USN										Course Code	2	1	M	E	4	2

Fourth Semester B.E. Degree Examinations, September 2024
MECHANICAL MEASUREMENTS AND METROLOGY

Duration: 3 hrs   **Max. Marks: 100**

Note: *1. Answer any **FIVE** full questions, choosing **ONE** full question from each module.*
          2. Missing data, if any, may be suitably assumed.

Q. No		*Question*	*Marks*	*(RBTL:CO:PI)*
		MODULE – 1		
1.	**a.**	Define Metrology and state its objectives?	**06**	(2 :1 : 1.6.1)
	b.	Differentiate line and end standards with examples.	**06**	(2 :1 : 1.6.1)
	c.	Sketch and explain Imperial standard yard.	**08**	(2 :1 : 1.6.1)
		OR		
2.	**a.**	Describe with a neat sketch the principle of Sine bar for angle measurement and its limitations.	**06**	(2 :1 : 1.6.1)
	b.	Selection of slip gauges is required to build a height of 28.495 mm and 37.456 mm. Give the best combination of slip gauges using a suitable set.	**08**	(2 :1 : 1.6.1)
	c.	Explain the wringing procedure of slip gauges with figures.	**06**	(2 :1 : 1.6.1)
		MODULE – 2		
3.	**a.**	Describe the following terms (i) Limit (ii) Fit (iii) Tolerance and (iv) Allowance with a figure.	**08**	(2 :2 : 1.6.1)
	b.	Draw and explain double ended plug gauge and snap gauge for limit measurement.	**06**	(2 :2 : 1.6.1)
	c.	A fit has to be provided for a shaft and bearing assembly having a diameter of 40 mm. Tolerances on hole and shaft are 0.06 and 0.04 mm, respectively. The tolerances are disposed unilaterally. If an allowance of 0.02 mm is provided, find the limits of size for hole and shaft when hole basis system is used and identify the type of fit.	**06**	(2 :2 : 1.6.1)
		OR		
4.	**a.**	What are the characteristics of a good comparator?	**05**	(2 :2 : 1.6.1)
	b.	What is a LVDT? Explain its working principle and discuss the voltage – displacement characteristics of LVDT.	**10**	(2 :2 : 1.6.1)
	c.	Write a note on Solex comparator.	**05**	(2 :2 : 1.6.1)
		MODULE – 3		
5.	**a.**	Illustrate the nomenclature of a standard screw thread and list some of the applications of screw thread.	**10**	(2 :3 : 1.6.1)
	b.	Derive an expression for effective diameter using three wire method for a screw thread with necessary sketch.	**10**	(2 :3 : 1.6.1)
		OR		

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator**)

6.	**a.**	Briefly explain the following gear tooth thickness measurement techniques (i) Constant chord method (ii) Base tangent method	**10**	(2 :3 : 1.6.1)
	b.	Discuss concentricity and run out for a gear and state how gear roll tester is used to find gear errors.	**10**	(2 :3 : 1.6.1)

MODULE – 4

7.	**a.**	Explain the following with diagrams, (i) Threshold (ii) Linearity (iii) Repeatability (iv) Calibration	**10**	(2 :4 : 1.6.1)
	b.	With a neat block diagram, explain the stages of generalized measurement system. Identify various measuring stages in a Bourdon type pressure gauge.	**10**	(2 :4 : 1.6.1)

OR

8.	**a.**	Distinguish between mechanical and electrical transducers	**06**	(2 :4 : 1.6.1)
	b.	Explain the inherent problems associated with mechanical systems.	**04**	(2 :4 : 1.6.1)
	c.	With a neat block diagram, explain the working of a X-Y Plotter.	**10**	(2 :4 : 1.6.1)

MODULE – 5

9.	**a.**	Briefly discuss Prony brake dynamometer with a sketch.	**06**	(2 :5 : 1.6.1)
	b.	With a neat diagram explain the low pressure measurement using Mcleod gauge.	**08**	(2 :5 : 1.6.1)
	c.	Explain working principle of a Proving ring with figure.	**06**	(2 :5 : 1.6.1)

OR

10.	**a.**	What is a strain gauge? What do you understand by bonded and un-bonded type strain gauges?	**08**	(2 :5 : 1.6.1)
	b.	What is a thermocouple? Explain the laws of thermocouple.	**06**	(2 :5 : 1.6.1)
	c.	Write a short note on total radiation pyrometer	**06**	(2 :5 : 1.6.1)

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