Shri Angalamman College of Engineering & Technology

(An ISO 9001:2008 Certified Institution)
Siruganoor, Tiruchirappalli – 621 105.

FS81 504

DEPARTMENT OF MECHANICAL ENGINEERING

ME 1304- Engineering Metrology and Measurements

Unit-1 CONCEPT OF MEASUREMENT

Part-A (2 Marks)

1. What is measurement? Give its types
2. Define Resolution
3. Define Sensitivity
4. Define Threshold
5. Define Drift.
6. Define measurand.
7. What are the elements of generalized measurement system?
8. Define 'precision and 'accuracy'
9. What is hysteresis?
10. Define systematic errors.
11. Define random errors.

Part – B (16 Marks)

1. Draw the block diagram of generalized measurement system and explain different stages with examples.
2. Distinguish between Repeatability and reproducibility
3. Distinguish between Systematic and random errors
4. Distinguish between Static and dynamic response.
5. Describe the different types of errors in measurements and the causes.

Unit-II LINEAR AND ANGULAR MEASUREMENT

Part-A (2 Marks)

1. List the various linear measurements
2. List out any four angular measuring instrument used in metrology.
3. What is the main difference between linear and angular measurement.
4. What is the advantage of using laser beam in interferometer?
5. State "Taylor's principle of gauge design".
6. Classify the comparator according to the principles used for obtaining Magnification.
7. State any two limitations of sine bar.
8. A 100 mm sine bar was used to measure the taper angle of the specimen and the gauge block was 5.055mm. What is the taper angle?

Part – B (16 Marks)

1 What is the constructional difference between an autocollimator and an angle dekkor?

2. How the displacements are measurement using laser interferometer?

3. Explain with the help of neat sketches, the principle and construction of an auto-collimator.

4 Explain the working principle of opto – mechanical comparator with a neatsketch.

5. Explain the working principle of Electrical comparator with a neat sketch

6. Explain the working principle of pneumatic comparator with a neat sketch.

7. Explain with the help of neat sketches, the principle and construction of an Angle dekkor.

Unit – III FORM MEASUREMENT

Part-A (2 Marks)

1. Name the various types of pitch errors found in screw.
2. Define drunken thread.
3. What is the effect of flank angle error?
4. What is the effect of helix angle error?
5. Define periodic error.
6. The outside diameter of a gear is 100mm and the number of teeth is what the module of gear is.
7. Define lead angle
8. Name four gear errors.
9. Define concentricity.
10. What is the use of Stylus Probe?

Part – B (16 Marks)

1. Explain the construction and working of floating carriage micrometer
2. How are the major and minor diameters of thread measured?
3. Define various terminologies related with screw thread
4. Define various terminologies related with screw gears
5. Explain any two taper measurements method.
6. Explain the construction and working of Gear tooth vernier
7. Explain a method used in the measurement of surface finish and flatness

Unit – IV LASER AND ADVANCES IN METROLOGY

Part-A (2 Marks)

1. Name different types of Interferometers
2. What is crust and trough?
3. What is CMM?
4. Mention four types of CMM
5. Mention advantages of CMM
6. State applications of Reverse Engineering
7. What is the advantage of using Laser Interferometer?
8. Define Straightness.
9. Define Flatness
10. Define Surface Finish.

Part – B (16 Marks)

1. Briefly explain various terminologies used in a screw thread
2. Briefly explain Computer Aided inspection and Digital devices
3. Explain the working of Laser Interferometer
4. Explain Different types of CMM
5. Explain the constructional features and application of CMM.

Unit – V MEASUREMENT OF POWER, FLOW AND TEMPERATURE RELATED PROPERTIES

Part-A (2 Marks)

1. Define force
2. What are Load cells?
3. Give the basic principle of equal Arm balance
4. Give the basic principle of strain Gauge Load Cell
5. Give some bimetallic strip metals
6. What are the metals used in Thermocouple?
7. What is the principle behind Thermocouple?
8. Name any four flow meters
9. Define Coefficient of Discharge.

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