Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.Tech(O)/SEM-1/EC-101/2012-13

2012
BASIC ELECTRONICS

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) Barrier potential of Ge diode is

   a) 0.3V b) 0.7V

   c) 0.4V d) 0V.

   ii) A differential amplifier has a differential gain of 20,000.CMRR=80dB. The common mode gain is given by

   a) 2 b) 1

   c) 0·5 d) 0.

   iii) With both junction reverse biased the transistor operates in

   a) active region b) cut-off region

   c) saturation region d) inverted region.

iv) If a register has the colour code (red-black-brown), the value of the register equals

a) 1000 Ω b) 10 kΩ

c) 110 Ω d) 100 Ω .

v) The operating state that distinguishes an SCR from diode is

a) forward conduction state

b) forward blocking state

c) reverse conduction state

d) reverse blocking state.

vi) When the gate to source voltage V_{GS} of n-channel JFET is made more negative, the drain current

a) increases

b) decreases

c) remains constant

d) may increase or decrease.

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

a) always larger than unity

b) always equal to unity

c) always less than unity.

viii) For an emitter-follower, the voltage gain is

a) unity

b) greater than unity

c) less than unity.

ix) JFET is a

a) current control device

b) voltage control device

c) temperature control device

d) none of these.

x) Which one is used as a reference voltage source ?

a) Junction diode b) Zener diode

c) Transistor d) Op-amp.

xi) UJT is used as

a) rectifier b) voltage follower

c) relaxation oscillator d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What is the importance of forbidden energy gap in material science ? What are the forbidden energies of Si and Ge ?

3. How does the depletion layer width change with doping concentration of a *p-n* junction diode ? Draw the ideal diode characteristic curve.

4. What is ripple factor ? Give an expression for the ripple factor.

5. What are effects of 'early effect" ? Define "punch through" in "early effect".

GROUP – C

(Long Answer Type Questions)

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

6. a) Explain the operation of a full-wave Bridge Rectifier with the help of circuit diagram. 10

   b) Obtain a mathematical expression for the efficiency of a full-wave rectifier and show that its ripple factor is 0·482. 5

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

   b) Explain the working principle of SCR. 7

   c) Draw the forward and reverse characteristics. 3

8. a) For a rectifier circuit using diodes, define

   (i) rectification frequency

   (ii) ripple factor

   (iii) PIV.

   b) Each of two diodes in a full-wave rectifier circuit has a forward resistance of 50 Ω . The DC voltage drop across a load resistance of 1·2 Ω is 30 V. Find the primary to total secondary turns ratio of the centre-tapped transformer, primary being fed from 220 V_{rms}. 9

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

   a) UJT

   b) Clamping circuit

   c) Barkhausen criterion

   d) Advantages of negative feedback amplifier

   e) Lissajous figures.