

Name :

Sixth Semester B.Tech. Degree Examination, May 2016
(2013 Scheme)
13.601 : METROLOGY AND INSTRUMENTATION (MP)

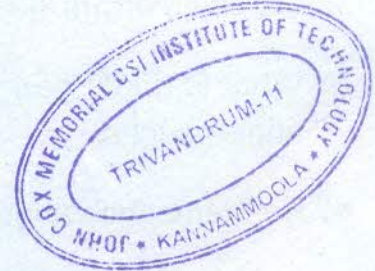
Time : 3 Hours

Max. Marks : 100

PART – A

Answer **all** questions ; **each** carries **2** marks.

1. Differentiate the terms 'precision' and 'accuracy'.
2. Define static calibration. Why it is necessary ?
3. Why tolerance are specified ?
4. State the 'Taylor's principle' for the design of limit gauges.
5. Define 'snug fit' and 'selective fit'.
6. State some of the disadvantages of stylus-type surface texture measuring instrument.
7. Name the instrument which measures the horizontal and vertical angular displacement simultaneously.
8. Give some of the precautions to be followed in using sine bars.
9. Define active and passive transducers. Give examples for each type.
10. Calculate the gage factor for a certain conducting material having a poisson ratio of 0.25 and resistance change due to piezo-resistance effect is unity.



P.T.O.



PART – B

Answer **any one full** question from **each** Module; **each** carries **20** marks.

Module – I

11. a) What do you understand by line and end measurements ? Discuss their relative characteristics.
- b) Discuss the possible effects upon accuracy of measurements due to
- Temperature variations
 - Elastic deformation and
 - Cosine errors.
12. a) What is angle gauge ? With suitable sketches explain the application of angle gauges.
- b) i) Name the various factors on which the accuracy of a sine bar depends.
- ii) How will you calibrate a 100 mm sine bar when it is known that ; the error in the center distance of the roller does not exceed $2.5\mu\text{m}$ and error in slip gauge pile does not exceed $1\mu\text{m}$.

Module – II

13. a) i) State the advantages and disadvantages for gauging a machined shaft by means of limit gauges.
- ii) Discuss briefly various aspects for deciding the tolerance on limit gauges.
- b) i) A limit gauge is required to check the hole of 50 H8. Length of the hole is 200 mm. Neglecting the gauge tolerance and wear allowance show that the GO and NO-GO limit gauges for checking this holes as per IS : 3484.
- ii) Comment on the gauges with reference to Taylor's principle : Take $IT8 = 39$ microns ; Limits 50 H8 are $50 + 0.038$ and $- 0.000$.



14. a) When measuring the effective diameter of an external screw thread gauge of 3.5 mm pitch, and 30.500 mm diameter cylindrical standard and 2.000 wires were used. The micrometer readings over the standard and wires and gauge and cylinders were 13.3768 and 12.2428 mm respectively. Calculate the thread gauge effective diameter.
- b) Explain the various types of fit with neat sketches.

Module – III

15. a) With neat sketches explain the principle of operation of Reed type Mechanical comparator in detail.
- b) Briefly explain the advantages and disadvantages of optical comparators.
16. a) With neat sketches explain the working principle of Taylor-Hobson electronic instrument to measure surface irregularities.
- b) i) Explain the formation of interface fringes when light falls on an optical flat resting on a lapped surface.
- ii) What are the advantages of using a monochromatic light source in interferometry measurements ?

Module – IV

17. a) Explain the various characteristics of random errors.
- b) Describe the construction and working of Mechanical torsion bar dynamometer for power measurement with neat sketches.
18. a) With neat sketch of spherical Co-ordinate Measuring Machine explain its construction and working principles.
- b) Write a short note on error classification.