



Name :

Roll No. :

Invigilator's Signature :

CS/B.Tech (AUE)/SEM-4/AUE-406/2010

2010

MEASUREMENT & INSTRUMENTATION

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A

(Multiple Choice Type Questions)

1. Answer *all* questions :

A. Choose the correct alternatives : $5 \times 1 = 5$

- i) The thread micrometer measures
 - a) the major diameter of the thread
 - b) the minor diameter of the thread
 - c) the effective diameter of the thread
 - d) the root diameter of the thread.
- ii) Surface roughness on a drawing is represented by
 - a) triangles
 - b) circles
 - c) squares
 - d) rectangles.
- iii) On a triple thread screw
 - a) lead = pitch
 - b) lead = 3 pitch
 - c) lead = $1/2$ pitch
 - d) lead = 9 pitch.



iv) Which of the following is the most important characteristic of a measuring instrument in general ?

- a) Precision b) Accuracy
- c) Sensitivity d) Readability.

v) Two slip gauges in precision measurement are joined by

- a) assembling b) sliding
- c) adhesion d) wringing.

B. Answer the following questions very briefly : $5 \times 1 = 5$

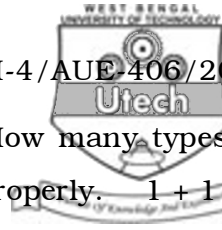
- vi) What is the full form of P.M.M.C. ?
- vii) What is the full form of L.V.D.T. ?
- viii) How many types of error are there ?
- ix) Name displacement measuring transducer.
- x) What do you mean by Precision ?

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

- 2. Explain the principle of operation of a “rolling” gear tester. State the errors in a spur gear that can be detected by “rolling” gear tester.
- 3. “A gear tooth vernier must have two vernier scales.” Comment on the statement.
- 4. State the essential requirements for accuracy in the construction of a sine bar.



5. What do you mean by dynamic error ? How many types of dynamic errors are there ? Explain them properly. 1 + 1 + 3
6. What do you mean by standard ? How many types of standard are there ? Explain them properly. 1 + 4

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. What do you mean by transducer ? How many types of transducer are there ? What are the advantages of transducer ? What do you mean by proximity sensor ? With suitable block diagram explain the construction and working principle of proximity sensor. 2 + 3 + 3 + 2 + 5
8. a) What do you mean by feedback ? How many types of feedback are there ? Find out the feedback gain with the help of a suitable block diagram. Compare the open loop and closed loop control systems. 2 + 1 + 4 + 3
- b) An amplifier has a voltage gain of 100, the feedback ratio is 0.04. Find out the following :
- The voltage gain with feedback
 - The feedback in dB
 - The output voltage of the feedback amplifier for an input voltage of 40 mV
 - The feedback factor
 - The feedback voltage. 5



9. a) Describe with sketch the principle of working of an auto-collimator. 5
- b) A 125 mm sine bar is to be set up to an angle of 30° . Estimate the error in the angle, if :
- i) distance between rollers is not correct by ± 0.005 mm
 - ii) dia. of roller is out by ± 0.002 mm
 - iii) the error of parallelism between top surface and line joining centres of rollers is ± 0.002 mm
 - iv) all the three errors exist simultaneously. $4 \times 2\frac{1}{2}$
10. a) With a neat sketch, illustrate how the effective diameter of a screw thread may be checked using 2-wire system. Derive an expression for the 'best size' wire. 4 + 2
- b) What is the difference between primary texture and secondary texture ? Describe an instrument that may be used to obtain a graphical record of primary texture. 3 + 6
11. Write short notes on the following : $2 \times 7\frac{1}{2}$
- a) Use of optical flat.
 - b) Coordinate Measuring Machine (CMM).
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