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B.E / B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV / DEC 2011

(MATERIALS SCIENCE AND ENGINEERING BRANCH)

THIRD SEMESTER

ME9306 – ENGINEERING METROLOGY AND MEASUREMENTS

(REGULATIONS 2008)

Time : 3hr

Max Mark : 100

Answer ALL questions

PART A (10 x 2 = 20 Marks)

1. What is the scope of metrology?
2. What is repeatability?
3. What are slip angles? Write any two applications of slip gauges.
4. What is Taylor's principle of gauging?
5. How can CMMs be calibrated?
6. What is the function of software in CMMs?
7. Define line of action in a gear.
8. How is surface finish indicated in an engineering drawing?
9. What is reliability?
10. What is pyrometry?

PART B (5 x 16 = 80 Marks)

11. (a) What are the various errors which occur during measurements? How can they be reduced or eliminated? (12 marks)
(b) Differentiate between accuracy and precision? (4 marks)
12. (a) Design "workshop", "general" and "inspection" type GO and NO GO gauges for a 25 H7/f8 fit. 25 mm lies in the diameter range 18 to 30. Show graphically the disposition of gauge tolerance zones relative to the work tolerance zones. The upper deviation for d shaft = $-5.5D^{0.41}$.
or
(b) (i) With neat diagrams explain the working principle of an angle dekkor. (12 marks)
(b) (ii) what are the various design requirements of a sine bar. (4 marks)
13. (a) What are the various configurations available in CMMs? With neat diagrams explain the merits and demerits of the different configurations.
or
(b) (i) With a neat diagram explain the working principle of laser interferometer. (10 marks)
(b) (ii) What are the advantages of machine vision in measurements? (6marks)
14. (a) (i) Explain the working principle of NPL Flatness Interferometer. (10marks)
(a) (ii) What is meant by functional inspection of gears? (6marks)

or

(b) (i) With neat diagrams explain the method of measuring straightness of a machine tool bed using autocollimator. (12 marks)

(b) (ii) What is least square line? What are the other lines which can be used as reference lines for measuring straightness? (4 marks)

15. (a) (i) With neat diagrams explain the working of any one instrument for measuring force. (6 marks)

(ii) With neat sketches explain the working principle of venturi meter and orifice meter. (10 marks)

or

(b) What is thermometric property? With neat sketches write short notes on (i) thermocouple (ii) bimetallic strip and (iii) electrical resistance thermometer.