CBCS SCHEME

USN | | | | | | | | | | 18ME46B/18MEB406

Fourth Semester B.E. Degree Examination, July/August 2022
Mechanical Measurements and Metrology

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain international prototype meter with a neat sketch. **(06 Marks)**

b. Four length bars A, B, C and D each having a basic length 125 mm are to be calibrated using a calibrated length bar of 500 mm basic length. The 500 mm bar has an actual length of 499.9991 mm. Also, it was found that

$L_B = L_A + 0.0001$ mm

$L_C = L_A + 0.0005$ mm

$L_D = L_A - 0.0002$ mm

and $L_A + L_B + L_C + L_D = L + 0.0003$ mm

Determine L_A, L_B, L_C and L_D **(08 Marks)**

c. Define a standard. Write a note on wavelength standards. **(06 Marks)**

OR

2 a. Explain sine centre with a neat sketch. **(06 Marks)**

b. Explain the principle and construction of Auto collimator with a neat diagram. **(14 Marks)**

Module-2

3 a. Define the terms :
(i) Limits (ii) Fits (iii) Fundamental deviation (iv) Tolerance
(v) Allowance (vi) Basic size **(06 Marks)**

b. Determine the actual dimensions to be provided for a shaft and hole of 90 mm size for H_8C_9 type clearance fit. Given Diameter steps are 80 mm and 100 mm,

$i = 0.45\sqrt[3]{D} + 0.001D$,

Value of tolerances for IT8 = 25i and for IT9 = 40i

and Fundamental Deviation for 'C' type shaft $F.D = -11D^{0.41}$

and also design the GO and NOGO gauges, considering wear allowance. **(14 Marks)**

OR

4 a. Explain the construction and working of Sigma Comparator with a neat sketch. **(10 Marks)**

b. Explain Solex Pneumatic Comparator with a neat sketch. **(10 Marks)**

Module-3

5 a. Explain Toolmaker's microscope with a neat sketch. **(14 Marks)**

b. Define Best Size Wire. Derive an expression for the same. **(06 Marks)**

OR

6 a. Explain the measurement of gear tooth thickness using constant chord method. **(10 Marks)**

b. Explain the Gear tooth Vernier Caliper with a neat sketch. **(10 Marks)**

Module-4

7	a.	Explain Generalized measurement system with a Block Diagram.	(12 Marks)
	b.	Define : (i) Accuracy (ii) Precision (iii) Threshold (iv) Hysteresis	(08 Marks)

OR

8	a.	Define Transfer Efficiency. Explain Ionisation transducer with a neat sketch.	(07 Marks)
	b.	Classify Transducers. Explain Resistive transducers with a neat sketch.	(13 Marks)

Module-5

9	a.	Explain Equal arm balance for force measurement.	(12 Marks)
	b.	Explain Prony brake dynamometer with a neat sketch.	(08 Marks)

OR

10	a.	Explain Mc Leod gauge with a neat sketch.	(10 Marks)
	b.	Define thermocouple. State the laws of thermocouple and explain.	(06 Marks)
	c.	Explain the theory of strain gauges and define gauge factor.	(04 Marks)

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