Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/B.Tech (OLD)/SEM-1/EC-101/2010-11

2010-11

BASIC ELECTRONIC ENGINEERING

Time Allotted : 3 Hours   *Full Marks :* 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :   10 × 1 = 10

    i)   A full-wave rectifier is more efficient than a half-wave rectifier because

        a)   it uses two diodes

        b)   it makes use of centre-tapped transformer

        c)   it utilizes both half cycles of the input

        d)   it produces higher *d.c.* value of current.

ii) Voltage-series feedback is used in

   a) current amplifier

   b) transconductance amplifier

   c) transresistance amplifier

   d) voltage amplifier.

iii) On increasing the forward bias across p-n junction, the depletion width

   a) increases   b) decreases

   c) remains unchanged   d) none of these.

iv) An extrinsic semiconductor may behave like an intrinsic one

   a) on increasing the temperature

   b) on decreasing the temperature

   c) on increasing doping

   d) never possible.

v) With both junctions forward biased, the transistor operates in

   a) active region   b) saturation region

   c) cutoff region   d) inverted region.

vi) Transistor having low input impedance and very high output impedance is in

   a) CB mode
   b) CE mode

   c) CC mode
   d) none of these.

vii) The closed loop gain of an Op-amp inverting amplifier is

   a) always larger than the unity

   b) always equal to unity

   c) always less than unity

   d) none of these.

viii) The operating state of that distinguishes an SCR for diode is

   a) forward conducting state

   b) forward blocking state

   c) reverse conduction state

   d) reverse blocking state.

ix) UJT is used in

   a) rectifier
   b) voltage follower

   c) relaxation oscillator
   d) none of these.

x)   Op-amp comparator circuit use

   a)   positive feedback

   b)   negative feedback

   c)   regenerative feedback

   d)   no feedback.

xi)   The horizontal plate of a CRO are supplied with

   a)   sinusoidal wave   b)   triangular wave

   c)   sawtooth wave   d)   pulse.

xii) The dimension less h-parameters are

   a) h_{11} and h_{12}

   b) h_{11} and h_{22}

   c) h_{12} and h_{21}

   d) h_{21} and h_{22}.

xiii) The form factor of a wave is 1. Its shape is

   a)   sinusoidal   b)   triangular

   c)   square   d)   sawtooth.
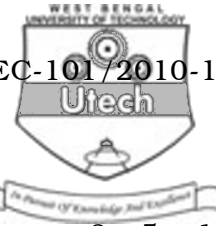
GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is Fermi level ? Calculate the probability that an energy state $(E_v - KT)$ is empty at $T = 300$ (Fermi energy is 0·35 eV above the valence maximum). $2 + 3$

3. What are the factors that effect bias stability of a transistor ? Draw the circuit diagram of self-biased n-p-n transistor and explain how bias stability is achieved in this case.

4. Draw the V-I characteristics of the UJT and explain the reason for the valley point in UJT characteristics.

5. Draw the two transistor analogy for the SCR. In the two transistor equivalent of an SCR, the current gains of p-n-p and n-p-n transistors are $\alpha_1 = 0·45$ and $\alpha_2 = 0·50$ respectively. If the anode to cathode voltage is 20 V and gate current to be 40 mA ? then calculate the anode current and forward resistance of the SCR.

6. Explain how an operational amplifier can be used as a Schmitt trigger circuit.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

7. a) Discuss the two transistor analogy of an SCR.   5

    b) Explain the working principle of SCR.   7

    c) Draw the current-voltage characteristics of the SCR.   3

8. a) Explain the mechanism of *N*-channel MOSFET.   5

    b) Why is FET called UNIPOLAR transistor ?   5

    c) What do you mean by Pinch off condition in J-FET ?   5

9. a) What do you mean by the deflection sensitivity of the CRO ? Compare between the electrostatic and magnetic deflection.   2 + 3

    b) Compare dual beam and dual trace CRO.   3

    c) What is the use of Lissajous figure on CRO ?   7

10. a) Explain and draw the block diagram of current series feedback amplifier.   5

b) How can you explain the method of non-linearity improvement through negative feedback ? 5

c) Derive the relation for feedback amplification gain and amplification gain without feedback. 5

11. Write short notes on any *three* of the following : 3 × 5

a) Saw tooth generator using UJT

b) Lissajous figures

c) Barkhausen criterion

d) Advantages of negative feedback amplifier

e) Advantage of FET over BJT.

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