



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.

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- iv) If a register has the colour code (red-black-brown), the value of the register equals
- a)  $1000 \Omega$                       b)  $10 \text{ k}\Omega$   
c)  $110 \Omega$                         d)  $100 \Omega$  .
- 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.  $3 \times 5 = 15$

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.  $3 \times 15 = 45$

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  $50 \Omega$ . The DC voltage drop across a load resistance of  $1.2 \Omega$  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 :  $3 \times 5$
- a) UJT
- b) Clamping circuit
- c) Barkhausen criterion
- d) Advantages of negative feedback amplifier
- e) Lissajous figures.