

Seat No. : _____

XD-128

T.Y.B.Sc.

March-2013

Electronics : Paper – X

Time : 3 Hours]

[Max. Marks : 70

- Instructions :** (1) Figure on right indicate marks of the question.
(2) The symbols have their traditional meaning.
(3) Draw neat sketches wherever necessary.

1. (a) Draw the block diagram of basic telephone set and describe the functions of each block. **6**

OR

Explain cellular concepts and describe multiple access methods used in cellular systems.

- (b) Discuss the role of microcontroller in modern electronic telephones. **6**

OR

State the basic characteristics and features of a 3G cell phone.

- (c) Write short answers : **2**
(i) What is Vocoder ?
(ii) What is PBX ?

2. (a) Describe working of Internet. **6**

OR

With respect to computer, what is network ? Classify and describe them.

- (b) Write a note on TCP/IP. **6**

OR

Discuss network topology in detail.

- (c) Write short answers : **2**
(i) What is PAN ?
(ii) What is router ?

3. (a) Write a note on : **6**

- (1) Linear and non-linear system
(2) Causal and non-casual system
(3) Time invariant and time variant systems

OR

Write the correlation property of z transform and determine the cross-correlation sequence of :

$$x_1(n) = (1, 2, 3, 4)$$

$$x_2(n) = (4, 3, 2, 1)$$

- (b) Discuss the state variable method for representation of an electronic system. **6**

OR

(i) Write the scaling property of z transform and find the z transform of $x(n) = 2^n u(n-2)$.

(ii) Write the linearity property of z transform and find the z transform of $x(n) = \delta(n+1) + 3\delta(n) + 6\delta(n-3) - \delta(n-4)$

- (c) Write short answers : **2**

(i) Define unit impulse function.

(ii) Write the statement of initial value theorem for z transform.

4. (a) Discuss the motion of electron in the presence of electric field in semiconductor and obtain the expression for mobility. **6**

OR

Calculate built in voltage for PN junction under equilibrium.

- (b) Obtain the Einstein's relation for non-uniformly doped P type material. **6**

OR

Discuss the diffusion of hole in non-uniformly doped N-type semiconductor.

- (c) In germanium, electrons are excited across the forbidden energy gap with $E_g = 0.75$ eV by photons. Calculate the maximum wavelength for photons which will give electron-hole pair in this semiconductor. **2**

where $h = 6.624 \times 10^{-34}$ Joule-sec, $C = 3 \times 10^8$ m/sec.

OR

Draw the diagram which shows band formation in silicon.

5. (a) What is Hysteresis ? Explain it using necessary diagrams. **5**

OR

State and prove uniqueness theorem.

- (b) Discuss the polarization of electromagnetic waves. **7**

OR

Obtain the Lorentz transformation equation for electromagnetic potentials.

- (c) Find the phase velocity of plane waves at frequency 10 GHz in polyethelene. $[\mu = \mu_0, \epsilon_R = 2.3, C = 3 \times 10^8$ m/sec] **2**

OR

Calculate relaxation time for copper conductor. $[\epsilon \simeq \epsilon_0 = 8.854 \times 10^{-12}$ F/m and $\sigma = 58 \times 10^6$ (rm)⁻¹]