Total No. of printed pages = 6

END SEMESTER EXAMINATION, NOVEMBER- 2018

Semester – 5th

Subject Code : Et-507

ELECTRONICS INSTRUMENTATION

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

Instructions :

1. All questions of PART–A are compulsory.
2. Answer any *five* questions from PART–B.

PART – A
Marks – 25

1. Fill in the blanks : 1×10=10

   (a) The resistance of the metal ——— with temperature.

   (b) Temperature measurement using thermo-electric sensor is discovered by ———.

   (c) Radiation Pyrometer is a non-contact type ——— measurement instrument.

[Turn over

(d) ——— function is a function of instruments and measuring system.

(e) Operation of a Pirani gauge depends on the variation of ——— of a gas with pressure.

(f) The accuracy of null type of instruments is ——— than that of deflection type.

(g) The quantity under measurement makes its first contact with the ——— sensing element.

(h) Thermistors are fabricated from the ——— materials.

(i) Turbine flow meters are ——— flow meters.

(j) Diaphragms is an ——— transducer.

2. Write true or false : 1×10=10

(a) Rayleigh current balance is a secondary instrument.

(b) Null type instrument is more sensitive than deflection type instrument.

(c) For dynamic measurement null type instrument is more suitable than deflection type instrument.

(d) Primary sensing element is one of the main functional elements of a measuring system.

(e) Wire-wound potentiometer may be used as a transducer for converting mechanical displacement to an electrical output.

(f) In self-generating types inductive transducer current signal is generated.

(g) Non self-generating type inductive transducer no external source is required.

(h) In LVDT type transducer soft iron core provides magnetic coupling between primary and secondary coils.

(i) Barium Titanate may be used as a piezo-electric transducer.

(j) Pirani gauge is used to measure the pressure of 10-8 mm of Hg.

3. Choose the correct answer : 1×5=5

(a) Electromagnetic tachometer generators are used for measurement of

(i) vibrations (ii) linear velocity

(iii) angular velocity (iv) acceleration

(b) Seismic accelerometer is used for the measurement of

(i) velocity (ii) acceleration

(iii) temperature (iv) pressure

(c) The conductivity of the liquid for the measurement of velocity of a liquid using electromagnetic flow meter should be

(i) higher than 10μΩ/m

(ii) less than 10μΩ/m

(iii) equal to 10μΩ/m

(iv) does not matter

(d) In AC tachometer generator the magnet is

(i) fixed (ii) moving

(iii) partially fixed (iv) does not matter

(e) Piezo-electric accelerometers are useful for

(i) low frequency

(ii) high frequency

(iii) in all frequencies

(iv) None of these

PART – B

Marks – 45

4. Describe the measurement technique of a deflection type instrument (PMMC type) and null type instrument (DC potentiometer type). 4+5=9

5. (a) What are the desirable characteristics of a transducer for its selection for a particular application ? 5

(b) What are the main factors for the selection of motion transducer ? 4

6. (a) Describe the measurement method for measuring motion using variable inductance transducer. 4

(b) What is LVDT transducer ? How it can be used for the measurement of linear and rotational motion of an object ? 1+4=5

7. (a) What do you mean by piezo-electric transducer ? How can it be used to measure the developed potential inside it and the pressure imposed on it ? 1+4=5

(b) A quartz crystal has charge sensitivity of 2pc/N. Its dielectric constant is 4.5 and Young's modulus is 9×1010 Pa. Find the voltage sensitivity constant. 4

8. What are the different types of opto-electrical transducer ? Discuss each of them. 9

9. Describe the low pressure measurement method using Pirani gauge and ionization type vacuum gauge. 5+4=9

10. With the help of necessary sketch, explain the operation principle of Drag Cup Rotor AC tachometer and also write the advantages and disadvantages of it. 9

11. (a) Deriving the necessary formula, describe the operating principle of electrical resistance thermometer. 5

(b) A platinum resistance thermometer has a resistance of 140.5Ω and 100Ω at the 1000C and 00C respectively. If its resistance becomes 305.3Ω when it is in contact with a hot gas, determine the temperature of the gas. The temperature co-efficient of platinum is 0.00390C-1. 4