



B.E DEGREE EXAMINATIONS: JUNE 2015

(Regulation 2009)

Third Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

EIE101: Transducer Engineering

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. A measure of the repeatability of a measurement of some quantity is
 - a) Error
 - b) Precision
 - c) Accuracy
 - d) Significant
2. Self generating type transducers are _____ transducers.
 - a) Active
 - b) Passive
 - c) Secondary
 - d) Inverse
3. Precision of a measuring device tells about
 - a) The degree of freedom from random error
 - b) How close the output reading of the instrument is to the correct value
 - c) The closeness of the readings when the same input is applied repetitively over a short period of time
 - d) All of the above.
4. Sensitivity of the transducer is
 - a) The quality of output produced by the transducer
 - b) The variation of output produced under any disturbed condition
 - c) The output produced per unit change in the input quantity being measured
 - d) The correctness of the output produced as a proportion to the input variation
5. Dummy strain gauge is used along with measuring strain gauge to
 - a) to compensate for the change caused by change in battery voltage
 - b) to compensate for the change caused by humidity variation
 - c) to compensate for the change caused by temperature variation
 - d) to compensate for the change caused by resistance variation

6. What device is similar to an RTD but has a negative temperature coefficient?
 - a) Strain gauge
 - b) Thermistor
 - c) Negative-type RTD
 - d) Thermocouple
7. For the measurement of weight type weighing machine we can use
 - a) LVDT type transducer
 - b) Thermocouple transducer
 - c) Thermistor type transducer
 - d) Capacitor Microphone
8. Capacitive transducers are normally employed for ----- measurements
 - a) static
 - b) Dynamic
 - c) Both static and dynamic
 - d) transient
9. Gas lighter uses the principle of
 - a) Hall effect
 - b) Piezo-electric effect
 - c) Piezo-resistive effect
 - d) friction
10. Shaft encoders are used
 - a) To measure the linear displacement of shaft
 - b) To measure the linear velocity of the shaft
 - c) To measure the angular position of the shaft
 - d) To measure the torque of the shaft

PART B (10 x 2 = 20 Marks)

11. What do you mean by static calibration?
12. Add 826 ± 5 to 628 ± 3 .
13. Define Resolution and Linearity of an instrument.
14. Draw the time response of a first-order instrument to a unit impulse signal.
15. Draw any two potentiometer circuits used for displacement measurement
16. What is self-heating error of thermometer?
17. What are the desirable features of capacitive transducer?
18. Sketch the desired frequency response of a capacitor microphone
19. Write any two applications of smart sensors.
20. How can piezoelectric transducer be used as an accelerometer?

PART C (5 x 14 = 70 Marks)

21. a) In a test temperature is measured 100 times with variations in apparatus and procedures. After applying the corrections, the results are:
Temperature °C :397 398 399 400 401 402 403 404 405
Frequency :1 3 12 23 37 16 4 2 2
Calculate the arithmetic mean, the average deviation, the standard deviation and the probable error.

(OR)

- b) (i) Classify standards and give example for each level of standard (9)
(ii) Describe the factors to be considered in the selection of a transducer (5)
22. a) (i) Derive the operational transfer function of a second-order instrument (7)
(ii) Obtain the step response of a second-order instrument. (7)
- b) (i) Obtain the ramp response of a first order instrument (7)
(ii) What is meant by zero order instruments? Illustrate with two examples. (7)
23. a) (i) Describe various types of Strain gauge with their advantages and disadvantages (10)
(ii) Explain the operation of piezo-resistive sensor. (4)

(OR)

- b) (i) Describe the temperature Vs resistance characteristic of a thermistor with equation. Explain any one method of linearizing thermistor characteristic. (7)
(ii) Explain the principle of operation, construction details and applications of Hot-wire anemometer (7)
24. a) (i) Describe the construction of LVDT and explain its operation with the aid of a diagram (10)
(ii) List the advantages, disadvantages and applications of LVDT (4)
- (OR)**
- b) Explain variable distance type and variable area type capacitive transducers and give their applications. (10)
Write a brief note on capacitor microphone (4)

25. a) (i) Explain how a fiber optic sensor work and list out its advantages (5)
(ii) Define magnetostrictive effect also name two materials used in magnetostrictive (9)
transducers and describe any one application of magnetostrictive transducer.

(OR)

- b) (i) Explain with a sketch the working of an encoder that gives 4-bit digital output proportional to linear displacement. Mention the advantages of digital transducers.
