

(i) Printed Pages : 3

Roll No.

(ii) Questions : 9

Sub. Code :

3	7	0	6
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Exam. Code :

0	4	7	2
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M.Sc. Physics Ist Semester

1128

ELECTRONICS-I

Paper-PHY-6005

Time Allowed : 3 Hours]

[Maximum Marks :60

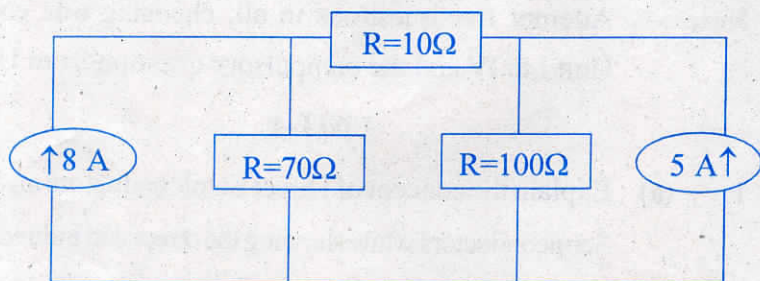
Note :- Attempt **five** questions in all, choosing **one** each from Unit I to IV and the compulsory question from Unit V.

UNIT-I

1. (a) Explain the concept of Direct Semiconductors and Indirect Semiconductors while showing the direct and indirect electron transition behavior accompanying photon emission.
(b) What is transferred-electron mechanism in semiconductor theory ? Explain any device based on this mechanism in detail while discussing the behavior characteristics of that particular device. 6,6
2. Explain the construction details of Solar Cell, with the help of a suitable diagram. Also explain the I-V characteristics for illuminated Solar cell, along with showing the maximum power area in the plot. Discuss the significance of fill factor for the Solar Cell. 4,4,4

UNIT-II

3. What is the significance of filter circuit in electronics ? Explain that the half section of a filter circuit can be utilized as an Impedance matching device. Calculate the values for the elements of Low Pass (LP) filter to operate at a load of 500Ω with a f_c of 1000 cycles/second. 2,4,6
4. (a) What is Nodal Analysis in electronic circuit theory ? Explain with the help of a simple resistive network.
- (b) By using Nodal Analysis, determine the voltage across the **10 Ω resistor** as shown in the circuit. 6,6



Circuit Diagram for Question No. 4(b)

6,6

UNIT-III

5. What is the Non-inverting configuration Amplifier using operational amplifier ? Draw and explain this Non-inverting configuration amplifier configuration for justification of the fact that the voltage gain is always greater than unity. Also draw the Input-Output Characteristics for this Non-inverting configuration. 2,6,4
6. (a) Design a circuit in which the buffered amplifier is connected to basic Differential Amplifier using operational amplifier.
- What will be the output circuit ?

- (b) How you can design an Integrator circuit from Inverting Amplifier using operational amplifier ? What will be relation for output voltage in this circuit ? 6,6

UNIT-IV

7. Discuss the basic terminal characteristics of Silicon Controlled Rectifier, explaining the constructional features with the help of a suitable diagram. Explain the three modes of operation for Silicon Controlled Rectifier, while discussing the I-V characteristics of Silicon Controlled Rectifier. 6,6
8. Write short notes on the following :
- (a) **Cellular Structure** of Mobile Communication System. 6
- (b) Difference in working of FDMA, TDMA, CDMA. 6

UNIT-V

9. Attempt all questions :
- (a) What is the 'incremental resistance' in pnpn devices ?
- (b) What is the significance of a Bode plot in Circuit analysis?
- (c) What is the significance of **Diffusion Flux** in semiconductors ?
- (d) Explain the difference between **Active** and **Passive** Filters.
- (e) What is the meaning of the term '**Gate Triggering**' in SCR working ?
- (f) What is the value of time delay period for Voice and Data in case of Satellite Communication ? $2 \times 6 = 12$