METROLOGY & MEASUREMENT
(MECH 2105)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Lower limit of diameter of a shaft can be quickly checked by suitable
(a) 'GO' snap gauge (b) Dial gauge
(c) 'NO GO' snap gauge (d) 'GO' plug gauge.

(ii) Which of the following is preferred for selecting a combination of slip gauges?
(a) Writing out and selecting the closest one (b) Averaging
(c) Determining the fewest number of blocks (d) all of these.

(iii) Straight edge is used to check
(a) parallelism (b) roundness
(c) flatness (d) cylindricity.

(iv) A 100mm sine bar is used to measure angle of a component. Slip gauges having total height of 25 mm is put under the sine bar roller to make the top surface of the component horizontal. Calculate the angle of the component in degree
(a) 13.25 (b) 14.48 (c) 12.27 (d) 9.67.

(v) A "Filler Gauge" is used
(a) To fill up a gap
(b) To measure gap between two mating surfaces
(c) To measure shaft diameter
(d) To measure corner radius.

(vi) Gear tooth vernier is use to measure
(a) Gear tooth profile (b) Involute function of gear tooth
(c) Pitch line thickness of gear tooth (d) Module.

(vii) Angle of a hacksaw blade teeth can be measured by
(a) Vernier bevel protractor (b) Vernier calliper
(c) Outside micrometer (d) Profile Projector.

(viii) The difference between the lower and higher values that an instrument is able to measure is called
(a) Accuracy (b) Range (c) Sensitivity (d) Error.

(ix) LVDT is usually used for measuring
(a) Temperature (b) Pressure
(c) Density (d) Displacement.

(x) "Waviness" is
(a) Primary texture (b) Secondary texture
(c) Flaws (d) Tertiary texture.

Group – B

2. (a) Define any two errors in measurement.

(b) Compute the slip gauge block combinations to build the following dimension: 152.475 mm
The slip gauge set M 38 consists of the following:

Range (mm)	Steps (mm)	No. of Pieces of slip gauge
1.005		01
1.01-1.09	0.01	09
1.1-1.9	0.1	09
1.0-9.0	1.0	09
10.0-100.0	10.0	10

6 + 6 = 12

3. (a) How to find out the least count of a vernier calliper.

(b) Define cylindricity and parallelism.

6 + 6 = 12

Group – C

4. (a) The following limits are specified for a hole shaft assembly.
Hole= $50^{+0.07}_{-0.00}$ Shaft = $50^{-0.008}_{-0.040}$
Determine the followings:
(i) Basic size, Tolerance of shaft and hole.
(ii) Maximum and minimum clearance, allowance.

(b) Differentiate between
(i) Hole basis system and shaft basis system.
(ii) Clearance and interference fit.

(3 + 3) + (3 + 3) = 12

5. (a) Briefly explain with sketch how does a Profile Projector work?

(b) What is the difference between a scale and a dial indicator?

6 + 6 = 12

Group – D

6. (a) Explain the functional elements of an instrument.

   (b) Define transducer. What is an active transducer?

6 + 6 = 12

7. (a) How to calculate CLA and RMS value of surface roughness.

   (b) Explain the working principle of Talysurf.

6 + 6 = 12

Group – E

8. (a) What is strain? How to measure it with the help of a strain gauge?

   (b) Explain the procedure to measure displacement by LVDT.

6 + 6 = 12

9. (a) What are the differences between thermometer and thermocouple?

   (b) Explain the working principle of Optical Pyrometer.

6 + 6 = 12

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ME	https://classroom.google.com/c/MjIwMDAwMTYwMDU3/a/Mjc0NzQzNjc2ODYw/details Class code: asfjyyk