



SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY :: PUTTUR
(AUTONOMOUS)
QUESTION BANK

Subject with Code: METROLOGY & MEASUREMENTS (23ME0315)

Course & Branch: B. Tech – ME

Year/ Sem: III-B. Tech & I-Sem

Regulation: R23

UNIT-I

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|----|---|------------|
| 1 | a) What is accuracy? | L1 CO1 2M |
| | b) How do you define 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) Compare Precision and Accuracy. | L2 CO1 5M |
| | b) Discuss about errors in measurements and Types of Errors. | L2 CO1 5M |
| 3 | Explain the following terms :
(i) Calibration (ii) Readability (iii) Repeatability | L2 CO1 10M |
| 4 | Differentiate between systematic error and random error. | L4 CO1 10M |
| 5 | With a neat sketch describe three types of fits. | L2 CO1 10M |
| 6 | Construct the conventional diagram of limits and fits and explain all terms. | L4 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 various types of assembly systems? Elaborate interchangeability | L2 CO1 5M |
| | b) Describe the Taylor's principle of gauge design | L1 CO1 5M |
| 11 | How do you classify the gauges and also explain the working of any four gauges. | L2 CO1 10M |

UNIT-II

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|----|----|---|----|-----|-----|
| 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) | Mention the purpose of sine bar | L1 | CO2 | 2M |
| | d) | List out Elements of Surface Texture. | L1 | CO3 | 2M |
| | e) | Draw the BIS symbol for surface roughness. | L1 | CO3 | 2M |
| 2 | | Elaborate the construction and uses of a) Vernier Calipers b) Vernier height gauge | L2 | CO2 | 10M |
| 3 | a) | Describe briefly about the grades of slip gauges. | L1 | CO2 | 5M |
| | b) | Write the procedure for buildup slip gauge blocks of required dimension | L1 | CO2 | 5M |
| 4 | a) | State the principle of a micrometer. List out types of micrometers. | L2 | CO2 | 5M |
| | b) | Explain the working of outside Micrometer with a neat Sketch. | L2 | CO2 | 5M |
| 5 | | Describe the construction and working of sigma comparator with the help of a neat sketch. | L2 | CO2 | 10M |
| 6 | a) | Describe the working of a sine bar and explain how it can be used to measure an unknown angle. | L2 | CO2 | 5M |
| | b) | Elucidate the working of Vernier bevel protractor with a suitable diagram. | L2 | CO2 | 5M |
| 7 | | Describe the working of i) Sine center ii) Angle dekkor with a neat sketch | L2 | CO2 | 10M |
| 8 | | Illustrate the working principle and construction of an Auto-collimator with a neat sketches. | L2 | CO3 | 10M |
| 9 | | Express the following methods of qualifying surface roughness: | L2 | CO3 | 10M |
| | | (a) Ra value. (b) RMS value. (c) Rz value. | | | |
| 10 | | Describe the construction, principle and operation of Talysurf with a neat sketch | L2 | CO3 | 10M |
| 11 | | Explicate the working principle and construction of an Tomlinson surface meter with a neat diagram. | L2 | CO3 | 10M |

UNIT-III

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|---|----|--|----|-----|-----|
| 1 | a) | List out elements of screw thread. | L1 | CO4 | 2M |
| | b) | What are the 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 the 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	Illustrate the gear tooth profile measurement with a neat sketch.	L2	CO4	10M
9	a) Derive an expressions for constant chord Method.	L3	CO4	5M
	b) Derive an expressions for Chordal thickness method.	L3	CO4	5M
10	a) Describe the parkinson's gear tester and state its limitations	L2	CO4	5M
	b) Discuss about the 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) How do you classify active and passive transducers.	L2	CO5	2M
	d) How the resistance strain gauge is functioning?	L2	CO5	2M
	e) Derive an 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) Mention the Classification of transducers and also discuss about 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	Discuss the working principle of photoelectric transducer with a neat sketch and also mention its advantages and limitation.	L2	CO5	10M
6	illustrate the working principle of ionization and also mention its merits and demerits	L2	CO5	10M
7	Describe the working principle of Piezo-electric transducer and also mention 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? List out various strain rosettes depending on the arrangement of strain gauges	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) Elucidate the working of Analytical Balance.	L2	CO6	5M
	b) Illustrate the working principle of 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	Elaborate the working principle of Servo controlled dynamometer with a 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 with neat sketch explain the working of C type Bourdon tube.	L2	CO6	5M