

Measurement And Instrumentation

1. Explain digital and analog modes of operation of the instruments.
2. Explain and describe the significance and application with examples of measurement systems.
3. Discuss the presence of experimental error and their primary causes in mechanical measuring system.
4. Explain Linearity and Non linearity with its types in detail.
5. Derive the equations for frequency response of a first order system and hence explain its characteristics.
6. Explain the methods of short range telemetry and slip rings for the measurement of torque.
7. Explain double bellows differential pressure gauge with a neat sketch used for pressure measurement.
8. Explain Normal distribution curve. A firm manufactures ball bearing for certain application. Several sample of size n were taken at random for a population of a large number of balls with mean \bar{x} and standard deviation σ what is the range within which the samples mean \bar{x} can lie with 95% confidence level?
9. Define seismic transducer or accelerometer. What are different modes in which it can be used? Explain in detail the piezoelectric type accelerometer.
10. Define various area flow meters. Explain the construction and working principle of a rotameter. List out its advantages, disadvantages.
11. Describe the series and parallel connections of thermocouples and explain under what situations they should be used?
12. Discuss the significance of measurement and instrumentation.
13. Discuss the various functional elements of a measurement system.
14. Distinguish between accuracy and precision. Which of these is more desirable during the act of measurement and why?
15. Define sensitivity? Would you prefer sensitivity to be low and high for an instrument.
16. Discuss the principle of working of following:
17. LVDT
18. RVDT
19. Strain gauge transducer.
20. Discuss three common arrangements by which varying areas can be accomplished. Discuss the important characteristics of variable area flow meter.

21. What are the thermistors? Discuss their main characteristics.
22. What are the main advantages of using resistance thermometers?
23. Describe the working of a bimetallic thermometer with the help of a neat sketch.
24. Discuss what is meant by temperature compensation and why is it needed?
25. What are primary, secondary and tertiary measurement? Explain with example.
26. Draw a block diagram representation of a generalized measurement system. Identify the various elements and point out the functions performed by each element.
27. What is the calibration and why i.e. it necessary for an instrument? How do you proceed to draw the calibration curve, correction curve and a error curve?
28. Define terms :
29. Frequency response
30. Phase shift
31. Time constant.
32. What do you mean by resistance strain gauges? Give a brief discussion on the subject covering the base principle, gauge and application of the method.
33. What is temperature compensation and how it is achieved when using bonded strain gauge for the measurement of axial thrust, bending load and torque?
34. Explain the following terms:
35. Gaussian Distribution
36. Curve fitting by principle of least squares
37. Describe the difference between deflection and null type of instruments with suitable examples.
38. Explain error, accuracy and precision of a mechanical measuring devices.
39. Derive the equations for frequency response of a first order system. Draw the response curve and find steady state error. Give some example.
40. Explain the construction of thermocouples. Describe the different methods used for reference junction compensation for thermocouple.
41. How would you classify the measuring instruments? Explain the various types of instruments briefly.
42. Derive an expression for time response of a second order under damped system when subjected to a unit ramp input. Show that the response is same as that for a unit step input. Find expression for the steady state error.
43. Enlist various calibration procedures. Explain what is indirect calibration.

44. Enlist various parameters of static performance, Explain static sensitivity.
45. Explain working principle of capacitive type transducer.
46. Explain Inductive type of transducer.
47. Explain Electric Amplifying Elements.
48. Explain the working principle of galvanometric recorders.
49. Explain working principle of Hydraulic and Pneumatic Load cell.
50. Explain working principle of thermister. Enlist its advantages
51. Explain different types of pyrometer.
52. Explain hysteresis curve.
53. Explain different method of torque measurement.
54. Explain different method of flow measurement.
55. Explain different method of pressure measurement.
56. Explain different type of sensor.
57. Explain different type of transducer.
58. Explain electromechanical transducer.
59. Explain different type of strain gauge.
60. Explain indicating and recording instrument.
61. Explain different types of load cell.
62. What is photo electric and optical device for measurement.
63. Define different types of encoder.
64. What is unbounded and bonded strain gauge?
65. What is temperature compensation?
66. What is analog and digital transducer?
67. What is wheat bridge stone for strain gauge.
68. What is turbine flow meter.
69. What is Impulse and Harmonic Functions.
70. Classification of Instruments, Standards and Calibration