Exam.Code:0005
Sub. Code: 0449

2021
B.A./B.Sc. (General) Fifth Semester
Physics
Paper – B: Electronics and Solid State Devices – I

Time allowed: 3 Hours Max. Marks:20

NOTE: *Attempt five questions in all, including Question No. VII (Unit-III) which is compulsory and selecting two questions each from Unit I - II.*

x-x-x

UNIT – I

I. a) Using block diagram, describe the various parts of CRO. Why sweep circuit is necessary?

b) What do you mean by voltage source and current source? Explain. (2,2)

II. a) Show that at absolute zero temperature fermi level of a semiconductor lies exactly at middle of the top and bottom of the conduction band. What happens to fermi level, when temperature increases?

b) Determine the number density of donor atoms to give a N type germanium having conductivity of $4\Omega^{-1}$ cm^{-1}. Given electron mobility in N type germanium = 3800 cm^2 / volt-sec. (2,2)

III. a) Explain principle, construction and working of photodiode. Explain 1-V Characteristics of a photodiode.

b) Derive an expression for density of electrons in conduction band in terms of energy gap of intrinsic semiconductor. (2,2)

UNIT – II

IV. Explain the working of a Capacitor filter in a full wave rectifier with resistive load. Derive the expression for ripple factor of the full wave rectifier using a capacitor (4)

V. a) Draw the input and output characteristics of common collector p-n-p transistor. Explain active, saturation and cutoff regions.

b) A bipolar junction transistor has $I_B = 40\mu A$, $\beta = 99$ and $I_{co} = 2\mu A$. What is the collector current? (2,2)

P.T.O.

VI. a) Explain the working of potential divider bias method and derive an expression for its stability factor.

b) In a fixed bias circuit R_B = 120 kΩ, R_c= 2 kΩ, V_{cc} = 12 V, V_{BE} = 0.7 V. Find the value of base current. (2x2)

UNIT – III

VII. Attempt the following:-

a) What is time base circuit?

b) What is aquadag coating?

c) What do you mean by power dissipation in Zener diode?

d) Why common base configuration is seldom used? (4x1)

x-x-x