MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : PC-AUE 404/PC-ME404 Metrology and Instrumentation

UPID : 004427

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) Define the effective diameter of thread.

(II) Name an optical device used for flatness testing.

(III) Write the use of dial indicator.

(IV) What is tolerance? Give an example.

(V) Name two equipments used for measurement of torque.

(VI) Define Interferometry.

(VII) What is an inverse transducer?

(VIII) What is Peltier effect?

(IX) Why slip gauges are termed as 'End Standard'?

(X) Name some light sources in use for interferometry

(XI) Why wringing of slip gauge is necessary to build up the required combination?

(XII) What is interchangeability?

Group-B (Short Answer Type Question)

Answer any three of the following : [5 x 3 = 15]

2. Discuss about GO and NOT GO gauge with sketch. [5]

3. What is the difference between surface texture and integrity? Two different surfaces may have the same roughness value. Why? [5]

4. Explain the need and standard procedure of calibration. [5]

5. What methods are used for measuring surface roughness? [5]

6. What is Optical Flat and explain the use of it. What are the limitations of Optical Flat? [5]

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) State the different types of errors and explain parallax error. [6]

(b) Write the differences of the following: [9]
i) Reproducibility and Repeatability
ii) Precision and Accuracy
iii) Line standards and End standard

8. (a) Discuss in details the concept of optical interference. Make necessary sketches. [7]

(b) Make a neat schematic diagram of a Tool Maker's Microscope and state its working principle and applications. [8]

9. (a) Distinguish between comparison and direct measurement of surface roughness. [6]

(b) With the help of a neat sketch, explain the constructional and operational features of Taylor Hobson Talysurf. [9]

10. (a) State and explain Taylor's Principle of gauge design. [5]

(b) Tolerances for a hole and shaft assembly having a nominal size of 50 mm are as follows: [10]

$+0.02 \quad -0.05$

Hole = $50^{+0.00}$ mm and shaft = $50^{-0.08}$ mm

Determine the following:

(i) Maximum and minimum clearances, (ii) Tolerances on shaft and hole

(iii) Allowance, (iv) MML of hole and shaft, (v) Type of fit

11. (a) Make neat labelled sketches of different types of screw threads. [7]

(b) Derive an expression for measuring simple effective diameter of external screw threads. [8]

*** END OF PAPER ***