

Roll No.

Exam Code : D-24

Subject Code—62381

B.Sc. EXAMINATION

(Main/Re-appear)

(Batch 2020 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. Use of Scientific (Non-programmable) calculator is allowed.

1. (a) What is Zener diode ?
- (b) What do you mean by power dissipation in the Zener diode ?

(8-17-17-1224) J-62381

P.T.O.

- (c) Draw the characteristic curve of an ideal diode.
- (d) Define α and β parameters of a transistor.
- (e) Where do the electrons flow in a PNP transistor ?
- (f) Define Power gain of a transistor.
- (g) What are the advantages of inverting op-amp over non-inverting op-amp ?
- (h) What are the conditions required for undamped oscillations in an oscillator ?

$2 \times 8 = 16$

Unit I

2. Derive expression for the following of a half-wave rectifier :

- (a) Average value of output current
- (b) R.M.S. value of output current.
- (c) Ripple Factor.
- (d) Voltage Regulation.

16

3. (a) Distinguish between the static and dynamic resistances of a $p-n$ junction diode. Do they depend on temperature and bias voltage ? 8
- (b) Explain the working of $p-n$ junction diode. Draw the full V-I characteristics of such a diode. Give its applications in electronic circuits. 8

Unit II

4. Describe input and output characteristic of a CE. PNP transistor. Explain the active, saturation and cut off regions. 16
5. (a) Show that $I_c = \beta I_B + I_{CEO}$, where the symbol have their usual meanings. 4
- (b) Define load line and quiescent operating point of a transistor amplifier. Explain graphically the operation of a transistor as an amplifier. 12

Unit III

6. What is feedback amplifier ? Explain the positive and negative feedback amplifier with diagram and also define the advantage of negative feedback in amplifier. 16

7. (a) Calculate :

(i) Operating frequency

(ii) Feedback fraction for Hartley Oscillator.

Given $L_1 = 1000\mu\text{H}$, $L_2 = 100\mu\text{H}$,
 $C = 20\mu\text{F}$, $M = 20\mu\text{H}$. 8

(b) Describe Colpit's Oscillator. 8

Unit IV

8. Explain the Open Loop and Closed Loop gain in Inverting and Non-inverting mode of amplifier. 16

9. (a) Explain the concept of virtual ground in an Op-Amp. 8

(b) Write a note on the use of an Op-Amp as a differentiator. 8