

VALLIAMMAI ENGINEERING COLLEGE
SRM NAGAR KATTANKULATHUR
DEPARTMENT OF MECHANICAL ENGINEERING
ME6504 METROLOGY AND MEASUREMENTS
QUESTION BANK

UNIT – I BASICS OF METROLOGY

PART-A (2 MARKS)

1. What are the uses of measurement?
2. What is legal metrology?
3. What are the objectives of metrology
4. What are the basic components of a measuring system?
5. Distinguish between Line standard and End standard.
6. Define the term Sensitivity of an instrument.
7. Differentiate between precision and accuracy.
8. Define the term reliability.
9. Give any four methods of measurement.
10. Give classification of measuring instruments.
11. Define Span.
12. Distinguish between repeatability and reproducibility.
13. Define error.
14. Distinguish between static and random error?
15. What are the sources of error?
16. Write short note on “Systematic errors”.
17. What are the factors affecting the accuracy of the measuring system?
18. Write short notes on the classification of error
19. What is the role of N.P.L
20. Explain the different types of units

PART-B (16 MARKS)

1. Explain the need for measurement
2. Differentiate between precision and accuracy with suitable example.
3. State the requirements for an instrument to measure accurately.
4. What are the various possible sources of errors in measurements? What do you understand by systematic error and random errors?
5. Explain in detail various types of errors that may arise in engineering measurements and the ways to control it.
6. Explain the different types of standards.
7. Explain in detail the legal metrology

8. What the various standards that are being followed in India with respect to metrology
9. Explain the need of precision and accuracy in metrology
10. Explain the general measurement system with sketch

UNIT – II LINEAR AND ANGULAR MEASUREMENT

PART-A (2 MARKS)

1. List any four linear measuring instruments.
2. Give the advantages of digital vernier caliper.
3. What are the various types of linear measuring instruments?
4. List the various linear measurements?
5. List out any four angular measuring instrument used in metrology.
6. Mention any four precautions to be taken while using slip gauges.
7. What are the chances of error in using sine bars?
8. List different types of fits?
9. What is sine center?
10. Differentiate precision and non-precision instruments?
11. Explain Taylor principle in gauge design.
12. What is meant by wringing of slip gauges?
13. Name any two materials commonly used for gauges.
14. Explain the concept of interchangeability?
15. Explain the concept of selective assembly?
16. What are limit gauges?
17. What is clinometer.
18. Explain the need of angle gauges.
19. What is an angle alignment telescope?
20. Brief the usage of autocollimator.

PART-B (16 MARKS)

1. Explain with a neat sketch how a Vernier caliper is used for linear measurement.
2. Explain with a neat sketch how a Micrometer is used for linear measurement.

3. Explain with a neat sketch the construction and of working Height gauge.
4. Describe the precautionary measures to be taken at various stages of using slip gauges and explain mathematically why error in sine bar increases when the angle being measured exceeds 45° .
5. Explain the construction and working principle of Limit Gauge with sketch.
6. Explain the gauge design terminology with procedure and neat sketch.
7. Explain the working method of angle alignment telescope with sketch.
8. Explain with a neat sketch, the construction and working of a Autocollimator.
9. What is the principle of Clinometer? How is it used for the measurement of angles?
10. Explain bevel protractor, angle gauges and spirit level with neat sketches.

UNIT – III ADVANCES IN METROLOGY

PART-A (2 MARKS)

1. Name the different types of interferometer?
2. Write the application of Laser Interferometry.
3. Name the common source of light used for interferometer
4. What are the advantages of laser interferometer?
5. List some of the applications of laser interferometer.
6. What is crest and trough?
7. What is wavelength?
8. What is CMM?
9. What are the types of CMM?
10. List any four possible causes of error in CMM.
11. Name the types of accuracy specification used for CMM.
12. Discuss the application of computer aided inspection
13. State the application of CMM in machine tool metrology
14. Name the type of accuracy specifications used for CMM
15. State the applications of CMM
16. Mention the disadvantages of CMM.
17. Define Machine vision.
18. What are the basic types of machine vision system?
19. What are the advantages of machine vision system?
20. Define gray scale analysis.

PART-B (16 MARKS)

1. Explain the construction and working principle of AC laser interferometer with neat diagram?
2. Explain the construction and working principle of DC laser interferometer with neat diagram?
3. Explain the use of laser interferometer in angular measurement.
4. Explain how the displacements are measured using laser interferometer?
5. What is meant by alignment test on machine tools? Why they are necessary? Explain
6. Explain the construction and principle of CMM.
7. How are CMMs classified with respect to constructional features? Sketch and state their main applications, merits and demerits.
8. Discuss the need of computers in inspection
9. Explain machine vision system and its types.
10. What are the applications of machine vision system in metrology?

UNIT – IV FORM MEASUREMENT

PART-A (2 MARKS)

1. Define straightness?
2. Describe the precautionary measures to be taken at various stages of using slip gauges.
3. How the gauges block are selected to built-up the length of 45.525mm?
4. How flatness is tested?
5. List out the methods of roundness measurement.
6. What are the types of gear?.
7. What are the various methods used for measuring the gear tooth thickness?
8. What are the different taper measurements?
9. Name the various types of pitch errors found in screw.
10. Name the various method of measuring the minor diameter of the thread.
11. Define the effective diameter of thread.
12. Name the two corrections to be applied for the measurement of effective diameter.
13. What is meant by “Best size wire” in screw thread measurement?
14. How Taylor’s principles are applied to screw thread gauge?
15. Explain drunken error in screw threads.

16. Define module.
17. What are the types of gears?
18. Define Lead?
19. What is GO and NO GO Gauge?
20. How straightness, flatness and roundness are measured.

PART-B (16 MARKS)

1. Name the important elements of screw thread with neat sketch.
2. Explain the one wire and two wire screw thread effective diameter method.
3. Explain the construction of a screw measuring machine and explain how it is used in measuring the minor diameter of a screw thread.
4. Draw and explain the measurement of effective diameter of a screw thread using three wires.
5. How to measure the specifications of the screw thread by using the tool makers microscope? Discuss in details.
6. Explain in detail the roundness testing machine.
7. Explain gear tooth vernier method of measuring the gear tooth thickness
8. Explain Base tangent method and Constant chord method of measuring the gear tooth thickness
9. Explain Tomlinson surface meter.
10. Describe a method to find out flatness of a surface plate.

UNIT – V MEASUREMENT OF POWER, FLOW AND TEMPERATURE

PART-A (2 MARKS)

1. What are load cells?
2. Give the principle of hot wire anemometer
3. State any four inferential types of flow meters
4. What is thermopile?
5. Mention the principle involved in bimetallic strip.
6. What is thermocouple?
7. What is the working principle of thermocouple?

8. Name any four method employed for measuring torque.
9. Give the composition and useful temperature range of any one commercial thermocouple?
10. What is a Kentometer?
11. What is the principle involved in fluid expansion thermometer?
12. What is the need of inspection?
13. What are the important elements of measurements?
14. What is the basic Principle of measurement?
15. How force, torque and power are measured?
16. What is bimetallic strip?
17. What is the use of pyrometer?
18. How flow in a draft is measured?
19. What is electrical resistance thermistor?
20. What is McLeod Gauge?

PART-B (16 MARKS)

1. Briefly explain various methods of measuring torque
2. Briefly explain various methods of measuring temperature
3. Briefly explain various methods of measuring flow
4. Briefly explain various methods of measuring power
5. Briefly explain various methods of measuring force
6. Explain working of Pressure thermometer and resistance thermometer
7. Explain the construction and working of Venturimeter and Rotameter
8. Explain the construction and working of Bimetallic strip and Thermocouple
9. Discuss the advantages and disadvantages of a) Pitot tube b) Rotameter c) Hydraulic force meter.
10. Explain with neat sketch the construction and working of a McLeod Gauge.