Total No. of printed pages = 7

ANALOG ELECTRONICS – I

Full Marks – 70

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 blanks : $1 \times 10 = 10$

    (a) The peak inverse voltage of two diode full wave rectifier is ————— of that of bridge rectifier.

    (b) Most of the semiconductor have ————— temperature coefficient of resistence.

    (c) The depletion layer width ————— in reverse-biased P-N junction diode.

    (d) The photodiode is a P-N junction operated with ————— bias.

[Turn over

(e) A multistage amplifier has more than _____ stage of amplification.

(f) An R-C coupled amplifier has a very good amplifer for _____ frequencies.

(g) The _____ harmonics are cancelled in push-pull amplifier.

(h) The negative feedback reduces the gain at cost of improved _____.

(i) For an amplifier to generate oscillations, product A.m should be equal to _____.

(j) Bandwidth is the range of frequencies for which gain of the amplifier is _____.

2. (a) Choose the correct answer : $1 \times 10 = 10$

   (i) A multistage amplifier is a amplifier having

     (a) Only one stage

     (b) Two stages

     (c) Two or more stages

(ii) In a multistage amplifier, the voltage gain decreases at low frequencies because of

(a) wiring capacitances

(b) coupling capacitors and bypass capacitors

(c) Junction capacitances

(iii) Cut in voltage for silicon junction diode is approximately

(a) 0.3 V

(b) 0.5 V

(c) 0.7 V

(iv) The Zener diode is used in voltage regulator circuit, and the diode should be in

(a) Reverse biased

(b) forward biased

(c) either of the two

(v) Heat sink are used in power amplifier circuits

   (a) to increase the output power

   (b) to reduce the heat losses in the transistor

   (c) to increase the voltage gain of the power amplifier

   (d) to increase the collector dissipation rating of the transistor

(vi) According to Barkhausen criteria

   (a) $|A\beta| < 1$

   (b) $|A\beta| > 1$

   (c) $|A\beta| = 1$

   (d) None of these

(vii) The negative feedback in an amplifier

   (a) reduces the voltage gain

   (b) increases the voltage gain

   (c) does not affect the voltage gain

(viii) An amplifier has voltage gain of 100 giving 2V output. The input voltage is

(a) 200 V

(b) 50 V

(c) 20 mV

(d) 2 mV

(ix) To obtain P-type semiconductor the impurity added to pure semiconductor is

(a) trivalent

(b) tetravalent

(c) pentavalent

(d) None of these

(x) The emitter of the transistor is doped

(a) heavily

(b) lightly

(c) moderately

(d) None of these.

(b) Answer the following questions : $1×5=5$

(i) What is ripple factor ?

(ii) What is the difference between half wave and full wave rectifier ?

(iii) What is peak inverse voltage ?

(iv) Write two advantages of negative feed-back amplifier.

(v) Why filter circuit is used ?

3. (a) What is semiconductor ? Classify them. 2

(b) Explain how to form N-type semiconductor with neat sketch. 3

(c) Describe the construction and working of a vacuum diode. 4

4. Describe the transistor action in detail. Also draw the output characteristic curve of transistor in C-E configuration and label all the parameters

$6+3=9$

5. Explain with the circuit diagram the working principle of a full wave bridge rectifier. Also list its advantages and disadvantages. $7+2=9$

6. What is an oscillator ? What is the condition for undamped oscillation ? Explain with circuit diagram the working principle of Hartley oscillator.

$1+1+7=9$

7. Explain with a circuit diagram the working of a class-B push-pull amplifier. Also draw the frequency versus gain curve of R-C couple amplifier.

$7+2=9$

8. Write short notes on any *two* : 4.5×2=9

   (a) Varactor diode

   (b) Feedback amplifier

   (c) Zener diode as voltage regulator

   (d) Triode valve

   (e) LED.