

VALLIAMMAI ENGINEERING COLLEGE
SRM NAGAR KATTANKULATHUR
DEPARTMENT OF MECHANICAL ENGINEERING
ME2304 ENGINEERING METROLOGY AND MEASUREMENT
QUESTION BANK

UNIT – I CONCEPT OF MEASUREMENT

PART-A (2 MARKS)

1. What are the uses of measurement?
2. What is generalized measurement system?
3. What are the basic components of a measuring system?
4. Distinguish between Line standard and End standard.
5. Define the term Sensitivity of an instrument.
6. What is the relationship between sensitivity and range?
7. Differentiate accuracy and Uncertainty with example.
8. Differentiate between precision and accuracy.
9. Define the term reliability.
10. Give any four methods of measurement.
11. Give classification of measuring instruments.
12. Define Span.
13. Distinguish between repeatability and reproducibility.
14. Define interchangeability.
15. Define error.
16. Distinguish between static and random error?
17. What are the sources of error?
18. Write short note on “Systematic errors”.
19. What are the factors affecting the accuracy of the measuring system?
20. Write short notes on the classification of error

PART-B (16 MARKS)

1. Explain the need for measurement
2. Differentiate between precision and accuracy with suitable example.
3. Write short notes on i)repeatability ii)Accuracy iii)Sensitivity iv)Uncertainty
4. Explain in detail the basic element of the accuracy of measuring systems.
5. State the requirements for an instrument to measure accurately.
6. What are the requirements of an inspection tool?
7. Draw the block diagram of a generalized measurement system and explain the various stages with an example.

8. What are the various possible sources of errors in measurements? What do you understand by systematic error and random errors?
9. Explain in detail various types of errors that may arise in engineering measurements.
10. Discuss on geometric and dimensional tolerancing with suitable examples.

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. Why is sine bar not suitable for measuring angle above 45° ?
9. What are the limitations of sine bar?
10. What are constructional requirements of a good sine bar?
11. State the requirement of accuracy in the construction of a sine bar.
12. What is meant by wringing of slip gauges?
13. Name any two materials commonly used for gauges.
14. What are the merits of mechanical comparators?
15. What is comparator? How they are classified?
16. What are limit gauges?
17. State the advantages and disadvantages of sigma comparators.
18. List the various parts of an optical comparator.
19. What are the disadvantages of electrical and electronic comparator?
20. Classify the comparator according to the principles used for obtaining magnification.

PART-B (16 MARKS)

1. Explain with a neat sketch how a Vernier caliper is used for linear measurement.
2. Sketch and explain the function of optical protractor with vernier.
3. Explain with a neat sketch the construction and of working Sigma comparators.

4. Describe the precautionary measures to be taken at various stages of using slip gauges.
5. With a neat sketch explain the construction and working principle of Solex pneumatic comparator.
6. Explain mathematically why error in sine bar increases when the angle being measured exceeds 45° .
7. Describe the flatness testing method by using Interferometry applied.
8. Explain the working method of mechanical optical comparators with sketch.
9. Explain with a neat sketch, the construction and working of a Tool Maker's Microscope.
10. What is the principle of Angle dekkor? How is it used for the measurement of angles?

UNIT – III FORM MEASUREMENT

PART-A (2 MARKS)

1. What is wringing of gauge block?
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. State 'Taylor's principle of gauge design'?
5. A 200mm sine bar is to be set to many appropriate set of gauge blocks.
6. Name any two materials commonly used for gauges.
7. A 100mm sine bar was used to measure the taper angle of the specimen and the gauge block was 5.055mm. What is the taper angle?
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. Describe a method of determining an absolute length of slip gauges using interferometer.
2. Explain the working principle of laser micrometer.
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 pitch of the screw thread by using the tool makers microscope? Discuss in details.
6. Describe the following tooth thickness measurement.
7. Constant chord method
8. Use tangent method.
9. Explain any one method of measuring the gear tooth thickness
10. Explain Gleason Gear Testing Machine.

UNIT – IV LASER AND 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 is crest and trough?
5. What is wavelength?
6. What is meant by alignment test on machine tools?
7. List the various geometrical checks made on machine tools.
8. Distinguish between geometrical test and practical test on a machine tool.
9. What are the main spindle errors?
10. Write the various tests conducted on any machine tools
11. Why the laser is used in alignment testing?
12. Classify the machine tool test.

13. What are the different types of geometrical tests conducted on machine tools?
14. What is CMM?
15. List any four possible causes of error in CMM.
16. Name the types of accuracy specification used for CMM.
17. Discuss the application of computer aided inspection
18. State the application in machine tool metrology
19. Name the type of accuracy specifications used for CMM
20. State the applications of CMM

PART-B (16 MARKS)

1. Explain the construction and working principle of laser interferometer with neat diagram?
2. Explain the use of laser interferometer in angular measurement.
3. Explain with a neat sketch the working of Taylorsurf instrument for surface finish measurement. What is the symbol for fully defining surface roughness and explain each term?
4. Describe in detail the method of checking roundness by using Roundness Measuring Machine. State its advantages.
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. With neat sketches, explain the significance of some important parameters used for measuring surface roughness. Why so many parameters are needed?
9. How surface finish is measured using LASER. How the angle is measured using a laser interferometer?
10. Discuss the steps involved in computing flatness of surface plate.
11. How are CMMs classified with respect to constructional features? Sketch and state their main applications, merits and demerits.

UNIT – V MEASUREMENT OF MECHANICAL PARAMETERS

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.