



**PART-A**

**I. Answer ALL of the following questions:**

**1 × 10 = 10**

1. What is the electric flux through a cube enclosing a charge of 1C?
2. Why is manganin preferred in the manufacture of resistance coils?
3. On what principle does Kirchoff's current law work?
4. Write the expression for magnetic field due to a current carrying solenoid.
5. What are eddy currents?
6. Give the expression for resolving power of a telescope.
7. How does the radius of a nucleus vary with its atomic number?
8. Draw the circuit symbol for npn transistor.
9. What is depletion region?
10. Give the bandwidth of sky waves.

**PART-B**

**II. Answer any FIVE of the following questions:**

**2 × 5 = 10**

11. Draw electric field lines for a)  $q < 0$  and b)  $q_1, q_2 > 0$ .
12. Give the limitations of Ohm's law.
13. Find  $V_{rms}$  if the peak voltage is 311V.
14. Define displacement current and give its expression.
15. Mention two uses of polaroids.
16. Give the limitations of Bohr's theory.
17. What are isotopes? Give an example.
18. Draw the block diagram of AM transmitter.

**PART - C**

**III. Answer any FIVE of the following questions:**

**3 × 5 = 15**

19. Derive an expression for the equivalent capacitance of two capacitors connected in series.
20. Derive an expression for drift velocity.
21. Derive an expression for the radius of the circular path of the charged particle moving perpendicular in a uniform magnetic field.
22. State and explain Gauss's law of magnetism.
23. Derive the mirror formula.
24. Derive the expression for the velocity of the electron in the  $n^{\text{th}}$  orbit of the hydrogen atom.
25. Derive an expression for half-life of a radioactive substance.
26. Give the differences between intrinsic and extrinsic semiconductors.

**PART - D**

**IV. Answer any TWO of the following questions:**

**5 × 2 = 10**

27. Derive an expression for electric field due to an electric dipole at a point on the axial line.
28. Derive an expression for the balanced condition of a Wheatstone bridge network.
29. Distinguish between diamagnetic and paramagnetic materials.

**V. Answer any TWO of the following questions:**

**5 × 2 = 10**

30. Derive an expression for the instantaneous emf and instantaneous current of an **AC** generator.
31. Give the theory of interference and hence arrive at the conditions for constructive and destructive interference.
32. Explain the action of a transistor as a switch in the CE mode.

**VI. Answer any THREE of the following questions:**

**5 × 3 = 15**

33. A 400 pF capacitor is charged by 200 V battery. It is then disconnected from the supply and is connected to another uncharged 400 pF capacitor. How much energy is lost in this process?
34. Two identical coils are placed coaxially with their centres separated by a distance of 0.08 m. A current of 2 A passes through each coil in opposite directions. If the radius of either coil is 0.2 m and the number of turns is 30, find the resultant magnetic field at the centre of either coil.
35. What is the self-inductance of the choke required to operate a bulb marked 100 W, 100 V which is connected to a 220 V, 50 Hz ac supply?
36. A ray of light is incident at an angle of  $50^\circ$  at one face of an equilateral prism is refracted through the prism in the minimum deviation position. Find the angle of minimum deviation and refractive index of the prism.
37. When light of frequency  $5.4 \times 10^{14}$  Hz is incident on a metal surface, the maximum energy of the emitted photoelectron is  $1.2 \times 10^{-19}$  J. If the surface is illuminated with light of frequency  $6.6 \times 10^{14}$  Hz the maximum energy of the emitted electrons is  $2 \times 10^{-19}$  J. Calculate the Planck's constant.



JAIN COLLEGE, J C Road Bangalore  
Mock Paper -2, January - 2019  
II PUC– Physics (33)

Time: 3 Hours 15 Minutes

Max. Marks :70

**PART-A**

- I. **Answer ALL of the following questions:** **1 × 10 = 10**
1. Define quantisation of charge.
  2. On what principle Kirchhoff's loop rule work?
  3. What is the resistance of an ideal ammeter?
  4. What are electromagnets?
  5. Write the SI unit of magnetic flux.
  6. What is the source of electromagnetic wave?
  7. Give the mathematical form of Malu's law.
  8. Does nuclear force obey inverse square law?
  9. Draw the logic symbol of OR gate.
  10. Why sky wave propagation is not possible for frequency above 30 MHz.

**PART-B**

- II. **Answer any FIVE of the following questions:** **2 × 5 = 10**
11. Mention any two properties of equipotential surface.
  12. Calculate the resistivity of the conductor with resistance of  $5 \Omega$  having area of cross section  $2.4 \times 10^{-6} \text{ m}^2$  and length of 0.5 m.
  13. Define declination and inclination.
  14. What is wattles current? What is the power factor of a pure resistor?
  15. Draw a neat labelled diagram of Davisson- Germer experiment.
  16. What is nuclear fusion reaction? Why fusion reaction is called as thermo nuclear reaction?
  17. Mention any two uses of photo diodes.
  18. Mention the types of transmission media.

**PART-C**

- III. **Answer any FIVE of the following questions:** **3 × 5 = 15**
19. Mention the properties of electric field lines.
  20. State and explain Biot- Savart's law.
  21. What is hysteresis? Draw the graphical variation of magnetic intensity with magnetic field.
  22. Show that  $f = R/2$ . Where the symbols have their usual meaning.
  23. Prove laws of reflection for a plane wave front using Huygens's principle.
  24. What is photoelectric effect? Draw a neat labelled diagram of the experimental set up of photoelectric effect.
  25. Distinguish between nuclear fission and nuclear fusion reaction.
  26. Explain the action of a transistor.

**PART-D**

- IV. **Answer any TWO of the following questions:** **2 × 5 = 10**
27. Define electric potential. Derive an expression for electric potential due to single point charge.
  28. Derive an expression for equivalent emf and resistance of two cells when connected in series.
  29. Derive an expression for magnetic field due to current carrying circular coil.

- V. Answer any TWO of the following questions:** **2 × 5 = 10**
30. Derive an expression for current and impedance for a **LCR** series circuit.
  31. Arrive at the relation for  $n, u, v$  and  $R$  for refraction due to single spherical surface, where the symbols have their usual meaning.
  32. Derive an expression for total energy an electron in the  $n^{\text{th}}$  orbit of hydrogen atom.
- VI. Answer any THREE of following questions:** **3 × 5 = 15**
33. Charges of  $+9 \text{ nC}$  and  $-16 \text{ nC}$  are placed at the corners A and C of a right angled triangle respectively with sides  $AB = 3 \text{ m}$ ,  $BC = 4 \text{ m}$  and  $ABC = 90^\circ$ . Find the magnitude and direction of the resultant electric field at the corner B.
  34. When two resistors are connected in series with a cell of emf  $1 \text{ V}$  and negligible internal resistance a current of  $2/5 \text{ A}$  flows in the circuit and  $5/3 \text{ A}$  when connected in parallel. Calculate the resistances.
  35. A square coil of  $10 \text{ cm}$  side and with  $60$  turns is rotated at a uniform speed of  $500 \text{ rpm}$  about an axis at right angles to a uniform field of  $0.5 \text{ T}$ . Calculate the maximum emf developed in the coil.  
What is the instantaneous value of emf, when the plane makes an angle of  $30^\circ$  with the magnetic field.
  36. In Young's double slit experiment while using a source of light of wavelength of  $4500 \text{ \AA}$ , the fringe width is  $5 \text{ mm}$ . If the distance between the screen and the slits is reduced to half of its initial value, what should be the wavelength of light to get fringe width of  $4 \text{ mm}$ .
  37. The half life of  ${}_{38}\text{Sr}^{90}$  is  $28$  years. What is the disintegration rate of  $15 \text{ mg}$  of this isotope?

