

Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

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Fourth Semester B.E. Degree Examination

Subject Title MECHANICAL MEASUREMENTS AND METROLOGY

TIME: 03 Hours

Max. Marks: 100

- Note: 01. Answer any FIVE full questions, choosing at least ONE question from each MODULE.
 02. Assume any missing data suitably
 03. Draw neat diagram wherever necessary

Module -1			*Bloom's Taxonomy Level	Marks
Q.01	a	Write at least five objectives of metrology and measurements	L1, CO1	5
	b	What are the disadvantages of material standards and which are the advantages of wavelength standard? Explain.	L2, CO1	10
	c	A calibrated metre 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 metre bar, the sum of LX and Ly 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.	L3, CO1	5
OR				
Q.02	a	Write the technique of wringing slip gauges	L1, CO1	5
	b	Explain the working principle of Sine bar. Calculate the height of slip gauge required to set a Sine bar of 100mm to an angle of 36°.	L2, CO1	10
	c	Using the set of 16 angle gauges, how we can set the angle 42°35'20", Explain with suitable sketch.	L3, CO1	5
Module-2				
Q. 03	a	Briefly explain the types of fits	L1, CO2	5
	b	For the following hole and shaft assembly, determine (a) hole and shaft tolerance and (b) type of fit +0.05 +0.08 Hole = 20 +0.00 mm and shaft = 20 +0.06 mm	L3, CO2	10
	c	With suitable sketch explain the working principle of Solex Pneumatic Gauge	L2, CO2	5
OR				
Q.04	a	Explain maximum material condition and fundamental deviation with suitable sketches	L1, CO2	5
	b	Tolerances for a hole and shaft assembly having a nominal size of 50mm are as follows: +0.02 -0.05 Hole = 50 +0.00mm and shaft = 50 -0.08mm 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	L3, CO2	10
	c	With suitable sketch explain the working principle of a mechanical optical comparator	L2, CO2	5
Module-3				
Q. 05	a	Write down the major types of errors of spur gear that are important from a metrological point of view.	L1, CO3	5
	b	A tooth span micrometer is being used to measure the span across three teeth. Three trials are conducted and the average value of span width is 31.120mm. The following data is available for the gear being inspected: the number of teeth = 32, addendum circle diameter = 136mm, pressure angle = 20°, and span of measurement = 3. Determine the percentage error of measurement.	L3, CO3	10
	c	Explain the 3 wire method of measurement of effective diameter.	L2, CO3	5
OR				
Q. 06	a	List the elements of gears which are important for analytical inspection	L1, CO3	5
	b	The following data is available for the measurement of chordal thickness of a	L3, CO3	10

		gear having an involute profile: the number of teeth = 32, addendum circle diameter = 136mm, and pressure angle = 20°. Determine the chordal height to which the gear tooth calliper should be set during measurement.		
	c	With neat sketch explain various spur gear terminology	L2, CO3	5
Module-4				
Q. 07	a	Define the following: Accuracy, Precision, Calibration, Sensitivity and Hysteresis.	L1, CO4	5
	b	Explain the various qualities a good transducer should possess.	L2, CO4	10
	c	Give the classification of errors in measurement	L1, CO4	5
OR				
Q. 08	a	Explain Direct and inverse transducers	L1, CO4	5
	b	With the help of block diagram explain the elements of a generalized measurement system	L2, CO4	8
	c	Briefly explain the general-purpose CRO with block diagram.	L2, CO4	7
Module-5				
Q. 09	a	Explain the working of a proving ring with a neat sketch.	L1, CO5	5
	b	State and explain the laws of thermocouples	L2, CO5	10
	c	Explain the best method to measure the radiations emitted by a hot body or furnace.	L2, CO5	5
OR				
Q. 10	a	List the different methods of strain measurement.	L1, CO5	5
	b	With the help of block diagram explain the working of optical pyrometer.	L2, CO5	10
	c	Write the advantages of thermistors as temperature sensors.	L1, CO5	5

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.