Total No. of printed pages = 6

Et-305/AE-I/3rd Sem/ETC/2017/M

ANALOG ELECTRONICS – I

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

Answer question Nos.1 and 2 and any *five* from the rest.

1. Fill in the gaps : 10

(a) The electron in the outermost orbit of an atom are called ..... electron.

(b) A pure semiconductor is also called ..... semiconductor.

(c) The barrier potential for a silicon P-N junction is ..... volt.

(d) Zener diodes are widely used as ..... regulators.

(e) The maximum voltage that can be applied to a diode without destroying it is called ..... .

[Turn over

(f) The turn on voltage of Ge function diode is nearly ..... volt.

(g) Zener diode is operated in ..... region.

(h) Ripple factor of a bridge rectifier is ..... .

(i) In NPN transistor the emitter-to-collector carrier is the ..... .

(j) The ratio of I_C and I_E gives the ..... of a transistor.

2. (A) Identify whether the following statements are true (T) or false (F): 6

(i) Silicon has atomic number 14 and is half filled.

(ii) A good biasing circuit should stabilize the I_C against variations in temperature.

(iii) Class A operation gives more efficiency than class B operations.

(iv) The decibel is a measure of voltage level.

(v) Amplifiers are coupled to increase gain.

(vi) For increasing the stability of an amplifier, positive feedback is employed.

(B) Choose the correct answer from the folowing : 4

(i) Which of the following will serve as a donor impurity in silicon ?

(a) Boron

(b) Indium

(c) Germanium

(d) Antimony

(ii) In a synbol of transistor, the sign of arrow shows :

(a) emitter

(b) base

(c) collector

(d) emitter and base both

(iii) The alpha (α) of a transistor is

(a) 1

(b) 0·99

(c) 20

(d) 0·1

(iv) Oscillators use following feedback :

(a) negative

(b) positive

(c) both

3. (a) What are N-type and p-type semiconductors ? Distinguish between Zener breakdown and avalanche breakdown. 3

(b) Draw the V-I characteristic curve of Zener diode. 2

(c) Draw the circuit diagram of a half-wave rectifier and explain its working giving input and output waveforms. What is its efficiency ? 5

4. (a) Draw a NPN and PNP transistor and label all the currents. Define α and β of a transistor and derive the relationship between them. 2+3=5

(b) Draw common emitter (CE) configuration of NPN transistor and draw its input and output characteristic curve. 2+3=5

5. (a) Draw the DC load line of a CE circuit. What is quiescent point ? 3

(b) What are the essential conditions needed for biasing a transistor ? 2

(c) Define stability factor. Draw and label a base bias with collector feedback circuit. 5

6. (a) Classify transistor based on its biasing conditions and distinguish among them. 5

(b) In a two-stage cascaded amplifier, the first stage has a voltage gain of 2000 and second stage has voltage gain of 1000. Find the overall voltage gain in dB. Neglect the loading effect of first stage by the second stage. 5

7. (a) What are the various coupling schemes used in cascaded amplifier ? Draw the circuit diagram of each. 5

(b) Draw the frequency response curve of an RC coupled amplifier and label it. 3

(c) When a direct-coupled amplifier is used ? 2

8. (a) What is a feedback amplifier ? Derive an expression for the gain of an amplifier using negative feedback. 5

(b) What is an oscillator ? How does it differ from an amplifier ? Draw the circuit diagram of a Hartley oscillator. 5

9. Write short notes on any *two* : 2×5=10

(a) How transistors amplifies the input signal ?

(b) Vacuum tube

(c) Push-pull amplifier

(d) Special semiconductor diode.