1310N706

Candidate's Seat No :_____

B.Sc. Sem.-6 (Rep) Examination

CC-310

Electronics

October-2025

Time : 2-30 Hours] **[Max. Marks : 70**

Instructions: (1) **All** questions carry equal marks
(2) The symbols have their usual meanings & figures to the right indicate marks.

1 (A) Define Strain gage. Derive the expression of gage factor. 7

(B) Explain in detail about Variable differential transformer transducer with figure: (a) essential components of the LVDT; (b) relative positions of the core generate the indicated output voltages. The linear characteristics impose limited core movements, which are typically up to 5 mm from the null position. 7

OR

(A) Name nine electrical principles most commonly used in the measurement of displacement. Explain capacitive transducer with diagram. Also explain double coil and single coil inductive transducer with diagram. 7

(B) With the help of figures explain Resistance thermometers in detail. 7

2 (A) Explain Deterministic and Non-deterministic signals. Also explain periodic and aperiodic signals in detail with some examples of periodic signals. 7

(B) Explain (a) Static and dynamic systems, (b) Linear and nonlinear systems, (c) Time-variant and Time-invariant systems, (d) Causal and non-causal systems & (e) Stable and unstable systems in detail. 7

OR

(A) Define discrete-time signal. Explain Unit-impulse function, Unit-step function and Unit ramp function in detail. 7

(B) Define Z-transform and Inverse Z-transform. Explain region of convergence (ROC). List important properties of the ROC for the z-transform. 7

3 (A) Obtain Maxwell's equations and discuss displacement current term. 7

(B) Explain solution of Laplace's Equation in Rectangular Coordinates 7

OR

(A) Explain the theory of polarization of electromagnetic waves. 7

(B) Explain the theory of radiation pressure and momentum of electromagnetic waves. 7

4 (A) Explain in detail about formation of energy bands. 7

(B) Write in detail about Intrinsic conduction in semiconductors. 7

OR

(A) Explain in detail about band theory from collective approach. 7

(B) Explain in detail about evaluation of conductivity for a semiconductor with diagram. 7

5 Attempt any **SEVEN** out of twelve. 14

1 In a photomultiplier the electronics emitted by the _____ are electrostatically directed toward a secondary emitting surface, called a dynode.

2 _____ has disadvantage of introducing a third dissimilar metal.

3 The mechanical elements that are used to convert the applied force into a _____ are called force-summing devices.

4 The frequency spectrum drawn only for positive values of frequencies alone is called _____ spectrum.

5 A discrete-time system is modelled by a difference equation, whereas a continuous-time system is modelled by a _____ equation.

6 If x(n) is anti-causal, then the ROC includes z = _____.

7 The velocity of the _____ wave in free space is given by $v_o = 2.99784 \times 10^8$ ms^{-1}

8 In hysteresis, with the iron core unmagnetized at the beginning of the experiment, H may be increased in increments _____.

9 If E and H are perpendicular to the propagation vector k. Such a wave is called _____ wave.

10 In a pure semiconductor the density of electrons in the conduction band and the hole density in the valance band are _____. Such a semiconductor is called intrinsic semiconductor.

11 A drop of ink in water spreads out is called _____ phenomenon.

12 In semiconductors, every electron that jumps to the conduction band leaves behind an empty quantum state in the _____ band.