18130

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – B.Tech.(ME)-2024
Course Name – Measurement and Metrology
Course Code - BTM30102
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Select the category of Slip gauges among the following.

a) End standard
b) Line standard
c) wave standard
d) none of the option

(ii) The algebraic difference between upper and lower deviations is defined as,

a) Tolerance
b) Allowance
c) Limit
d) Fit

(iii) Select the device that is used to measure the accuracy of micrometer.

a) Slip Gauge
b) Feeler Gauge
c) Screw Gauge
d) Height Gauge

(iv) Identify the device that is used to measure the flatness of a surface.

a) Dial Indicator
b) Screw Gauge
c) Height Gauge
d) none of the option

(v) Select the total no. of grade of the tolerances.

a) 18
b) 12
c) 5
d) 6

(vi) Identify the maximum angle that can be measurable by sine bar.

a) 45 degree
b) 60 degree
c) 120 degree
d) 80 degree

(vii) Select the position of vernier scale should be kept.

a) 0-90°
b) 0-180°
c) 0-360°
d) 90-270°

(viii) Select the center distance of the two roller of the sine bar.

a) 100 mm
b) 25 mm
c) 10 mm
d) 10 mm

(ix) Select the type of tolerance provided in drilling mostly.

a) Bilateral
b) Unilateral
c) Trilateral
d) Compound

(x) Identify the principle that is related to Gauge design among the following.

a) Rankin principle
b) Position principle
c) Taylor's principle
d) Carnot Principle

(xi) Identify the type of thread formed on female screw gauge.

a) External thread
b) Internal thread
c) Both internal and external
d) Major screw thread

(xii) Choose the option which represent active transducer.

a) Strain gauge
b) Thermistor
c) LVDT
d) Thermocouple

(xiii) Select the analog transducer.

a) Encoders
b) Strain gauge
c) Digital tachometers
d) Limit switches

(xiv) Identify the quantity of a strain gauge that varies with applied force.

a) Resistance
b) Capacitance
c) Inductance
d) Flux

(xv) Select the device that is used as indication instrument in a liquid expansion system.

a) Bellows
b) Bourdon tube
c) Ammeter
d) Thermometer

Group-B

(Short Answer Type Questions) 3 x 5=15

2. State the following terms: Fundamental Deviation, Tolerance Grade. (3)
3. Tolerances for a hole and shaft assembly having a nominal size of 50 mm are as follows: Hole = 50 (+0.00/+0.02) mm and shaft = 50 (-0.08/-0.05) mm. Estimate the following values: (a) Maximum and minimum clearances (b) Type of fit (3)
4. Distinguish between tolerance and allowance. (3)
5. Write a short note on pyrometer. (3)
6. Illustrate a short note on Limit and Fit. (3)

OR

Explain the factors that affect the surface finish. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Show the dimensions of the shaft and hole, for a 40 mm shaft and hole pair designated as 40 H8/d9, given that, (a) $i = 0.453\sqrt[3]{(D)} + 0.001D$ (b) 40 mm lies in the diameter range of 30–50 mm (c) IT8 = 25i (d) IT9 = 40i (e) upper deviation of shaft = –16D^0.44 (5)
8. Define fits and explain in brief the types of fits. (5)
9. With proper diagram explain the working principle of sine bar. (5)
10. Summarize a short note on Hole basis and Shaft basis system. (5)
11. With a proper diagram discuss the construction feature of LVDT. (5)
12. Write the working principle of the bourdon tube pressure gauge with a neat sketch. (5)

OR

Evaluate the advantages and disadvantages of thermocouples, also state their working principle with a neat sketch. (5)