Exam.Code:0472
Sub. Code: 3705

2022
M.Sc. (Physics)
First Semester
PHY-8014: Electronics – I

Time allowed: 3 Hours | Max. Marks: 60

***NOTE**: Attempt <u>five</u> questions in all, including Question No. 9 (Unit-V) which is compulsory and selecting one question each from Unit I - IV.*

x-x-x

Unit – I

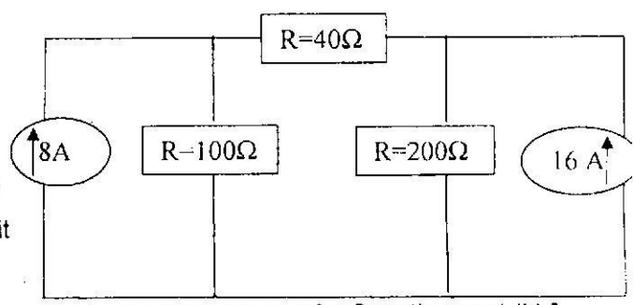
1. Explain the idea of energy band theory in semiconductor devices. Also explain the significance of energy band diagrams in electronics. With the help of a suitable diagram, discuss the useful information linked with the position of Fermi level.
2. Explain the construction details of Light Emitting Diode with the help of a suitable diagram. Also explain the I-V characteristics for this device. Discuss how its working is different from Laser diode for similar applications.

Unit – II

3. Explain the working of the Band Pass Filter network using circuit diagram by calculating the Characteristic Impedance. Also draw the circuit diagram and output waveform for the Band Pass Filter network. Write some important applications of Band Pass Filter in electronics.

4.(a). Explain the Norton Theorem with the help of a simple resistive network. Also write some of its important applications in electronics.

(b). By using Nodal Analysis, determine the voltage across the 40 Ω **resistor** as shown in the circuit



[Circuit Diagram for Question no.4 (b)]

Unit – III

5. Write a short note on followings:
   (a). IC 555 Timer based circuit,
   (b). Basic internal circuit of IC Op-amp.
6. (a). Discuss the application of an Op-amp configuration as an Integrator with the help of a suitable diagram
   (b). Design an analogue computation circuit for Solving differential equations using an Operational Amplifier .

Unit - IV

7. (a). What is Active filter? Why it is so called? How it is different from normal Passive filters?
   (b). Explain the working of a pnpn power device? Also show its basic characteristics.
8. (a) Write short notes on the General Communication system with the help of a block diagram?
   (b). What is TDMA System? Differentiate it from the FDMA system with reference to a particular application in communication. **<u>(12 x 4 = 48).</u>**

P.T.O.

Unit – V

9. Attempt all questions:

(a). What is the concept of Multiple access in communication system?

(b). What is the significance of studying the Transmission matrices in circuit analysis?

(c). How common mode rejection ratio is calculated in electronics?

(d). Explain the difference between **Admittance** and **Impedance**.

(e). What is the significance of **Photo-conductivity** in semiconductor devices?

(f). What is the advantage in the studying the carrier concentration of semiconductors?

(6x2)