

# RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.SC. SECOND SEMESTER EXAMINATION, MAY-JUNE 2013

FIRST YEAR

Electronic (General)

Date : 22/05/2013

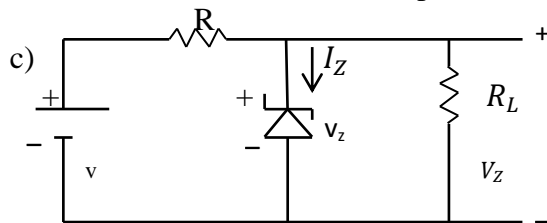
Time : 11am – 1pm

Paper : II

Full Marks : 50

Answer **any five** questions

1. a) Distinguish between intrinsic and extrinsic semiconductors.  
b) The Intrinsic carrier density at room temperature in Ge is  $2.37 \times 10^{19}/m^3$ . If the electron and hole mobilities are 0.38 and  $0.18 m^2/(Vs)$ , respectively, calculate the resistivity. 5+5
2. a) How does the position of the Fermi level in an extrinsic semiconductor change if the temperature is raised?  
b) What do you mean by 'effective mass' of electrons in a semiconductor?  
c) Show that the mobility of the electrons in a semiconductor is  $\mu = -\frac{e\epsilon}{m^*}$  where symbols have their usual meaning. 3+2+5
3. A full wave P-N diode rectifier uses load resistor of  $1500\Omega$ . No filter is used. Assume each diode to have idealized characteristic with  $R_f = 10\Omega$  and  $R_r = \alpha$ . The sinusoidal voltage applied to each diode has an amplitude of 30V and frequency of 50Hz. Calculate
  - (i) peak d.c load current
  - (ii) rms load current
  - (iii) d.c. power output
  - (iv) a.c. power input
  - (v) rectifier efficiency 2x5
4. a) Distinguish between avalanche and Zener break downs.  
b) "The barrier potential across a p-n junction diode cannot be measured by placing a voltmeter across the diode terminals" –Explain.



In the above circuit the supply voltage  $v=15$  volt The  $12 v$ ,  $0.36 w$  zener diode operates at a minimum diode current of  $2mA$ . Calculate the series resistance  $R$  and the range over which the load resistance  $R_L$  can be varied.

5. a) Explain the operation of a bridge rectifier using  $\pi$  type filter with the help of a circuit diagram.  
b) Distinguish between full wave and bridge rectifiers. 5+5
6. a) Draw and explain input and output characteristics of a transistor in CE configuration.  
b) Establish the relation between  $\alpha$  and  $\beta$ . 3+3+4
7. a) When is the channel of a JFET is said to be pinched off?  
b) Give the relationship between the pinch off voltage, the saturation voltage and the gate source voltage.  
c) Discuss the principle of operation of an n-channel enhancement and depletion MOSFET. 2+4+4

