Seat No. : _____

LG-105

April-2014

B.Sc., Sem.-VI

Electronics : (CC-310)

Time : 3 Hours] **[Max. Marks : 70**

Instructions : (1) **All** questions carry equal marks.
(2) Symbols used here have their usual meanings.
(3) Figures to the right indicate marks.

1. (a) Write the force summing devices used for displacement transducer. Explain the construction and working of linear variable differential transformer. **8**

OR

Name the different temperature measurement devices. Explain thermistor and its characteristics.

(b) Name different photosensitive devices and explain photomultiplier in detail. **6**

OR

The resistance strain gage with a gage factor of 2.4 is mounted on a steel beam whose modulus of elasticity is 2×10^6 kg/cm^2. The strain gage has an unstrained resistance of 120.0 Ω which increases to 120.1 Ω when the beam is subjected to a stress. Calculate the stress at the point where the strain gage is mounted.

2. (a) Classify the discrete time signals and discuss the following signals. **8**

(i) Energy and power signals

(ii) Even and odd signals

OR

(i) Write convolution property of Z transform and compute the convolution of the two sequences.

$x(n) = \{2, 1, 0, 0.5\}$ $L(n) = \{2, 2, 1, 1\}$

(ii) Write initial value theorem and final value theorem

If $X(z) = 2 + 3z^{-1} + 4z^{-2}$. Find the initial and final values of the corresponding sequences $x(n)$.

(b) Write the advantages of digital signal processing. **6**

OR

Write the methods of evaluation of the inverse Z transform and explain one of them.

3. (a) Obtain the solution of Laplace equation in rectangular co-ordinate. **7**

OR

Explain hystersis loop in detail.

(b) Obtain the Maxwell's equation and discuss the displacement current term. **7**

OR

Explain the radiation pressure. Derive necessary equations to show that Poynting Vector gives not the pressure but also the momentum of electromagnetic waves.

4. (a) Explain band theory from collective approach. **8**

OR

Explain drift under electric field, diffusion and generation recombination and derive the continuity equation.

(b) Obtain an expression for the conductivity of semiconductor in terms of charge carrier densities and their mobilities. **6**

OR

Discuss the diffusion of hole in n type semiconductor bar and obtain the expression for current density.

5. Answer in **one** or **two** sentence : **14**

(1) Define Transducer.

(2) Which gas is filled in gas filled phototube ?

(3) Write disadvantage of Piezoelectric transducer.

(4) What s RTD ?

(5) Find the Z transform of $x(n) = \delta (n - k)$.

(6) Write two properties of ROC for Z transform.

(7) What is static system ?

(8) Define unit Impulse function.

(9) Write Poisson's equation.

(10) Draw the diagram of electromagnetic spectrum.

(11) Write ferromagnetic substance.

(12) Draw energy band diagram for conductor and insulator.

(13) What is Einstein Relation ?

(14) Write two applications of continuity equation.

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