

Subject Code—58410

B. Sc. EXAMINATION

(Main/Reappear) (Batch 2018 Onwards)

(Third Semester)

PHYSICS

CPL-303

Course—VI

Semiconductor Devices

Time : 3 Hours

Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

1. (a) What is Depletion region ?
- (b) What is CMRR ?
- (c) Draw the V-I characteristics of ideal diode.

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- (d) Discuss the biasing of transistor in active region.
 - (e) What do you mean by closed loop gain in OPAMP ?
 - (f) What is LED ?
 - (g) What are the uses of oscillator ?
 - (h) Which transistor is mostly used npn or pnp ?
- $8 \times 2 = 16$

Unit I

- 2. (a) Explain the formation of PN junction diode. 8
- (b) What is Zener diode ? Discuss Zener diode as voltage regulator. 8
- 3. (a) Discuss the working of central taped full wave rectifier. 10
- (b) Find the resistivity of an intrinsic semiconductor with intrinsic concentration of 2.5×10^{19} per m^3 . The mobilities of electrons and holes are $0.40 m^2/V-s$ and $0.20 m^2/V-s$. 6

Unit II

4. (a) What do you mean by the following terms : 8
- (i) saturation region
 - (ii) load line
 - (iii) Q-point.
- (b) Explain the input and output characteristics of npn transistor in CB configuration. 8
5. (a) What do you understand by current gain in transistor ? Derive the relation in between different types of current gain. 10
- (b) For a certain transistor, $I_B = 20 \mu A$; $I_C = 2 \text{ mA}$ and $\beta = 80$. Calculate I_{CBO} . 6

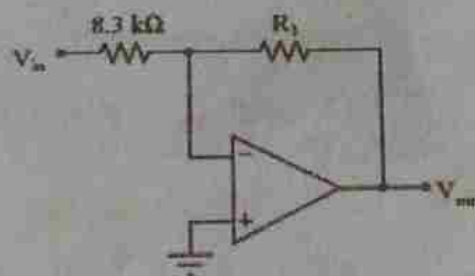
Unit III

6. (a) Describe the working of CE transistor as an amplifier. 8
- (b) Explain the working of class-B amplifier. 8

7. (a) Draw the circuit diagram for Hartley oscillator and discuss its working. 8
(b) What is feedback in amplifier ? Discuss its types. 8

Unit IV

8. (a) What is OPAMP ? Discuss the characteristics of ideal and practical OPAMP. 8
(b) Calculate the necessary resistor value (R_1) in this circuit to give it a voltage gain of 7.5 : 8



9. (a) Discuss the application of OPAMP as a differentiator. 8
(b) Explain the working of OPAMP as an inverting amplifier. 8