

(i) Printed Pages : 4

Roll No.

(ii) Questions : 9

Sub. Code :

3	2	2	6
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Exam. Code :

4	7	2
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M.Sc. 1st Semester

1125

PHYSICS

Paper– Phy–6005 : Electronics–I

Time Allowed : Three Hours]

[Maximum Marks : 60

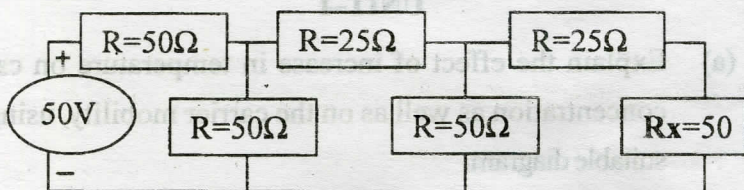
Note:– Attempt **five** questions in all. Choosing **one** each from Unit–I to IV and the compulsory questions from unit–V.

UNIT–I

1. (a) Explain the effect of increase in temperature on carrier concentration as well as on the carrier mobility, using the suitable diagram.
(b) Calculate the change in Barrier Potential of a PN junction in Silicon at 300 K if doping on N side is increased by 100 times while keeping doping on P side unchanged. Given that intrinsic carrier density for Silicon is $1.4 \times 10^{16} \text{ m}^{-3}$. 6,6
2. (a) Explain the microwave application of Gunn Diode, with the help of a suitable example. Also show its output response.
(b) Explain with the help of circuit diagram, the operation of Light Emitting Diodes alongwith explaining the charge carrier combination. 5,7

UNIT-II

3. Write short notes on the use of following in the network theory :
- (a) Hybrid Matrix of the network 6
 - (b) Transmission Matrix of the network. 6
4. Define the Norton's Theorem and give the proof of Norton's Theorem alongwith with illustrating the different steps for its derivation. Also use the Norton's Theorem to find the current through the resistor R_x shown in the Diagram.



Circuit Diagram for Question no. 4

12

UNIT-III

5. Design and explain the circuit of Differentiator with use of operational amplifier. Also calculate the output voltage for this circuit if we fed the input to this differentiator, a sinusoidal voltage of peak value of 10 mV and frequency of 1 kHz. Consider the value for Resistor $R = 1000 \text{ k}\Omega$ and Capacitor $C = 10 \mu\text{F}$.

12

6. (a) Discuss in detail the basic internal circuit of Integrated Circuit Operational Amplifier.
- (b) Discuss in detail the use of 555 timer based circuits as Astable Multivibrator using external passive components.
- 5,7

UNIT-IV

7. Discuss CDMA system, showing its block diagram and basic working. Give reasons, how this communication technique helps in improving the spectral bandwidth efficiency. For this reference, compare with some other modulation techniques.
- 12

8. Write short notes on the difference between :

- (a) **FDMA** and **TDMA** systems 6
- (b) Active and Passive Filter Circuits. 6

UNIT-V

9. Attempt all questions :

- (a) What is the meaning of the term 'depth of modulation' in receiver?
- (b) What is the significance of **Peaking amplifier** (using an operational amplifier)?

- (c) What is the use of Antenna in Amplitude Modulation ?
- (d) Define the term **Transfer Function**.
- (e) Explain why Fermi Level is so important.
- (f) What is the significance of an SCR **Triggering Circuit** ?

$$2 \times 6 = 12$$

