

DEPARTMENT OF MECHANICAL ENGINEERING
FIFTH SEMESTER
ME54 – ENGINEERING METROLOGY and MEASUREMENTS
TWO MARK QUESTIONS UNIT

I- Concept Of Measurment

1. What is Range of measurement?:
2. . What is Resolution:
3. Differentiate between sensitivity and range with suitable example.
4. Deflne system error and correction.,
5. Define: Measurand.
6. Define: Deterministic Metrology.
7. Define over damped and under damped systemL
8. Give any four methods of measurement
9. Give classification of measuring instruments.
- 10 .Define True size:
11. Define Actual size
12. What is Hysteresis
13. Differentiate accuracy and Uncertainty with example.
14. Define Span:
- 15 Differentiate between precision and accuracy.
16. What is Scale interval:
17. What is Response time:
18. Define Repeatability:
19. Explain the term magniftication:
20. Classify the Absolute error.
21. What is Relative error.
22. Classify the errors
23. What is the basic Principle of measurement:
24. What are the applications of Legal metrology ?
24. What is the need of inspection
25. What are the important elements of measurments?
26. What is LEGAL METROLOGY

UNIT II – Linear and Angular Measurments

27. What are the considerations while manufacturing the slip gauges?
28. How do you calibrate the slip gauges?

29. List the various linear measurements?
30. What are the various types of linear measuring instruments?
31. List out any four angular measuring instrument used in metrology
32. What is comparators?
33. Classify the comparator according to the principles used for obtaining magnification.
34. How the mechanical comparator works?
35. State the best example of a mechanical comparator.
36. Define least count and mention the least count of a mechanical comparator.
37. How the mechanical comparator is used? State with any one example.
38. State any four advantages of reed type mechanical comparator.
39. Mention any two disadvantages of reed type mechanical comparator.
40. What are the major types of on electrical comparator?
41. On what basis the transducer works?
42. How is the accuracy of an electrical comparator checked?
43. State the working principle of an electronic comparator.
44. Mention the important parts of an electronic comparator.
45. Classify pneumatic comparators.
46. What are the advantages of electrical and electronic comparator?
47. What are the disadvantages of electrical and electronic comparator?
48. List the various parts of an optical comparator
48. What are the advantages of pneumatic comparator?

Unit 3 Form Measurement

49. Name the various types of pitch errors found in screw?
50. Name the various methods of measuring the minor diameter of the thread.
51. Name the various methods used for measuring the major diameter
52. Name the various methods for measuring effective diameter.
53. Name the various methods for measuring pitch diameter.
54. Name the two corrections are to be applied in the measurement of effective diameter.
55. What is best size of wire?
56. Define. Drunken thread

57. What is the effect of flank angle error?
58. What are the applications of toolmaker's microscope?
59. Define: Periodic error.
60. What are the commonly used forms of gear teeth?
61. what are the types of gears?
62. Define: Module
63. Define: Lead angle
64. What are the various methods used for measuring the gear tooth thickness?
65. Name four gear errors.
66. Name the method used for checking the pitch of the gear.
67. What are the direct angular measurements methods?
68. Define : constant chord
69. Give the formula for measuring radius of circle.
70. What are the two methods used in measuring radius of concave surface.
71. What are the factors affecting surface roughness?
72. What are the methods used for evaluating the surface finish?
73. Define fullness and emptiness in form factor.
74. What are the methods used for measuring surface roughness?
75. What are the stylus probe instruments?
76. Define: Straightness of a line in two planes.
77. Define: Roundness. Name the four measurement of roundness.
78. Name the devices used for measurement of roundness.
79. Define : lay
80. What is runout?

UNIT 4- Laser and advances in Metrology

81. What is interferometer?
82. Name the different types of interferometer?
83. Name the common source of light used for interferometer
84. What is crest and trough?
85. What is wavelength?
86. *What is meant by alignment test on machine tools?*
87. List the various geometrical checks made on machine tools.

88. Distinguish between geometrical test and practical test on a machine tool
89. What are the main spindle errors?
90. Write the various tests conducted on any machine tools
91. Why the laser is used in alignment testing?
92. Classify the machine tool test.
93. What are the different types of geometrical tests conducted on machine tools?
94. What is the principle of laser.
95. What is CMM?
96. Define axial length measuring accuracy
97. Write the types of coordinate measuring machines
98. Explain CNC, CMM briefly.
99. Write some features of CMM software.
100. Define machine vision.
101. What are the four basic types of machine vision system?
102. Write the advantages of machine vision system.
103. Define grayscale analysis.
104. Mention the advantages of CMM.
105. Mention the disadvantages of CMM.
106. Mention the application of CMM.
107. Describe the features of a flexible inspection system.
108. Write brief note about (i) Co-ordinate measuring machine equipped with a laser probe (ii) Virtual measuring system
109. Explain briefly the three important fields of machine vision system

UNIT 5 – Measurement of Power, Flow and Temperature related properties

110. What are load cells?
111. Give the principle of hot wire anemometer
112. State any four inferential type of flowmeters
113. What is the principle involved in fluid expansion thermometer?
114. Mention the principle involved in bimetallic strip.
115. What is thermocouple?
116. What is a Kentometer?
117. What is thermopile?

DESCRIPTIVE TYPE QUESTIONS

UNIT –I

- 1) Explain the various systematic and random errors in measurements?
- 2) What is the need of calibration? Explain the classification of various measuring methods.
- 3) Write detailed notes on :
 - (i) sensitivity.
 - (ii) Calibration
 - (iii) Precision
 - (iv) Interchangeability
- 4) Define precision, accuracy, readability and sensitivity with respect to measurement.
- 5) Describe loading errors and environmental errors.
- 6) What are elements of a measuring system? how they affect accuracy and precision? How error due to these elements are eliminated

UNIT-II

- 1) With neat sketch explain the construction and working principle of differential pneumatic comparator.
- 2) With neat diagram explain the construction and working principle of depth micrometer?
- 3) What is auto collimator? With neat sketch explain the working principle of microoptic auto collimator?
- 4) Write the advantages and disadvantages of the mechanical comparator?
- 5) Explain with a schematic sketch the working principle of solex pneumatic comparator.
- 6) Describe the working principle, advantages and disadvantages of optical comparators.
- 7) Describe the method of checking the angle of a taper plug gauge using rollers, micrometer and slip gauges,
- 8) State and explain the “Taylor’s principle of gauge design”.
Explain the following in connection with gauge design:

- (1) Gauge maker's tolerance (2) Wear allowance
- 9) Explain the working principle of autocollimator and briefly explain its application
- 10) Describe with the help of a neat sketch, a vernier bevel protractor.
- 11) How and angle dekkor differ from and Auto-Collimator?
- 12) What types of measuring systems are used for linear distance?
- 13) Describe an opto-mechanical comparator.

UNIT-III

- 1) How to measure the pitch of the screw thread by using the tool maker's microscope? Discuss in detail.
- 2) Describe the method of inspecting the profile of spur gear by using involute measuring machine.
- 3) How to check the composite errors of the gear by using Parkinson gear testing machine? Explain it in detail?
- 4) Briefly describe major, minor and effective diameter of thread?
- 5) Describe the two wire method of finding the effective diameter of screw threads.
- 6) Describe the chordal thickness method using gear tooth vernier caliper.
- 7) Explain one method of assessing the straightness of a straight-edge.
- 8) Write notes on the types of irregularities of a circular part and mention its causes.
- 9) Describe a gear tooth vernier caliper and explain its use for checking tooth thickness and depth of tooth.
- 10) Explain the principle of checking the involute profile of gear tooth.
- 11) Derive the formula for measuring the effective diameter of thread by 3-wire method
- 12) Draw the set up and explain the measurement of effective diameter of a screw thread using three wires.
- 13) Describe a thread pitch measuring machine.
- 14) With the aid of sketch describe the principle of operation of a rolling gear testing machine.
- 15) Describe a method for inspecting the involute profile of a spur gear tooth.
- 16) How is the involute profile of gear tooth measured?

UNIT-IV

- 1) With neat sketch explain the various types of CMM based on its construction. Write the advantages of computer aided inspection.
- 2) Explain the construction and working principle of laser interferometer with neat diagram? Explain the use of laser interferometer in angular measurement.
- 3) Explain the construction details of column type CMMs. What are the advantages of bridge type CMMs? State the possible sources of errors in CMM.
- 4) Explain the working principle of AC LASER interferometer and how the straightness is measured?
- 5) Sketch and describe the optical system of a laser interferometer.
- 6) Define explain the working principle of Tomlinson surface meter with a neat sketch. Define straightness. Describe any one method of measuring straightness of a surface.
- 7) explain how the straightness error of a Lathe bed is checked using a Auto-collimator
- 8) How surface finish is measured using LASER. How the angle is measured using a laser interferometer?
- 9) How are CMMs classified with respect to constructional features? Sketch and state their main applications, merits and demerits.

UNIT-V

- 1) How to measure the power by using rope brake dynamometer?
Explain with a neat diagram
- 2) Explain how cup and vane type anemometers are used to measure air movement.
- 3) With neat sketch explain the construction and working principle of vapour pressure thermometer.
- 4) List the advantages of temperature measurement by using the resistance thermometer.
- 5) Explain with neat diagram the purpose and operating principle of a venturimeter.
- 6) What are rotameters? State its applications.
- 7) Explain the working principle of an electrical resistance thermometer.
- 8) What are thermo couples? State its applications.