MEASUREMENT AND INSTRUMENTATION (SEMESTER - 4)

CS/B.Tech (AUE-N)/SEM-4/AUE-406/09

1. ..... *Signature of Invigilator*

2. ..... *Signature of the Officer-in-Charge*

Reg. No. | | | | | | | | | | | | | | |

Roll No. of the Candidate | | | | | | | | | | | | | | |

CS/B.Tech (AUE-N)/SEM-4/AUE-406/09

ENGINEERING & MANAGEMENT EXAMINATIONS, JUNE – 2009

MEASUREMENT AND INSTRUMENTATION (SEMESTER - 4)

Time : 3 Hours] [Full Marks : 70

INSTRUCTIONS TO THE CANDIDATES :

1. This Booklet is a Question-cum-Answer Booklet. The Booklet consists of **32 pages**. The questions of this concerned subject commence from Page No. 3.
2. a) In **Group – A**, Questions are of Objective type. You have to answer the questions in the space provided **marked "Answer Sheet'.**
   b) For **Groups – B** & **C** you have to answer the questions in the space provided marked 'Answer Sheet'. Questions of **Group – B** are Short answer type. Questions of **Group – C** are Long answer type. Write on both sides of the paper.
3. **Fill in your Roll No. in the box** provided as in your Admit Card before answering the questions.
4. Read the instructions given inside carefully before answering.
5. You should not forget to write the corresponding question numbers while answering.
6. Do not write your name or put any special mark in the booklet that may disclose your identity, which will render you liable to disqualification. Any candidate found copying will be subject to Disciplinary Action under the relevant rules.
7. **Use of Mobile Phone and Programmable Calculator is totally prohibited in the examination hall.**
8. You should return the booklet to the invigilator at the end of the examination and should not take any page of this booklet with you outside the examination hall, **which will lead to disqualification**.
9. Rough work, if necessary is to be done in this booklet only and cross it through.

No additional sheets are to be used and no loose paper will be provided

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FOR OFFICE USE / EVALUATION ONLY

Marks Obtained

	Group – A										Group – B			Group – C				
Question Number																	***Total Marks***	***Examiner's Signature***
Marks Obtained																		

.....

Head-Examiner/Co-Ordinator/Scrutineer

DO NOT WRITE ON THIS PAGE

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MEASUREMENT AND INSTRUMENTATION

SEMESTER - 4

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GROUP – A

(Objective Type Questions)

1. Answer the following questions : 10 ∞ 1 = 10

A) Choose the correct alternatives for the following :

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) Repeatability of measuring equipment is

a) the capability to indicate the same reading again for a given measurement

b) a measure of how close the reading is to the true size

c) difference between measured value and actual value

d) the smallest change in measure that can be measured.

iii) On a triple thread screw

a) lead = pitch b) lead = 3 pitch

c) lead = 1/2 pitch d) lead = 9 pitch.

iv) Angle Deckor is one type of

a) auto-collimator b) optical square

c) clinometer d) angle gauge.

v) Profile of a gear tooth can be checked by

a) sine bar b) bench micrometer

c) optical pyrometer d) optical projector.

B) Answer the following in brief :

vi) What do you mean by instrumentation ?

vii) What do you mean by standard deviation ?

viii) What do you mean by static error ?

ix) What do you mean by standard ?

x) What do you mean by precision ?

GROUP – B

(Short Answer Type Questions)

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

2. What are the different methods of measuring angles ? Explain the principle of autocollimator for measuring small angular differences.

3. What are the various types of pitch errors on thread component ? What do you understand by drunken thread ?

4. Prove that the involute function of a gear tooth

$\delta = \tan \phi - \phi$, where ϕ is the pressure angle.

5. Explain clearly the objective of DAS.

6. Discuss the function and relative merits of open loop and closed loop control systems.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \infty 15 = 45$

7. What do you mean by LVDT ? What type of transducer is it ? Draw the circuit diagram and explain its operation. Write down the advantages and disadvantages of LVDT.

$2 + 1 + 7 + 5$

8. a) Why is it that the use of a sine bar is not recommended for angles larger than 45° if high accuracy is demanded ? How do you calibrate a precision polygon ?

b) Show, for a sine bar, that the error of angular setting θ arising from errors of the dimension l and h is given by :

$$\Delta\theta \text{ (radians)} = (\sec\theta / l) \Delta h - (\tan\theta / l) \Delta l$$

c) If, for a 100 mm sine bar, the setting error $\Delta\theta$ is not to exceed 15 seconds of arc when $\Delta l = + 0{\cdot}004$ mm and $\Delta h = - 0{\cdot}002$ mm, what is the maximum value of θ which the sine bar may be set ? $(3 + 5) + 3 + 4$

9 a) With a neat sketch, illustrate how the effecive diameter of a screw thread may be checked using 2-wire system. Derive an expression for the 'best size' wire.

b) What are the various methods for measuring gear tooth thickness ? Determine the gear tooth vernier caliper settings to measure the gear tooth thichness.

c) How do you use the property of interference of light to check the height of gauge block ? $(4 + 2) + (2 + 4) + 3$

10. What do you mean by transducers ? How are they classified ? What are the important parameters of it ? Write down the advantages of electrical transducer. 2 + 2 + 5 + 6

11. Write short notes on any *three* of the following : 3 ∞ 5

a) Taylor-Hobson Talysurf

b) Use of optical flat

c) Liquid crystal display

d) Measurement of velocity in automobiles.

END