

(i) Printed Pages : 4

Roll No.

(ii) Questions : 9

Sub. Code :

2	6	1	0	4
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Exam. Code :

0	4	7	2
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M.Sc. Physics 1st Semester

(2125)

ELECTRONICS—I

Paper : PHY-8014

Time Allowed : Three Hours]

[Maximum Marks : 60

Note :— Attempt **five** questions in all, selecting **one** question from each unit (Unit I to IV). Question No. **9** of Unit V is compulsory.

UNIT—I

1. Explain the concept of energy band theory in semiconductors. Discuss the importance of energy band diagrams in electronic devices and illustrate how the position of the Fermi level provides useful information. 12
2. (a) Explain the fabrication of a p-n junction diode and discuss the current flow mechanism under forward and reverse bias conditions. 6
(b) Derive expressions for diffusion and depletion capacitances of a p-n junction. 6

UNIT—II

3. (a) Define and derive Admittance (Y), Impedance (Z), Hybrid (h), and Transmission (ABCD) parameters for two-port networks. 6
- (b) Discuss the applications of these parameters in network analysis and communication systems. 6
4. (a) Explain Thevenin's theorem with the help of a simple resistive network. Also write some of its important applications in electronics. 6
- (b) By using Nodal Analysis, determine the voltage across the 20Ω resistor as shown in the circuit.

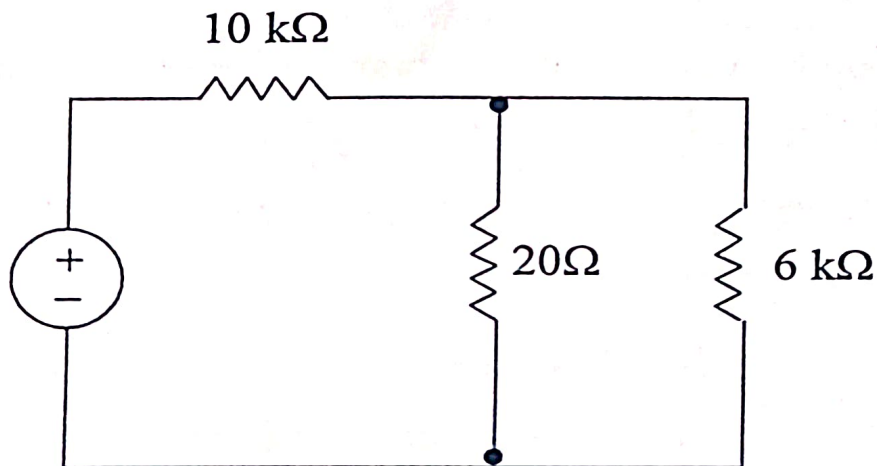


Fig. 1

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UNIT—III

5. (a) Explain the construction and working of a differential amplifier. 6
- (b) Define and derive the expression for Common Mode Rejection Ratio (CMRR). Discuss its importance in OPAMP design. 6
6. (a) Discuss the application of an Op-amp configuration as an Integrator with the help of a suitable diagram. 6
- (b) Design an analogue computation circuit for solving differential equations using an Operational Amplifier. 6

UNIT—IV

7. (a) Explain the structure and working of a pnpn device. How does it differ from a transistor? 6
- (b) Describe the characteristics of a Silicon Controlled Rectifier (SCR) with a neat diagram. 6
8. (a) Explain the working of satellite communication systems with block diagrams. 6
- (b) Describe and differentiate between TDMA, FDMA, and CDMA multiple access techniques used in mobile communication. 6

UNIT—V

9. Attempt all questions:

- (a) Write a short note on Gunn diode and IMPATT diode as high-frequency devices.
- (b) Define carrier mobility and state the factors affecting it.
- (c) What is the difference between open-loop and closed-loop gain?
- (d) Write two applications of a 555 timer.
- (e) What is the function of an active filter?
- (f) Define quality factor (Q) in filters.

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