



**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR**

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(Autonomous)

**QUESTION BANK (DESCRIPTIVE)**

**Subject with Code :** Metrology & Measurements (18ME0321) **Course & Branch:** B.Tech - ME

**Year & Sem:** III-B.Tech & II-Sem

**Regulation:** R18

**UNIT –I**

1. a) What is Taylor's principle? L1 CO1 2M  
 b) Define limits and tolerances. L1 CO1 2M  
 c) What indicates 50H7f8? L1 CO1 2M  
 d) Differentiate between Allowance and Tolerance. L2 CO1 2M  
 e) List out types of fits. L2 CO1 2M
2. Define fit? With neat sketch describe three types of fits. L1 CO1 10M
3. Construct the conventional diagram of limits and fits and explain all terms. L6 CO1 10M
4. 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:  $30^{-0.040}_{-0.070}$  mm  
 Determine: i) Maximum and minimum clearance obtainable ii) Allowance  
 iii) Hole and shaft tolerance iv) The type of fit.
5. 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. Find the size of the shaft and the hole on (a) hole basis unilateral system b) Shaft basis unilateral system. L6 CO1 10M
6. 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. L4 CO1 5M
7. a) Distinguish between 'Hole basis system' and 'Shaft basis system' of fits. L4 CO1 5M  
 b) Define deviations. Explain types of deviations with the help of sketches. L1 CO1 5M
8. a) Explain selective assembly. L2 CO1 5M  
 b) List out types of assembly systems? Elaborate interchangeability. L6 CO1 5M
9. Describe briefly the principal features of the Indian standard System of limits and fits. L1 CO1 10M
10. What are the different types of gauges? Explain any four limit gauges. L1 CO1 10M

**UNIT –II**

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|-----|----|--|----|-----|-----|
| 1.  | a) | What are the purposes of Vernier calipers  | L1 | CO2 | 2M  |
|     | b) | Why micrometer carries a ratchet stop?   | L2 | CO2 | 2M  |
|     | c) | Mention the features of a Universal Bevel Protractor   | L2 | CO2 | 2M  |
|     | d) | what is mean by wringing process of slip gauge   | L1 | CO2 | 2M  |
|     | e) | Draw the BIS symbol for surface roughness.   | L1 | CO2 | 2M  |
| 2.  | a) | Elaborate the construction of Vernier height gauge   | L6 | CO2 | 5M  |
|     | b) | Name the two types of dial indicators, Explain dial indicator with neat sketch.  | L1 | CO2 | 5M  |
| 3.  | a) | What is mean by wringing process? Describe briefly grades of slip gauges.  | L1 | CO2 | 5M  |
|     | b) | What is procedure for buildup slip gauge blocks for required dimension   | L1 | CO2 | 5M  |
| 4.  |    | State the principle of a micrometer. Explain with neat Sketch an outside micrometer.   | L2 | CO2 | 10M |
| 5.  |    | Construct in detail the working of the Sine Bar to measure unknown angle   | L6 | CO2 | 10M |
| 6.  | a) | Simplify the angle measuring method involved in Bevel protractors with a neat sketch.  | L4 | CO2 | 6M  |
|     | b) | Explain about angle gauges.  | L2 | CO2 | 4M  |
| 7.  |    | Express the following methods of qualifying surface roughness:<br>(a) Ra value.                      (b) RMS value.                      (c) Rz value. | L2 | CO2 | 10M |
| 8.  |    | Briefly describe the construction, principle and operation of Talysurf with a neat sketch.   | L1 | CO2 | 10M |
| 9.  | a) | Explain BIS symbols for indication of surface finish.  | L2 | CO2 | 5M  |
|     | b) | Name the different terms used in surface roughness.  | L1 | CO2 | 5M  |
| 10. |    | Explain with the help of neat sketches the principle and construction of an auto collimator  | L2 | CO2 | 10M |

**UNIT –III**

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|----|----|---|----|-----|-----|
| 1. | a) | List out elements of screw thread                                       | L1 | CO3 | 2M  |
|    | b) | What are errors in threads  | L1 | CO3 | 2M  |
|    | c) | What is the best size wire  | L1 | CO3 | 2M  |
|    | d) | Name the various types of errors in gears                               | L2 | CO3 | 2M  |
|    | e) | List out tools required for machine alignment                           | L1 | CO3 | 2M  |
| 2. |    | List out the various elements that you would measure in a screw thread? | L1 | CO3 | 10M |

- Also list the instruments that are required for measuring these elements
3. Explain three wire method of measuring effective diameter of screw threads. L1 CO3 5M  
What are the errors and its causes in screw threads? L1 CO3 5M
  4. Evaluate (i) Outer diameter. (ii) Effective diameter. L5 CO3 5M  
(iii) Core diameter. (iv) Pitch diameter  
Describe measurement of effective diameter with two wire method with neat sketch L1 CO3 5M
  5. Sketch and explain working and application of versatile instrument of toolmakers microscope L2 CO3 10M
  6. a) Explain the elements of gear tooth profile with neat sketch. L2 CO3 5M  
b) Classify the various sources of errors in manufacturing gears. L4 CO3 5M
  7. a) Explain with neat sketch the gear tooth profile measurement. L2 CO3 5M  
b) Describe the parkinson's gear tester and state its limitations L1 CO3 5M
  8. a) Describe measurement of pitch by base Tangent method. L1 CO3 5M  
b) Elaborate method of measuring the gear tooth thickness by Constant Chord method L1 CO3 5M
  9. a) With the help of an illustration, explain any four alignment tests on lathe L2 CO3 7M  
b) Discuss the factors influenced working accuracy of the machine tool. L6 CO3 3M
  10. With the help of an illustration, explain any four alignment tests on milling machine. L2 CO3 10M

### UNIT –IV

1. a) What is transducer? List out active and passive transducers L1 CO4 2M  
b) What is a piezoelectric sensor? L1 CO4 2M  
c) List out contact and non contact tachometers? L2 CO4 2M  
d) How the resistance strain gauge is functioning? L1 CO4 2M  
e) Derive the expression for gauge factor in a strain gauge. L2 CO4 2M
2. Classify digital transducers? Elaborate piezoelectric effect and sketch with neat Piezo-electric transducer. L6 CO4 10M
3. List out Displacement transducers? Explain inductive transducer with suitable sketch. L2 CO4 10M
4. a) Define transducer? List and explain two important and closely related parts L1 CO4 5M  
b) Classify transducers? Discuss active and passive transducers with examples L1 CO4 5M

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|--------|--|----|-----|-----|
| 5.     | Prove variable Capacitance Transducer is the most common form of measurement of displacement?                | L5 | CO4 | 10M |
| 6.     | Classify digital transducers? Elaborate piezoelectric effect and sketch with neat Piezo-electric transducer. | L6 | CO4 | 10M |
| 7. a)  | Classify measurement of angular speed tachometers and list out tachometers.                                  | L2 | CO4 | 5M  |
| b)     | Explain working of Photo-electric tachometer   | L2 | CO4 | 5M  |
| 8. a)  | Describe the principle of bonded and un bonded strain gauges?.   | L1 | CO4 | 5M  |
| b)     | List the essential characteristics required for the backing material of a bonded strain gauge..              | L1 | CO4 | 5M  |
| 9. a)  | Define strain rosette? Depending on the arrangement of strain gauges, list out strain rosettes               | L1 | CO4 | 5M  |
| b)     | Elaborate Rectangular strain gauge rosette   | L6 | CO4 | 5M  |
| 10. a) | What is the principle of strain gauge? Explain the method of usage for measurement of strains.               | L1 | CO4 | 5M  |
| b)     | Explain working of Electrical Strain Gauge.  | L2 | CO4 | 5M  |

### UNIT –V

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|-------|--|----|-----|-----|
| 1. a) | What is meant by calibration?  | L1 | CO5 | 2M  |
| b)    | Define seebeck effect and peltier effect   | L1 | CO5 | 2M  |
| c)    | Discuss limitations of elastic diaphragm gauge.  | L2 | CO5 | 2M  |
| d)    | What is measurement of principle of load cell?   | L1 | CO5 | 2M  |
| e)    | How does a torque meter work?  | L2 | CO5 | 2M  |
| 2.    | List out thermal expansion methods and describe electrical resistance sensor of RTD with neat sketch | L1 | CO5 | 10M |
| 3.    | Discuss in detail about the principle and working of thermo couple with neat sketch                  | L6 | CO5 | 10M |
| 4.    | Sketch a Mcleod gauge and explain working principles. Describe applications and limitations          | L1 | CO5 | 10M |
| 5. a) | Define pyrometer? With neat sketch elaborate total radiation pyrometer                               | L1 | CO5 | 5M  |
| b)    | What is formula for dead weight tester? Discuss the Dead Weight gauge in detail.                     | L1 | CO5 | 5M  |
| 6. a) | Define manometer? Elaborate the U- tube Manometer in detail.   | L6 | CO5 | 5M  |
| b)    | List out common piezoelectric material? Sketch Piezoelectric pressure                                | L1 | CO5 | 5M  |

- transducer with parts.
7. a) Explain about Diaphragm gauge in detail. write advantages. L4 CO5 5M  
b) List the essential characteristics required for the backing material of a bonded strain gauge.. L1 CO5 5M
8. a) Discuss the U- tube Differential Manometer in detail. derive the expression for pressure difference. L6 CO5 5M  
b) List out very high pressure measuring instruments and draw with neat sketch C type Bourdon tube L1 CO5 5M
9. What are the methods employed for the measurement of torque? Sketch a strain gauge torque meter and elaborate it. L1 CO5 10M
10. What are the basic methods of force measurement? Elaborate elastic force devices with neat sketch L1 CO5 10M