B.Sc. ELECTRONICS
First Semester
BASIC ELECTRONICS
(BSE - 103)

Duration: 3Hrs. **Full Marks: 70**

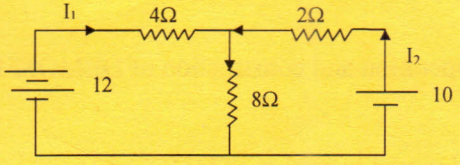
Part-A (Objective) =20
Part-B (Descriptive) =50

(PART-B: Descriptive)

Duration: 2 hrs. 40 mins. **Marks: 50**

Answer any *five* of the following questions:

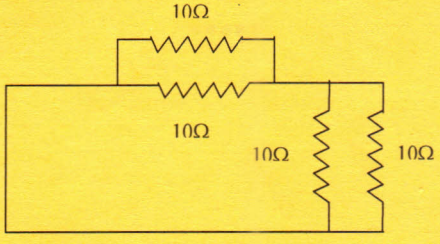
1. a) Using KVL find the currents in the branches:



b) Explain current division and voltage division rule.

(6+4=10)

2. a) Find the equivalent resistance of the following fig.



b) What is Ohm's law? Find the expression for specific resistance of a conductor.

(5+5=10)

3. a) Discuss the significance of Fermi level for intrinsic semiconductor material.
   b) What is an ideal diode? Explain the formation of depletion layer.
   (5+2+3=10)
4. a) Find the expressions for charge densities for P-type and N-type semiconductor.
   b) What are breakdown devices? Explain two transistor analogy of SCR.
   (5+2+3=10)
5. What is mobility? Derive the diode equation. (2+8=1
6. a) Derive the relationship among the current amplification factor for CB, CE and CC configuration.
   b) Explain the input and output characteristics of PNP transistor in CB mode.
   (5+5=10)
7. a) What is a FET? What are the advantages of FET over the conventional transistor?
   b) Explain in brief the operation and construction of DEMOSFET.
   (5+5=10)
8. a) Explain the construction and operation of UJT.
   b) Explain JFET drain characteristics.
   (5+5=10)

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Duration: 20 minutes **Marks – 20**

(PART A- Objective Type)

I. Choose the correct answer: **1×20=20**

1. Which of the following materials does not have covalent bond?
   a) metal b) silicon
   c) organic polymer d) diamond

2. When two resistances are connected in series, they have
   a) same resistance value b) same voltage across them
   c) same current passing through them d) different resistance value

3. In parallel circuit, all resistances must
   a) have same potential difference across them b) have the same value
   c) carry the same current d) none

4. Kirchhoff's voltage law is connected with
   a) IR drops b) battery EMFs
   c) junction voltages d) both (a) and (b)

5. When forward biased, an ideal diode offers
   a) zero resistance b) infinite resistance
   c) a moderate value d) both (a) and (b)

6. For proper working of a transistor in CB configuration
   a) EBJ is reverse-biased, CBJ forward biased.
   b) EBJ is forward-biased, CBJ reverse-biased.
   c) EBJ is reverse-biased, CBJ reversed-biased.
   d) both (a) and (b).

7. Reverse saturation current is due to
   a) majority carriers b) minority carriers
   c) applied forward bias d) none

8. The current amplification factor alpha(dc) is given by
   a) $\frac{I_B}{I_C}$ b) $\frac{I_C}{I_B}$ c) $\frac{I_B}{I_E}$ d) $\frac{I_C}{I_E}$

9. FET consists of a
   a) source b) drain
   c) gate d) all of the above

10. In DE MOSFET, drain current flows when gate voltage is
   a) positive b) negative
   c) zero d) all

11. The positive gate operation of an N-channel DE MOSFET is known as
   a) depletion mode b) enhancement mode
   c) E-only d) normal

12. In an intrinsic semiconductor, Fermi level lies
   a) in the middle of conduction and valence bands.
   b) near conduction band.
   c) near valence band.
   d) none of the above.

13. Which of the following atoms may be used as a P-type impurity?
   a) Arsenic b) Boron
   c) Phosphorous d) Antimony

14. Avalanche breakdown in semiconductor occurs if
   a) forward current exceeds a certain value.
   b) reverse bias exceeds a certain value.
   c) forward bias exceeds a certain value.
   d) the potential barrier is reduced to zero.

15. The most heavily doped region in a transistor is
   a) base b) emitter
   c) collector d) both emitter and collector

16. In a symbol of transistor, the sign of arrow shows
   a) emitter b) base
   c) collector d) both (a) and (c)

17. The transistor configuration producing highest output resistance is
   a) CC b) CB c) CE d) none

18. When Ge crystal is doped with P atoms, it becomes
   a) N-type semiconductor b) P-type semiconductor
   c) an insulator d) photo-transistor

19. The main factor which differentiates DEMOSFET from an E- only MOSFET is the absence of

a) insulated gate b) electrons
c) channel d) P-N junctions

20. Large energy gap is found in

a) insulator b) conductor
c) semiconductor d) all

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