U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: Mechanical Engineering **Duration: 3 hrs.**
Course Code: 19ME4DCMMM/15ME4DCMMM **Max Marks: 100**
Course: Mechanical Measurement & Metrology **Date: 20.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1	a)	List the objectives of metrology.	**05**
	b)	Tolerances for a hole and shaft assembly having a nominal size of 50mm are as follows: Hole = $50^{+0.02}_{+0.00}$ mm and shaft = $50^{-0.05}_{-0.08}$ mm Determine the following: (a) Maximum and minimum clearances (b) Tolerances on shaft and hole (c) Allowance (d) MML of hole and shaft (e) Type of fit	**09**
	c)	Compare the concepts of interchangeability and selective assembly.	**06**

OR

2	a)	A calibrated meter end bar, which has an actual length of 1000.0005mm, is to be used in the calibration of two bars X and Y, each having a basic length of 500mm. When compared with the meter bar, the sum of L_X and L_Y is found to be shorter by 0.0003mm. When X and Y are compared, it is observed that X is 0.0004mm longer than Y. Determine the actual length of X and Y.	**06**
	b)	Differentiate between Hole basis system and Shaft basis system with simple sketches.	**08**
	c)	Explain Taylor's principles of Gauge Design.	**06**

UNIT - II

3	a)	Sketch and describe working of LVDT. Also draw the characteristic curve and explain.	**12**
	b)	Illustrate measurement of Un-known angle of a component using Sine bar with a suitable sketch.	**08**

OR

4 a) Build up the dimensions 43.716rnm, 55.87rnm and 23.258rnm, using M-45 Slip gauge set. Also buildup 43.716 using a pair of 2.5 mm protector blocks. **06**

(1) Set M 45 (Normal set)		
Range (mm)	Steps (mm)	No. of blocks
1.001 – 1.009	0.001	9
1.01 – 1.09	0.01	9
1.1 – 1.9	0.1	9
1 – 9	1	9
10 – 90	10	9

b) Explain working of Sigma comparator with a neat sketch. **10**

c) Elaborate Wringing mechanism with a suitable sketch **04**

UNIT - III

5 a) Explain the three stages of generalized measuring system using any one example. **12**

b) Differentiate: **08**

i) Sensor and Transducer ii)Active and Passive transducer

iii)Accuracy and Precision iv) Systematic and Random errors

UNIT - IV

6 a) Describe the following with neat sketches; **12**

(i) Pirani gauge (ii) Prony brake.

b) Discuss laws of thermocouple in detail. **08**

UNIT - V

7 a) Illustrate principle and working of Autocollimator. **12**

b) Differentiate between Transmission Electron Microscopy and Scanning Electron Microscopy. **08**

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