Differentiate between systematic errors and random errors with suitable examples.

    (c) Discuss the advantages of using wavelength standard as Basic unit to define primary standard of length.

    (d) Describe the steps in wringing of slip gauges in terms of block diagram.   (5×4=20)

2. Explain with neat sketch the principle, construction and working of Pneumatic measurement system. What are the advantages and limitations of this system over electrical measuring systems?   (20)

[P.T.O.]

SECTION - B

3. (a) What do you mean by standardization? Distinguish between design standardization and manufacturing standardization with suitable examples.

    (b) What is difference between unilateral and bilateral tolerances? Why a unilateral tolerance is preferred over bilateral tolerance?

    (c) What point will you keep in your mind in selecting the tolerances between the piston and cylinder of steam engine?

    (d) Explain the principle of interchangeability with suitable examples.   (5×4=20)

4. What do you mean by angular measurement? List various types of instruments/equipments used for angular measurement. What is sine bar? Discuss with suitable sketches how sine bar can be used to locate any workpiece at given angle and to measure taper angle.   (20)

SECTION - C

5. (a) Explain how the straightness can be measured by using auto-collimator.

    (b) With a schematic diagram explain the working of photo-electric auto collimator. List applications of this method.   (10×2=20)

6. (a) Write procedure for measuring "Effective diameter" of screw thread by using "Two wire method".

    (b) Explain the term "Best wire size". Derive an expression of Best Wire Size in thread measurement.   (10×2=20)

SECTION - D

7. (a) Draw the sketch and write the procedure of squareness testing of Lathe Machine Spindle.

   (b) Calculate the alignment error for the headstock and tail stock for following data:

   Initial reading of dial indicator = 0.1 mm

   Final reading of dial indicator= 0.2 mm

   Movement of carriage along longitudinal direction= 100 mm   (10×2=20)

8. (a) Explain with the help of neat sketch the function of a Parkinson Gear Rolling Tester used for checking composite errors.

   (b) Explain the principle of measuring gear tooth thickness by Base Tangent method.   (10×2=20)

SECTION - E

9. (i) What is the purpose of macro-etch test?

   (ii) What will happen if gauge blocks are just simply placed one over the another and measurements are made?

   (iii) What are the requirements of ideal measurement system?

   (iv) Why tapper gauges are preferred over angle gauges?

   (v) Discuss basic principle of clinometers.

   (vi) Draw the labeled sketch of GO and NOGO gauges.

   (vii) What are sine centers?

   (viii) List any two methods employed for measuring torque.

   (ix) Name the fundamental methods of measurements.

   (x) What is difference between surface finish and surface roughness?   (2×10=20)