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 : $1 \times 10 = 10$

(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 : 2×5=10

(a) Define intrinsic and extrinsic semiconductors.

(b) Draw the symbol of Varactor and Schottky diodes.

(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 : 3×5=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 μA and β = 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.