

(i) Printed Pages: 3

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(ii) Questions : 7

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Exam. Code : 

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**B.A./B.Sc. (General) 5<sup>th</sup> Semester**

**1128**

**PHYSICS**

**Paper—B : Electronics and Solid State Devices—I**

**Time Allowed : Three Hours]**

**[Maximum Marks : 22**

**Note :—** (1) Attempt *five* questions in all, selecting *two* questions from each of Unit-I and Unit-II.

(2) Unit-III is compulsory.

(3) Use of non-programmable calculator is allowed.

**UNIT—I**

1. (a) Draw the block diagram of Cathode Ray Tube (CRT). What is the function of aquading coating necessary in (CRT) ? Draw the pattern observed on the screen of the cathode ray oscilloscope, when the phase difference between two signals of same frequency is (i)  $45^\circ$  (ii)  $180^\circ$ . 3
- (b) State Thevenin's theorem, explain with example. 1½
2. (a) Derive an expression for position of fermi level in an intrinsic semiconductor. How does its position change when acceptor atoms are added to a semiconductor ? What happens if its temperature is raised ? 3
- (b) A N-type semiconductor made up of germanium has resistivity  $4 \Omega \text{ cm}$  and electron mobility  $3200 \text{ cm}^2/\text{volt-sec}$ . Find the donor concentration. 1½

3. (a) Explain principle and working of Light Emitting Diode (LED). Write any two applications of LED and explain why we prefer LEDs over conventional incandescent lamps. 3
- (b) The reverse bias saturation current for PN junction diode is  $2 \mu\text{A}$  at 300 K. Determine its dynamic resistance at 125 mV forward bias.  $1\frac{1}{2}$

### UNIT—II

4. (a) Draw the circuit diagram of LC filter with full wave rectifier. Explain its working. Also derive the expression for its ripple factor. 3
- (b) Explain the working of voltage regulation circuit using zener diode.  $1\frac{1}{2}$
5. (a) Draw the input and output characteristics of common emitter n-p-n transistor. Explain active, saturation and cut off regions. 3
- (b) A transistor has  $\alpha = 0.96$ , leakage current  $1.5 \mu\text{A}$  and collector current  $0.845 \text{ mA}$ . Find the emitter current and base current in transistor.  $1\frac{1}{2}$
6. (a) Define stability factor. Draw a collector to base bias circuit diagram and derive an expression for its stability factor. What are the disadvantages of this technique? 3
- (b) A transistor in common base with  $\alpha = 0.98$  gives reverse saturation current  $I_{\text{CBO}} = 10 \mu\text{A}$ . When used in CE mode, it gives the base current of  $0.1 \text{ mA}$ . Calculate its total collector current in CE mode.  $1\frac{1}{2}$

### UNIT—III

7. Attempt any *eight* questions :

- (i) What is the charge on n type semiconductor ?
- (ii) What is zener breakdown ? What is its cause ?
- (iii) What is the negative clipper ?
- (iv) What do you understand by load line ?
- (v) What is the advantage of bridge rectifier over conventional full wave rectifier ?
- (vi) Describe the action of the inductor filter and its limitations.
- (vii) Why BJT is called current controlled device ?
- (viii) Why is capacitor filter preferred than the inductor filter ?
- (ix) What is the leakage current in a transistor ?
- (x) Why is the width of the base regions of a transistor very small ?  $\frac{1}{2} \times 8 = 4$