OAN551 SENSORS AND TRANSDUCERS

Question Bank

Unit I

INTRODUCTION

Part A

1. What is instrument?

2. Add 826 ± 5 to 628 ± 3

3. Subtract 628 ± 3 from 826 ± 5

4. List three sources of possible errors in instrument.

5. Define instrumental error.

6. Define limiting error.

7. Define probable error.

8. Define environmental error.

9. Define arithmetic mean.

10. Define average deviation.

11. Define units.

12. Define standards.

13. Draw the functional block diagram of measurement system.

14. Mention the purpose of measurement.

15. What are the methods of measurement?

16. Define ODDs.

17. Classify standards.

18. Define transducer and give an example.

19. Classify transducers.

20. What is primary transducer?

21. What is secondary transducer?

22. What is passive transducer?

23. What is active transducer?

24. What is analog transducer?

25. Give the classification of units.

26. Define primary fundamental and auxiliary fundamental units.

27. Define unit of mass preserved at international bureau of weight and measure at Severes near Paris.

28. Define static calibration.

29. Define traceability.

30. What are random errors or residual errors?

31. Give one property of piezo electric crystal.

32. Define an inverse transducer. Give an example.

33. List the factors responsible in selection of transducer.

34. Define static characteristics.

35. Mention different types of static characteristics.

36. What are dynamic characteristics?

37. Mention different types of dynamic characteristics.

38. What are the test inputs of the transducer?

39. Define zero order transducer.

40. What is mathematical model?

41. What is frequency response of ZOT?

42. What is damping ratio?

43. Define static sensitivity.

44. Define linearity.

45. Compare accuracy and precision.

46. What is threshold?

47. Define resolution.

48. Define hysteresis.

49. What is rand and span?

50. What is rise time?

Part B & Part C

1. Describe the functional elements of an instrument with its block diagram.
   (May 05, 07, 09, 10 Dec 07, 09, 10)

2. What are the three categories of systematic errors in the instrument and explain in detail.
   (May 06, 07, Dec 05, 06, 07, 09, 11)

3. Explain in detail calibration technique and draw the calibration curve in general.
   (May 04, 11, Dec 06, 07)

4. Discuss in detail various types of errors associated in measurement and how these errors can be minimized? **(May 06, 07, Dec 05, 06, 07, 09, 11)**

5. Define the following terms in the context of normal frequency distribution of data (a) Mean Value, (b) Deviation, (c) Average deviation, (d) Variance, (e) standard deviation **(May 05, 08, 10, 11, Dec 07, 08)**

6. Define and explain the static characteristics of an instrument. **(May 06, 11, Dec 04, 08, 09)**

7. Define and explain the types of static errors possible in an instrument. **(May 05, 06, 07, 11, Dec 04, 05, 06, 07, 08, 09, 11)**

8. Discuss in detail the various static and dynamic characteristics of a measurement system. **(May 06, 11 Dec 04, 08, 09, 11)**

9. For the given data, calculate (a) Arithmetic mean, (b) deviation of each value, (c) Algebraic sum of the deviation $X_1 = 49.7$, $X_2 = 50.1$, $X_3 = 50.2$, $X_4 = 49.6$, $X_5 = 49.7$ **(May 05, 08, 10, 11, Dec 07, 08)**

10. Explain in detail the types of static error **(May 06, 07, Dec 05, 06, 07, 09, 11)**

11. What is standard? Explain the different types of standards? **(May 05, 08 Dec 11)**

Unit II

MOTION, PROXIMITY AND RANGING SENSORS

Part A

1. What is potentiometer?
2. What are the advantages and disadvantages of potentiometer?
3. What is inductance transducer?
4. Mention three principles of inductance transducer
5. What is LVDT?
6. What are the advantages and disadvantages of LVDT?
7. What are the applications of LVDT?
8. What is null voltage?
9. Explain the principle of induction potentiometer?
10. What is the principle of capacitive transducer?
11. What are the desirable features of capacitive transducer?
12. What are the different practical capacitance pickups?
13. What is microphone?
14. What is the principle of change of capacitance?
15. What are advantages of capacitive transducers?
16. What are the disadvantages of capacitive transducers?
17. What are the uses of capacitive transducers?
18. What is the value of capacitance for measurement of level of a non-conducting liquid?
19. Define motion sensor.
20. List the various types of motion sensors.
21. List the motion sensors application.
22. Mention the types of potentiometers.
23. Define resolver.
24. List the various application of resolver.
25. Define encoder.
26. List out types of encoder.
27. What is optical sensor?
28. Mention the types of optical sensors.
29. What is magnetic sensor?
30. What is synchro?
31. Mention the various types of synchros system.

32. What is Accelerometer?

33. List out the applications of accelerometer.

34. What is GPS?

35. Mention the types of segments used in GPS.

36. List out the advantages of GPS.

37. List out the disadvantages of GPS.

38. List out the applications of GPS.

39. What is Bluetooth?

40. Mention the applications of Bluetooth.

41. List out the advantages of Bluetooth.

42. List out the disadvantages if Bluetooth.

Part B & Part C

1. Explain in detail about the laboratory type DC potentiometer. **(May 07Dec 10)**

2. Give the applications of AC potentiometers. **(Dec 07)**

3. With fundamentals distinguish between DC and AC potentiometer, and give any two specific applications for each. **(May 09, Dec 11)**

4. Explain in detail about motion sensor.

5. Explain in detail about working of resolver.

6. Explain in detail about working of encoder and its applications.

7. Describe the basic working principle of optical sensor.

8. Describe the construction and working of magnetic sensors.

9. Explain the construction and working of inductive sensors.

10. Explain the basic structure of LVDT and its operation.

11. Explain the basic structure of RVDT and its operation.

12. Define Synchro, construction and working.

13. List out the various types of Accelerometer and working principle.

14. Explain the operation and application of GPS.

15. Explain the operation and application of Bluetooth.

16. Explain the operation and application of Laser range Sensor (LIDAR).

Unit III

FORCE, MAGNETIC AND HEADING SENSORS

Part A

1. What is gauge factor?
2. What are the different types of strain gauge?
3. What are the factors to be considered for bonded strain gauge?
4. What is strain?
5. What is young's modulus?
6. Mention the application of strain gauge.
7. Define load cell.
8. List out the various kinds of load cells.
9. What are the advantages of load cell?
10. What are the disadvantages of load cell?
11. Enumerate use of load cell.
12. What is magnetic sensor?
13. List out the various types of magnetic sensors.
14. Define magnetoresistive sensor.
15. What is magnetostrictive detector?
16. Mention the advantages of magnetoresistive sensors.
17. Mention the disadvantages of magnetoresistive sensors.
18. Enumerate some of the applications of magnetoresistive sensor.
19. What is Hall Effect sensor?
20. What are the types of Hall Effect sensors?
21. What is current sensor?
22. What are the basic principles of current sensors?
23. What are the types of current sensors?
24. What are the advantages of current sensor?
25. What are the disadvantages of current sensor?
26. Mention applications of current sensors.
27. What is heading sensor?
28. Define compass.
29. Define gyroscope.
30. What are the types of gyroscope?
31. What are the applications of gyroscope?

32. What is inclinometer?

33. What are the various types of inclinometer?

34. List the applications of inclinometer.

Part B & Part C

1. Describe the construction and working of strain gauge.

2. Describe the construction and working of load cell.

3. Explain the various types of magnetic sensors and working principle.

4. Explain the details about resistive sensors and its application.

5. Define Hall Effect, draw and explain the Hall Effect sensor.

6. Explain the basic principle of compass and its types.

7. Explain the basic principle of gyroscope and its types.

8. Explain the basic principle of inclinometer and its types.

Unit IV

OPTICAL, PRESSURE AND TEMPERATURE SENSORS

Part A

1. What are resistive thermometers?
2. What are the different approximation methods of resistive thermometers?
3. What is self-heating error of thermometer?
4. What are the advantages and disadvantages of resistive thermometers (RTD)?
5. What is the principle of hot wire anemometer?
6. Why dynamic compensation is required for hot wire anemometer?
7. What are the applications of thermistor?
8. Mention the features of thermistors.
9. Mention the materials used for thermistors.
10. Explain the principle of various reluctance accelerometer.
11. What is the need of demodulator in variable reluctance accelerometer?
12. What is analog transducer?
13. What is digital transducer?
14. What is piezo electric transducer?
15. What are the suitable materials for piezo electric transducer?
16. What is 'd' coefficient?
17. What is 'g' coefficient?
18. What is 'h' coefficient?
19. What are the suitable materials for magneto-strictive transducer?
20. What is magneto-strictive transducer?
21. What are different magneto-strictive transducers?
22. What are the errors in magneto-strictive transducer?
23. What are the special features of magneto-strictive transducer?
24. What is fibre optic transducer?
25. What are the different digital transducers available?
26. What is piezo electric effect?
27. What are the classifications of piezoelectric transducers?
28. What is photovoltaic cell?
29. What is photo emissive cell?
30. What is LDR?
31. What are the types of LDR?

32. Mention the applications of LDR.

33. What are the advantages of LDR?

34. What are the disadvantages of LDR?

35. What is fibre optic sensor?

36. Draw the block diagram of fibre optic sensor.

37. What are the advantages of fibre optic sensors?

38. What is the disadvantage of fibre optic sensor?

39. Mention the applications of fibre optic sensors.

40. What is pressure sensor?

41. What is the need for pressure sensors?

42. What are the types of pressure sensors?

43. What are tactile sensors?

44. What are the types of tactile sensors?

45. Define thermocouple.

46. List out the advantages of thermocouple.

47. List out the dis advantages of thermocouple.

48. Give any applications of smart sensors.

Part B & Part C

1. Explain the principle of photo conductive cell. **(May 05, 07, 09, Dec 05, 07)**

2. Explain the construction and working of photo voltaic with near sketch. **(May 05, Dec 03, 06, 08, 09)**

3. Discuss in detail about photo resistive. **(Dec 11)**

4. Explain the various types of temperature transducer. **(Dec 04, 05, 08)**

5. Explain the functions of piezo electric transducer. **(May 04, 09, 10, 11, Dec 04, 11)**

6. Describe the piezo electric transducer and give the formula for coupling coefficient. **(May 04, 09, 10, 11 Dec 04, 11)**

7. Explain the construction and working of LDR with neat sketch.

8. Explain the construction and working of fibre optic sensor.

9. Explain the construction and working of pressure sensor.

10. Explain the construction and working of tactile sensor.

11. Explain the construction and working of temperature IC.

12. Explain the construction and working of thermistor.

13. Explain the construction and working of RTD.

14. Explain the construction and working of thermocouple.

15. Explain the construction and working of acoustic sensor.

16. Explain the construction and working of flow and level measurement.

17. Explain the construction and working of radiation sensor.

18. Explain the construction and working of smart sensors.

Unit V

SIGNAL CONDITIONING AND DAQ SYSTEMS

Part A

1. Compare digital transducer with analog.
2. How will you achieve resolution with digital transducer?
3. What is digitizer?
4. What are the classifications of encoder?
5. What are the input characteristics of transducer?
6. What is zero error of the transducer?
7. What are the different transfer characteristics of the transducer?
8. What is the need of sample and hold circuit in A/D converter?
9. Draw the simple sample and hold circuit?
10. What is single channel data acquisition system?
11. What is multi-channel data acquisition system?
12. Define environmental monitoring.
13. What is data acquisition system?
14. What are the types of data acquisition system?
15. List out the major drawbacks in using it as a DAS.
16. Draw the generalising DAS system.
17. List out the various general configurations DAS.
18. List out the objectives of data acquisition system.

Part B & Part C

1. Explain the construction and working of amplification and its types.
2. Explain the construction and working of filtering and its types.
3. Describe operation of sample and hold circuits with relevant waveform.
4. Explain the construction and working of single channel and multi channel data acquisition system.
5. Explain the construction and working of data logging.
6. List out the applications DAS in automobile industry.
7. List out the applications DAS in aerospace.
8. List out the applications DAS in home appliances.
9. List out the applications DAS in manufacturing.
10. List out the applications DAS in environmental monitoring.