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# FACULTY OF ENGINEERING
## B.E. 4/4 (Mech./Prod.) I Semester Examination, December. 2011
## METROLOGY AND INSTRUMENTATION

Time: 3 Hours] [Max. Marks:75

***Note** : Answer **all** questions of Part **A**, Answer **five** questions from Part **B**.*

PART – A **(10× $2^1/_2$ = 25 Marks)**

1. Distinguish between accuracy and precision of measuring devices.
2. Explain the working principle of piezoelectric load cell.
3. List the standard thermocouple materials.
4. What is fundamental deviation ? Give its importance.
5. What is the general working principle of a comparator ?
6. Classify the surface roughness parameters.
7. Distinguish between line and end standards.
8. Define roundness error with the help of a sketch.
9. Explain the concept of best size wire in thread measurement.
10. State the Taylor's principles used in designing GO gauges.

PART – B **(5×10= 50 Marks)**

11. a) Draw the schematic diagram of generalized measurement system and explain the role of each element. 5
    b) Explain with a sketch the measurement of straightness error using Auto-collimator. 5
12. a) How do you check the size deviations of parts using a pneumatic comparator ? 5
    b) Measurement of angles over 45° using a Sine bar is not recommended. Justify. 5
13. a) What is interchangeability ? Explain various types of interchangeability. 5
    b) What is surface roughness ? Explain its measurement procedure using Talysurf ? 5

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14. a) Derive the expression for effective diameter of a screw thread using 2-wire method. 5

    b) Design the limit gauges for $\Phi$45 H10 hole. Assume gauge tolerance and wear allowance as 10% of work tolerance. Consider 100 $\mu$m work tolerance. 5

15. a) Suggest the best possible bridge configuration for measuring axial loads using strain gauge load cell. Justify. 5

    b) What are the various dynamic characteristics of instruments ? 5

16. a) Explain the measurement of pressure using different elastic transducer elements. 5

    b) State and discuss the laws of thermoelectricity. 5

17. Write short notes on: 10

    a) End standards

    b) Selective assembly

    c) Bulk modulus gauge

    d) Coordinate Measuring Machine (CMM).



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