

Total No. of printed pages = 6

END SEMESTER/RETEST EXAMINATION-2022

Semester : 3rd

Branch : Electronics and Telecommunication
Engineering

Subject Code : Et-305

ANALOG ELECTRONICS-I

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Instruction :

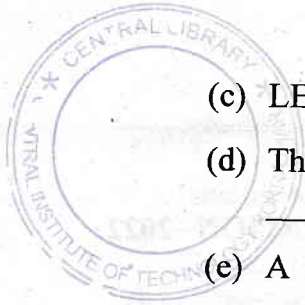
All questions of PART-A are compulsory.

PART-A

Marks-25

- 1 Fill in the blanks : 1×10=10
- (a) The number of valence electrons in a silicon atom is —.
- (b) — are the majority charge carriers in p-type semiconductors.

[Turn over



- (c) LED stands for _____.
- (d) The ripple factor of full-wave rectifier is _____.
- (e) A BJT has _____ terminals.
- (f) The emitter of a transistor is _____ doped.
- (g) The value of α in a transistor is always _____ than unity.
- (h) A UJT has _____ PN junction(s).
- (i) JFET is a _____ controlled device.
- (j) _____ coupling is used for amplifying extremely low frequency signals.

2. Write true or false : 1×10=10

- (a) The valence band and the conduction band overlap each other in case of an insulator.
- (b) Reverse saturation current in a diode flows due to majority charge carriers.
- (c) Zener diode has sharp breakdown voltage.
- (d) Schottky diodes have very fast switching action.
- (e) A negative clamper circuit pushes the input signal upwards.

- (f) A full-wave bridge rectifier does not require a centre-tapped transformer for its operations.
- (g) Thermistor can be used for bias compensation in transistor.
- (h) Collector current is the sum of emitter and base currents in a transistor.
- (i) MOSFET is a unipolar device.
- (j) Transformer coupling is used for impedance matching.

3. Choose the correct answers : 1×5=5

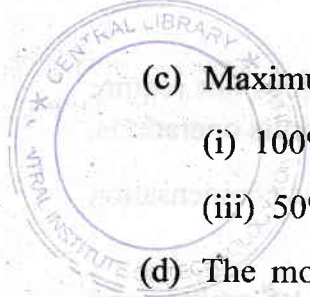
(a) The resistivity of a semiconductor is

- (i) more than an insulator
- (ii) less than an insulator
- (iii) equal to an insulator
- (iv) None of the above

(b) When a PN junction diode is reverse biased, the width of the depletion layer

- (i) increases
- (ii) decreases
- (iii) remains same
- (iv) None of the above





(c) Maximum efficiency of half-wave rectifier is

- (i) 100%
- (ii) 81.2%
- (iii) 50%
- (iv) 40.6%

(d) The most widely used method of providing biasing and stabilization to a transistor is

- (i) base bias
- (ii) collector feedback bias
- (iii) emitter feedback bias
- (iv) potential divider bias

(e) The collector current flows at all times during the full cycle of the signal in _____ power amplifier.

- (i) class A
- (ii) class B
- (iii) class C
- (iv) class AB.

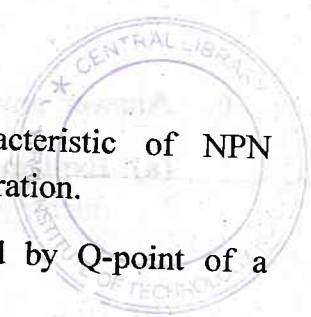
PART-B

Marks-45

• **Instruction :** Read the instructions given for each question.

4. Answer the following questions : $2 \times 5 = 10$

- (a) Define intrinsic and extrinsic semiconductors.
- (b) Draw the symbol of Varactor and Schottky diodes.

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- (c) Draw the output characteristic of NPN transistor in CE configuration.
 - (d) What do you understand by Q-point of a transistor?
 - (e) What is crossover distortion?

5. Answer any *five* questions : $3 \times 5 = 15$

- (a) Explain in brief the atomic bonding in semiconductors.
- (b) Explain in brief the working of a PN junction diode under reverse bias condition.
- (c) Derive an expression to find the maximum efficiency of a half-wave rectifier circuit.
- (d) Explain in brief the construction of an NPN BJT.
- (e) Calculate the emitter current I_E in a transistor for which the base current $I_B = 20 \mu\text{A}$ and $\beta = 50$.
- (f) Write the differences between BJT and JFET.
- (g) Draw the frequency response curve of RC coupled amplifier. Write one application of RC coupled amplifier.

6. Answer any *four* questions : 5×4=20

- (a) Explain insulator, semiconductor and conductor with the help of energy band diagrams.
- (b) How is Zener breakdown different from avalanche breakdown ? Explain Zener diode as voltage regulator.
- (c) Explain the diode clamping circuits with necessary diagrams.
- (d) Explain the working of an n-channel JFET.
- (e) Explain the circuit operation of class B push pull amplifier.
- (f) Write short notes on any *two* :
 - (i) Solar cell
 - (ii) Filter circuits
 - (iii) Load line.

