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BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – Dip.ME-2023
Course Name – Measurements & Metrology
Course Code - DMEPC502
(Semester V)

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) An instrument's degree of repeatability is identified as
a) Precision b) error
c) accuracy d) all of these

(ii) Select the aim of calibration from the following options.
a) meet customer requirement b) detect deterioration of accuracy
c) comply with ISO 9000 standard requirements d) practise measurement procedures

(iii) Select the correct option for Random errors.
a) experimentally b) by performing sensitivity analysis
c) statistically d) empirically

(iv) Select the purpose of using secondary standards in measurement.
a) To replace primary standards b) To calibrate measuring instruments
c) To measure large quantities d) To create new measurement units

(v) Select the comparator that provides the highest magnification.
a) Mechanical comparator b) Optical comparator
c) Pneumatic comparator d) Vibration comparator

(vi) Identify correct option from the following that best defines the term "helix angle" in thread measurement.
a) The angle between the thread axis and the flank of the thread b) The angle between the helix of the thread and a line perpendicular to the axis
c) The angle formed between the crest and the root of the thread d) The angle of the thread form

(vii) Identify the application of sprit level.
a) Check flatness b) Check roundness
c) Both a and b d) None of the option

(viii) Choose the most common cause of error in load cell measurements

a) Hysteresis
b) Calibration drift
c) Temperature changes
d) Vibrations

(ix) Select the disadvantage of the Prony Brake.

a) Complex construction
b) Excessive cooling requirement
c) Requires regular calibration
d) Generates significant heat

(x) According to Taylor's principle, Select the usuage of GO gauges

a) maximum metal condition
b) minimum metal condition
c) both of these
d) none of these

(xi) Identify the least count of Micrometer.

a) 0.001
b) 0.01
c) 0.02
d) 0.0002

(xii) In a mechanical revolution counter, choose the component that tracks the revolutions

a) Digital display
b) Gear mechanism
c) Electric motor
d) Springs

(xiii) Select the typical humidity range that a hair hygrometer can measure.

a) 0-50%
b) 20-100%
c) 10-90%
d) 30-80%

(xiv) Select the correct principle behind the operation of a hydrometer.

a) Archimedes' principle of buoyancy
b) Pascal's principle of pressure
c) Bernoulli's principle of fluid dynamics
d) Newton's law of motion

(xv) Choose the advantage of float gauges over other liquid level measurement devices.

a) Higher accuracy
b) No moving parts
c) Simple and cost-effective
d) Suitable for extreme temperatures

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain the term 'Error'. (3)
3. State the characteristics of a good comparator. (3)
4. 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)
5. Write the advantages of using a McLeod gauge over other low-pressure measurement devices. (3)
6. Differentiate between tolerance and allowance. (3)

OR

Calculate the actual value and the measured value, where the absolute and relative errors are 3.12 mm and 0.0123. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. List the importance of inspection. (5)
8. Describe the principle of operation of a hygrometer. Name the different types of hygrometers used in humidity measurement. (5)
9. A clearance fit has to be provided for a shaft and bearing assembly having a diameter of 40 mm. Tolerances on hole and shaft are 0.006 and 0.004 mm, respectively. The tolerances are disposed unilaterally. If an allowance of 0.002 mm is provided, evaluate the limits of size for hole and shaft when (a) hole basis system and (b) shaft basis system are used. (5)
10. Explain the application of slip gauge and ring gauge. (5)
11. Explain the working principle of a piezoelectric transducer with a simple diagram. (5)
12. Explain the working principle of a LVDT with the help of a neat sketch. (5)

OR

Classify the fits and explain each of them. (5)

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