



Seat No. _____

HQ-003-0492006

B. Sc. / M. Sc (Applied Physics) (Sem. II) (CBCS) Examination

April – 2023

Basic Electronics : Paper-VIII

(New Course)

Faculty Code : 003

Subject Code : 0492006

Time : $2\frac{1}{2}$ Hours / Total Marks : 70

Instructions :

- (1) All questions are compulsory.
- (2) Numbers in the right indicate marks.

1 (a) Write answers : 4

- (1) The impurity level in an extrinsic semiconductor is about of pure semiconductor.
 - (A) 10 atoms for 10^8 atoms
 - (B) 1 atom for 10^4 atoms
 - (C) 1 atom for 10^8 atoms
 - (D) 1 atom for 100 atoms

- (2) In the depletion region of a pn junction, there is shortage of:
 - (A) Acceptor ions
 - (B) Donor ions
 - (C) Holes and electrons
 - (D) None of the above

(3) A reverse biased pn junction has :

- (A) Very narrow depletion layer
- (B) Very low resistance
- (C) Almost no current
- (D) Large current flow

(4) A crystal diode has

- (A) One pn junction
- (B) Three pn junctions
- (C) Two pn junctions
- (D) None of the above

(b) Write answers of any one : 2

- (1) Draw schematic diagram of photodiode.
- (2) Draw the equivalent circuit of crystal diode.

(c) Write answers of any one : 3

- (1) Explain the Zener diode as voltage stabilizer.
- (2) Write the advantage and disadvantage of half wave and centre tap full wave rectifier.

(d) Write answers of any one : 5

- (1) Derive an expression for the efficiency of a half wave rectifier.
- (2) Explain the V-I characteristics of tunnel diode with tunneling effect.

2 (a) Write answers : 4

- (1) A transistor has _____
 - (A) One pn junction
 - (B) Three pn junctions
 - (C) Two pn junctions
 - (D) Four pn junctions

- (2) The base of a transistor is _____ doped.
- (A) Heavily
 - (B) Lightly
 - (C) Moderately
 - (D) None of the above
- (3) In a pnp transistor, the current carriers are _____.
- (A) Acceptor ions
 - (B) Free electrons
 - (C) Donor ions
 - (D) Holes
- (4) In a transistor, the base current is about _____ of emitter current.
- (A) 25%
 - (B) 35%
 - (C) 20%
 - (D) 5%

(b) Write answers of any one : **2**

- (1) Give the application of CB, CE, CC amplifier.
- (2) Why collector is wider than emitter and base ?

(c) Write answers of any one : **3**

- (1) Give two application of photodiode.
- (2) Define α . Show that it is always less than unity.

(d) Write answers of any one : **5**

- (1) Describe transistor action in detail.
- (2) Write an expression for collector current in CE connection.

- 3 (a) Write answers : 4
- (1) Transistor biasing is generally provided by a _____
- (A) Biasing circuit
 - (B) Diode
 - (C) Bias battery
 - (D) None of the above
- (2) An ideal value of stability factor is _____
- (A) 100
 - (B) More than 200
 - (C) 200
 - (D) 1
- (3) The zero signal I_c is generally _____ mA in the initial stages of a transistor amplifier.
- (A) 4
 - (B) 3
 - (C) 1
 - (D) More than 10
- (4) The point of intersection of d.c. and a.c. load lines represents _____.
- (A) Operating point
 - (B) Voltage gain
 - (C) Current gain
 - (D) None of the above
- (b) Write answers of any one : 2
- (1) Why is potential divider method of biasing became universal ?
- (2) Define Ripple Factor.
- (c) Write answers of any one : 3
- (1) Draw the symbol of npn and pnp transistor and explain each terminal.
- (2) Explain the cut off, saturation and active region in CE transistor circuit.

- (d) Write answers of any one: 5
- (1) Explain the stability factor in voltage divider method.
 - (2) Write short note on base resistor method with stability factor.

4 (a) Write answers : 4

- (1) The operating point is also called the _____.
 - (A) Cut off point
 - (B) Saturation point
 - (C) Quiescent point
 - (D) None of the above

- (2) The disadvantage of voltage divider bias is that it has _____.
 - (A) High stability factor
 - (B) Many resistors
 - (C) Low base current
 - (D) None of the above

- (3) In a transistor amplifier circuit $V_{CE} = V_{CB} +$ _____.
 - (A) V_{BE}
 - (B) $5 V_{BE}$
 - (C) $2V_{BE}$
 - (D) None of the above

- (4) The base resistor method is generally used in _____.
 - (A) Amplifier circuits
 - (B) Rectifier circuits
 - (C) Switching circuits
 - (D) None of the above

- (b) Write answers of any one : 2
- (1) Define Knee Voltage.
 - (2) Draw the circuit diagram of optoisolator.

- (c) Write answers of any one : 3
- (1) Give the name of various method used for transistor biasing. State their advantage and disadvantage.
 - (2) Explain direct coupled transistor amplifier.
- (d) Write answers of any one : 5
- (1) Explain the DC and AC equivalent circuit for single stage amplifier.
 - (2) Explain the working of transformer coupled transistor amplifier with neat circuit diagram.
- 5 (a) Write answers : 4
- (1) A semiconductor is formed by _____ bonds.
 - (A) Covalent
 - (B) Electrovalent
 - (C) Coordinate
 - (D) None of the above
 - (2) The resistivity of pure germanium under standard conditions is about
 - (A) $6 \times 10^4 \ \Omega\text{cm}$
 - (B) $60 \ \Omega\text{cm}$
 - (C) $3 \times 10^6 \ \Omega\text{cm}$
 - (D) $6 \times 10^{-4} \ \Omega\text{cm}$
 - (3) When a pure semiconductor is heated, its resistance
 - (A) Goes up
 - (B) Remains the same
 - (C) Goes down
 - (D) Cannot say
 - (4) When a pentavalent impurity is added to a pure semiconductor, it become
 - (A) An insulator
 - (B) p-type semiconductor
 - (C) An intrinsic semi-conductor
 - (D) n-type semiconductor

- (b) Write answers of any one : 2
- (1) Write the atomic number of Si and Ge.
 - (2) Write the potential barrier voltage for Si and Ge.
- (c) Write answers of any one : 3
- (1) Give the band energy description of semiconductor.
 - (2) Discuss the effect of temperature on semiconductor.
- (d) Write answers of any one : 5
- (1) Describe concept of doping in intrinsic semiconductor.
 - (2) Discuss the behaviour of pn junction under forward and reverse biasing.
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