

(i) Printed Pages : 4

Roll No. ....

(ii) Questions : 9

Sub. Code : 

3	7	0	5
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Exam. Code : 

0	4	7	2
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M.Sc. Physics 1<sup>st</sup> Semester  
(2122)

**ELECTRONICS-I**

**Paper : PHY-8014**

**Time Allowed : Three Hours]**

**[Maximum Marks : 60**

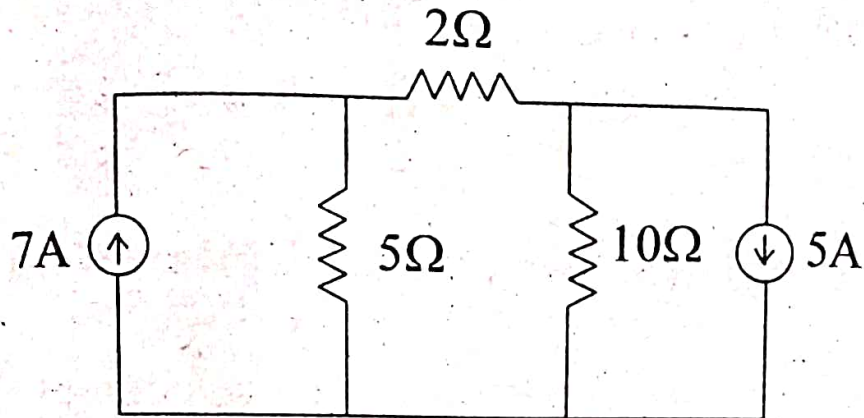
**Note :—**Attempt **FIVE** questions in all, selecting **ONE** question from each unit (Unit-I to Unit-IV). Question No. 9 of the Unit-V is compulsory.

**UNIT—I**

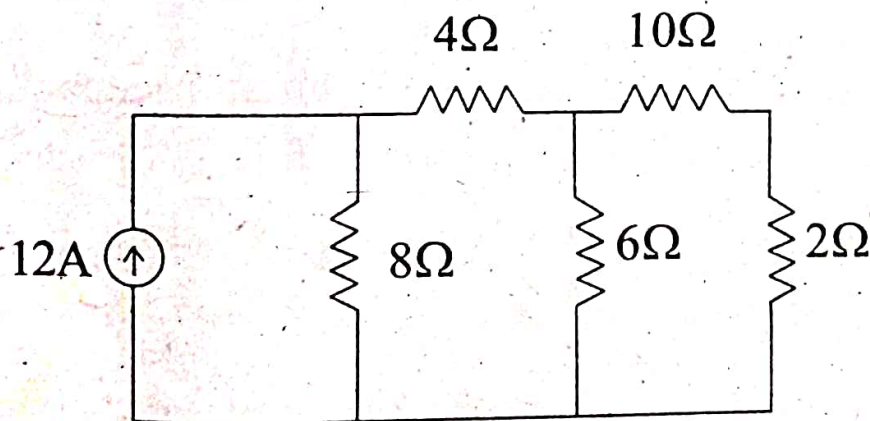
1. (a) Derive the expression for junction capacitance of p-n junction with the relationship for the forward and reverse potential across the junction. Explain the concept of the varactors. 7
- (b) Differentiate between direct and indirect type semiconductors with examples. 5
2. With the help of suitable diagrams, discuss the negative resistance region of following high frequencies diodes :
  - (a) Tunnel diode
  - (b) Impatt diode. 6,6

## UNIT—II

3. (a) What is Mesh analysis ? Explain how it helps in calculating branch current in circuit having three meshes containing resistances and independent voltage sources. 6
- (b) Using the nodal analysis, calculate the current flowing in 2 ohm resistance in figure given below :



4. (a) Calculate the current flowing through 6 ohm resistance using Norton's theorem : 6



- (b) Explain the working and circuit diagram for any two of the following filters :
- (i) LP (Low Pass)
  - (ii) BP (Band Pass)
  - (iii) BR (Band Reject).



### UNIT—III

5. (a) Discuss the application of operational amplifier as integrator and differentiator. 6
- (b) Discuss the IC operational amplifier with the internal structure. Discuss the some of parameters of the operation amplifier. 6
6. (a) What is the differential amplifier ? Draw its transfer characteristics and derive Transconductance. 6
- (b) Discuss the 555 timer based circuit to generate the square wave as output. Derive for expression for the time period. 6

### UNIT—IV

7. (a) Discuss the construction of thyristor devices. Explain the I-V characteristics of thyristor circuit diagram. 6
- (b) Discuss the generation and detection of SSB. 6
8. (a) Differentiate in the working of Amplitude Shift Keying (ASK) and Frequency Shift Keying (FSK) system. 6
- (b) What is code division multiple access system ? Explain it for three stations with proper coding. 6

### UNIT—V

9. Give the point answers of following questions :
- (a) Draw the position of fermi level in p and n type of semiconductors. Give its significance.

- (b) Define the carrier life time. Give its importance.
- (c) Define the admittance parameter for the two port network.
- (d) If the differential mode gain is  $10^3$  times more than common mode gain. Find CMRR in DB units.
- (e) What are uses of poles for the stability of circuit ?
- (f) In any FM system if  $m_f$  becomes four times by halving modulating frequency. What is the change on the maximum deviation ?

$$6 \times 2 = 12$$