K17P 0400

Reg. No. : .....

Name : .....

Fourth Semester M.Sc. Degree (Reg./Suppl./Imp.) Examination, March 2017

PHYSICS

(2014 Admission Onwards)

PHY 4E08 : Electronic Instrumentation

Time : 3 Hours Max. Marks : 60

SECTION – A

Answer **both** questions (either **a** or **b**) :

1. a) Explain the basic characteristics of measuring devices.

OR

b) Explain the electrostatic deflection of a CRT beam and deduce the expression for deflection on the fluorescent screen in meters and deflection factor G of the CRT.

2. a) Explain with necessary figures the working of
   a) Variable capacitor transducer
   b) Hall effect angular displacement transducer.

OR

b) Explain with circuit diagram Wheatstone bridge for strain measurement in a strain gauge. Draw the Poisson configurations and obtain the expression for output voltage of
   a) Half Bridge b) Full Bridge **(2×12=24)**

SECTION – B

Answer **any four**. (**1** mark for Part **a**, **3** marks for Part **b**, **5** marks for Part **c**) :

3. a) Define repeatability.

b) Explain the difference between precision and accuracy.

c) For the given finite data, calculate the standard deviation.

X1 = 101.2 X2 = 101.7 X3 = 101.3 X4 = 101 X5 = 101.5 X6 = 101.3
X7 = 101.2 X8 = 101.4 X9 = 101.3 X10 = 101.1

P.T.O.

4. a) What is compensated attenuator ?

   b) Draw the basic block diagram of an Oscilloscope.

   c) The two deflection plates of a CRT are separated by 1 cm and the effective length of the deflection plates is 3 cm. The accelerating potential is 1200 V. Calculate the voltage required across the deflection plates to deflect an electron beam 1°.

5. a) State any three major electrical transduction principles.

   b) Explain level measurement technique.

   c) The maximum output of an LVDT is 5.2 V. The range of the position of the core is ±0.5 cm. Calculate the output voltage when the core is – 0.25 cm. from the centre.

6. a) What is gauge sensitivity ?

   b) State the theory of operation of a resistance strain gauge.

   c) A resistance strain gauge with a gauge factor 2 is mounted on a steel bean which is subjected to a strain of 1×10^{-6}. If the original resistance value of the gauge is 130 Ω , calculate the change in resistance.

7. a) What is turn off time of a thyristor ?

   b) Draw and explain the forward gate characteristics of a thyristor.

   c) For an SCR, the gate cathode characteristic has a straight line slope of 130. For trigger source voltage of 15 V and allowable gate power dissipation of 0.5 W, compute the gate source resistance.

8. a) What is electrocardiogram ?

   b) Briefly describe electromyograph.

   c) Explain the basic principle of medical ultrasound scan. Mention any three advantages of MRI scan. **(4×9=36)**
