SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

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QUESTION BANK

Subject with Code: METROLOGY & MEASUREMENTS (23ME0315)

Course & Branch: B. Tech – ME **Year/ Sem:** III-B. Tech & I-Sem Regulation**:** R23

UNIT-I

1	a)	What is accuracy?	**L1**	**CO1**	**2M**
	b)	What is precision?	**L1**	**CO1**	**2M**
	c)	Define sensitivity.	**L1**	**CO1**	**2M**
	d)	Define Fit.	**L1**	**CO1**	**2M**
	e)	State Taylor's principle.	**L2**	**CO1**	**2M**
2	a)	Differentiate between Precision and Accuracy.	**L2**	**CO1**	**5M**
	b)	Explain Errors in measurements and Types of Errors?	**L2**	**CO1**	**5M**
3		Explain the following teams : (i) Calibration (ii) Readability (iii) Repeatability	**L2**	**CO1**	**10M**
4		Differentiate between systematic error and random error.	**L4**	**CO1**	**10M**
5		Define fit? With neat sketch describe three types of fits.	**L1**	**CO1**	**10M**
6		Construct the conventional diagram of limits and fits and explain all terms.	**L2**	**CO1**	**10M**
7		In a hole and shaft assembly of 30mm nominal size, the tolerances for hole and shaft are as specified below: Hole: $30^{+0.02}_{-0.00}$ mm Shaft: $30^{-0.040}_{-0.070}$ m. Determine: i) Maximum and minimum clearance obtainable ii) Allowance iii) Hole and shaft tolerance iv) The type of fit.	**L3**	**CO1**	**10M**
8		Between two mating parts of 100 mm basic size, the actual interference fit is to be from 0.05mm to 0.12mm. The tolerance for hole is the same as the tolerance for the shaft. solve the size of the shaft and the hole on (a) hole basis unilateral system b) Shaft basis unilateral system.	**L3**	**CO1**	**10M**
9	a)	Define Maximum, Minimum Metal limits and Maximum, Minimum clearances with the help of neat sketches.	**L1**	**CO1**	**5M**
	b)	Distinguish unilateral and bilateral tolerance system.	**L2**	**CO1**	**5M**
10	a)	List out types of assembly systems? Elaborate interchangeability	**L2**	**CO1**	**5M**
	b)	What is Taylor's principle of gauge design?	**L1**	**CO1**	**5M**
11		What are the Classifications of gauge? Explain any four gauges.	**L1**	**CO1**	**10M**

UNIT-II

1	a)	What is mean by wringing process of slip gauge?	**L1**	**CO2**	**2M**
	b)	Why micrometer carries a ratchet stop?	**L2**	**CO2**	**2M**
	c)	What is sine bar?	**L1**	**CO2**	**2M**
	d)	List out Elements of Surface Texture.	**L1**	**CO3**	**2M**
	e)	Draw the BIS symbol for surface roughness.	**L2**	**CO3**	**2M**
2		Elaborate the construction and uses of a) Vernier Calipers b) Vernier height gauge	**L2**	**CO2**	**10M**
3	a)	What is mean by wringing process? Describe briefly the manufacture of slip gauges.	**L1**	**CO2**	**5M**
	b)	What is procedure for buildup slip gauge blocks for required dimension	**L1**	**CO2**	**5M**
4	a)	State the principle of a micrometer. List out types of micrometers.	**L2**	**CO2**	**5M**
	b)	Explain with neat Sketch an outside micrometer.	**L2**	**CO2**	**5M**
5		Describe in brief the construction and working of a sigma comparator with the help of neat sketch.	**L2**	**CO2**	**10M**
6	a)	Construct in detail the working of the Sine Bar to measure unknown angle.	**L2**	**CO2**	**5M**
	b)	Explain Vernier bevel protractor with suitable diagram.	**L2**	**CO2**	**5M**
7		Describe briefly with neat sketch i) Sine center ii) Angle dekkor	**L2**	**CO2**	**10M**
8		Explain with the help of neat sketches the principle and construction of an auto-collimator.	**L2**	**CO3**	**10M**
9		Express the following methods of qualifying surface roughness: (a) Ra value. (b) RMS value. (c) Rz value.	**L2**	**CO3**	**10M**
10		Briefly describe the construction, principle and operation of Talysurf with a neat sketch	**L2**	**CO3**	**10M**
11		Explain with the help of neat sketches the principle and construction of an Tomlinson surface meter.	**L2**	**CO3**	**10M**

UNIT-III

1	a)	List out elements of screw thread.	**L1**	**CO4**	**2M**
	b)	What are errors in threads?	**L1**	**CO4**	**2M**
	c)	What is the best size wire?	**L1**	**CO4**	**2M**
	d)	Name the various types of errors in gears	**L2**	**CO4**	**2M**
	e)	List out elements of gear.	**L1**	**CO4**	**2M**
2		List out the various elements that you would measure in a screw thread? Also list the instruments that are required for measuring these elements	**L2**	**CO4**	**10M**
3	a)	Explain three wire method of measuring effective diameter of screw threads.	**L2**	**CO4**	**5M**
	b)	What are the errors and its causes in screw threads?	**L2**	**CO4**	**5M**

4		Evaluate: (i) Outer diameter. (ii) Effective diameter. (iii) Core diameter. (iv) Pitch diameter	**L4**	**CO4**	**10M**
5		Sketch and explain working and application of versatile instrument of toolmakers microscope	**L2**	**CO4**	**10M**
6		Name and describe the various methods of measuring the minor diameter of the thread.	**L2**	**CO4**	**10M**
7		Explain the elements of gear tooth profile with neat sketch.	**L1**	**CO4**	**10M**
8		Explain with neat sketch the gear tooth profile measurement.	**L2**	**CO4**	**10M**
9	a)	Derive the expressions for constant chord Method.	**L3**	**CO4**	**5M**
	b)	Derive the expressions for Chordal thickness method.	**L3**	**CO4**	**5M**
10	a)	Describe the parkinson's gear tester and state its limitations	**L2**	**CO4**	**5M**
	b)	Describe measurement of pitch by base Tangent method	**L2**	**CO4**	**5M**
11		List out various types of Co-ordinate Measuring Machine and Explain it with neat sketch. What are the advantages of CMM?	**L2**	**CO4**	**10M**

UNIT-IV

1	a)	What is transducer?	**L1**	**CO5**	**2M**
	b)	List out Displacement transducers?	**L2**	**CO5**	**2M**
	c)	List out active and passive transducers.	**L2**	**CO5**	**2M**
	d)	How the resistance strain gauge is functioning?	**L2**	**CO5**	**2M**
	e)	Derive the expression for gauge factor in a strain gauge.	**L3**	**CO5**	**2M**
2		Explain Linear variable differential transformer with suitable sketch.	**L2**	**CO5**	**10M**
3	a)	Define transducer? List and explain two important and closely related parts.	**L1**	**CO5**	**5M**
	b)	Classify transducers? Discuss active and passive transducers with examples.	**L2**	**CO5**	**5M**
4		Prove variable Capacitance Transducer is the most common form of measurement of displacement?	**L4**	**CO5**	**10M**
5		With neat sketch discuss the working principle of photoelectric transducer and its advantages, limitation.	**L2**	**CO5**	**10M**
6		With neat sketch discuss the working principle of ionization and its advantages, limitation.	**L2**	**CO5**	**10M**
7		With neat sketch discuss the working principle of Piezo-electric transducer and its advantages.	**L2**	**CO5**	**10M**
8		What is the principle of strain gauge? Explain the method of usage for measurement of strains.	**L1**	**CO5**	**10M**
9		What do you understand about measurement of torque? Discuss about strain gauge torque meter.	**L2**	**CO5**	**10M**
10	a)	Describe the principle of bonded and un bonded strain gauges?	**L2**	**CO5**	**5M**
	b)	List the essential characteristics required for the backing material of a bonded strain gauge.	**L1**	**CO5**	**5M**
11	a)	Define strain rosette? Depending on the arrangement of strain gauges, list out strain rosettes	**L1**	**CO5**	**5M**
	b)	Elaborate Rectangular strain gauge rosette	**L2**	**CO5**	**5M**

UNIT-V

1	a)	Define Load Cell.	**L1**	**CO6**	**2M**
	b)	How does a torque meter work?	**L2**	**CO6**	**2M**
	c)	Define manometer?	**L1**	**CO6**	**2M**
	d)	List out the dynamometers.	**L2**	**CO6**	**2M**
	e)	List out types pressures.	**L2**	**CO6**	**2M**
2		What are the basic methods of force measurement? Elaborate elastic force devices with neat sketch	**L1**	**CO6**	**10M**
3		Explain the working of a load cell with a neat sketch.	**L2**	**CO6**	**10M**
4	a)	Explain Analytical Balance.	**L2**	**CO6**	**5M**
	b)	Explain Platform Balance.	**L2**	**CO6**	**5M**
5		Sketch a Mcleod gauge and explain working principle and its applications, limitations.	**L2**	**CO6**	**10M**
6		Explain the principle and working of Torsion bar dynamometer with neat sketch.	**L2**	**CO6**	**10M**
7		Explain the principle and working of Servo controlled dynamometer with neat sketch.	**L2**	**CO6**	**10M**
8		Define manometer? Classify the manometer. Elaborate the U- tube Manometer in detail	**L1**	**CO6**	**10M**
9		Discuss the Dead Weight gauge in detail.	**L2**	**CO6**	**10M**
10		List out very high pressure measuring instruments and draw with neat sketch diaphragms pressure gauge.	**L2**	**CO6**	**10M**
11	a)	Discuss the Differential U-Tube Manometer in details and Derive the expression for pressure difference.	**L2**	**CO6**	**5M**
	b)	List out very high pressure measuring instruments and draw with neat sketch C type Bourdon tube.	**L2**	**CO6**	**5M**