

(i) Printed Pages : 4]

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(ii) Questions : 7]

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**B.A./B.Sc. (General) 5th Semester
Examination**

1127

PHYSICS

(Electronics and Solid State Devices-I)

Paper : B

Time : 3 Hours]

[Max. Marks : 44

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

(ii) Unit-III is compulsory.

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

Unit-I

1. (a) State principle, construction and working of cathode ray oscilloscope ? How is it used for the measurement of frequency of the sinusoidal voltage input ?

6

NA-85

(1)

Turn Over

- (b) State and explain Norton's theorem. 3
2. (a) What are extrinsic semiconductors ? Derive an expression for position of Fermi level in p-type semiconductor. 6
- (b) A germanium diode with reverse saturation current of $10 \mu\text{A}$ is to be used. Calculate the Forward voltage at which the diode current is 90 mA at 300 Kelvin . 3
3. (a) Define depletion-region capacitance of p-n junction diode and derive its expression by assuming acceptor concentration is very large as compared to donor concentration. 6
- (b) The band gap of GaAs semiconductor is 1.42 eV . Find the wavelength of radiation emitted by this diode. 3

Unit-II

4. (a) Draw the circuit diagram of full wave rectifier with π -section filter and derive an expression for its ripple factor. 6
- (b) Draw the diagram of full wave voltage doubler and explain its operation. 3

5. (a) Explain the common collector transistor characteristics (input and output). Explain the condition to be used in saturation and active region. 6
- (b) A zener diode uses a zener diode of 8 V having permitted dissipation of 0.10 mW. If load resistance is $100\ \Omega$ and supply voltage is 10 V, then calculate the series resistance. 3
6. (a) Draw the low frequency h-parameters equivalent circuit of a common emitter transistor amplifiers. Derive expression for output impedance and voltage gain. 6
- (b) A transistor amplifier in CE configuration connects a source of internal resistance $2\text{ k}\Omega$ to a load resistance of $50\text{ k}\Omega$. Find the input impedance and current gain.
- Given $h_{ie} = 2\text{ k}\Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 140$,
 $h_{oe} = 20\ \mu\text{A/V}$. 3

Unit-III

7. Attempt any *eight* parts :

- (a) What is ideal voltage source ?
- (b) State Thevenin's theorem.

- (c) Name two applications of CRO.
- (d) What is positive clipper ?
- (e) Why space charge region is called depletion region ?
- (f) Define peak inverse voltage.
- (g) How does operating point of transistor amplifier changes with temperature ?
- (h) What are the disadvantages of transistor ?
- (i) What is solar cell ?
- (j) What is the principle of LED ? 8×1=8