



**JAIN COLLEGE, J C Road Bangalore**  
**Mock Paper -1, January - 2020**  
**II PUC- Physics (33)**

**Time: 3 Hours 15 Minutes**

**Max. Marks: 70**

**PART-A**

**I. Answer all the following questions: 1 × 10 = 10**

1. How does the electrostatic force between two point charges change, when a dielectric medium is introduced between them?
2. Define mobility of free electron.
3. What is magnetic susceptibility?
4. What is the significance of Lenz's law?
5. Write the relation connecting rms and peak value of alternating current.
6. Write the expression for displacement current.
7. For which position of the object magnification of convex lens is -1 (minus one) ?
8. For which angle of incidence reflected ray is completely polarized?
9. What is the ratio of the nuclear densities of two nuclei having mass numbers in the ratio 1:3?
10. Write the truth table of NAND gate.

**PART-B**

**II. Answer all the following questions: 2 × 5 = 10**

11. Write any two properties of electric field lines.
12. State and explain Ohm's law.
13. A galvanometer having a coil of resistance  $12 \Omega$  gives full scale deflection for a current of 4 mA. How can it be converted into a voltmeter of range 0 to 24 V?
14. Distinguish between diamagnetic and paramagnetic substances.
15. Mention any two factors on which the self-inductance of a coil depends.
16. Mention any two sources of energy losses in transformer.
17. Write Maxwell's equation for the speed of electromagnetic waves and explain the terms used.
18. Write the expression for de-Broglie wavelength of electrons in terms of electric potential and explain the terms used.

**PART - C**

**III. Answer all the following questions: 3 × 5 = 15**

19. Obtain the expression for effective capacitance of two capacitors connected in series.
20. State Ampere's circuital law. Using it, derive the expression for magnetic field at a point due to a long current carrying conductor.
21. What is hysteresis? Define the terms coercivity and retentivity of a ferromagnetic materials.
22. Derive an expression for energy stored in an inductor.
23. Define critical angle. Write two conditions for total internal reflection.
24. What is interference? Write the condition for path difference between two waves in case of constructive and destructive interference.
25. Mention any three experimental observations of photoelectric effect.
26. Explain conduction band, valance band and energy gap in semiconductors.

**PART - D**

**IV. Answer all the following questions:**

**5 × 2 = 10**

27. State Gauss's law. Derive an expression for electric intensity at a point outside a uniformly charged spherical shell.
28. Obtain the balanced condition of Wheatstone bridge by applying Kirchhoff's rules.
29. Derive an expression for the impedance of a series LCR circuit, when an AC voltage is applied to it.

**V. Answer all the following questions:**

**5 × 2 = 10**

30. Derive the relation between  $u$ ,  $v$ ,  $n$  and  $R$  for refraction at spherical surface when the real object is placed towards the convex surface. Where the symbols have their usual meaning.
31. Derive the expression for total energy of the electron in  $n^{\text{th}}$  stationary orbit of hydrogen atom using Bohr's postulate.
32. What is rectifier? With suitable circuit describe the action of a full wave rectifier by drawing input and output waveforms.

**VI. Answer all the following questions:**

**5 × 3 = 15**

33. In a circular parallel plate capacitor radius of each plate is 5 cm and they are separated by a distance of 2 mm. Calculate the capacitance and the energy stored, when it is charged by connecting the battery of 200 V ( Given  $\epsilon_0 = 8.854 \times 10^{-12} \text{Fm}^{-1}$ ).
34. A 100 mg mass of nichrome metal is drawn into a wire of area of cross section  $0.05 \text{mm}^2$ . Calculate the resistance of this wire. [Given density of nichrome  $8.4 \times 10^3 \text{kgm}^{-3}$  and resistivity of the material is  $1.2 \times 10^{-6} \Omega \text{m}$  ].
35. A circular coil of radius 0.08 m consisting of 100 turns is carrying a current of 0.4 A. Calculate the magnitude of the magnetic field (i) at the centre of the coil and (ii) at a point 0.2 m from the centre of the coil on its axis.
36. In Young's double slit experiment wave length of light used is 500 nm and distance between the slits is 2 mm, distance of the screen from the slits is 1 m. Find fringe width and also calculate the distance of 7<sup>th</sup> dark fringe from central bright fringe.
37. Calculate the binding energy and binding energy per nucleon of an oxygen nucleus ( ${}_8\text{O}^{16}$ ) using the following data (MeV).  
Mass of the proton = 1.007825 u  
Mass of the neutron = 1.008665 u  
Mass of the oxygen nucleus = 15.995 u.

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**JAIN COLLEGE, J C Road Bangalore**  
**Mock Paper -2, January - 2020**  
**II PUC- Physics (33)**

**Time: 3 Hours 15 Minutes**

**Max. Marks :70**

**PART-A**

- I. Answer all the following questions:** **1 × 10 = 10**
1. What is an equipotential surface?
  2. The colour code of a carbon resistor is Brown – Red – Brown – Gold. What is its resistance?
  3. Write the expression for force acting on a charge moving in a magnetic field.
  4. What is Lorentz force?
  5. Mention the value of power factor of pure capacitor.
  6. Mention any one application of microwave.
  7. Write the expression for magnifying power of a telescope in terms of focal lengths.
  8. State Malu's law.
  9. What is the relation between half-life and mean life of a radioactive element?
  10. Give the circuit symbol of AND gate.

**PART-B**

- II. Answer all the following questions:** **2 × 5 = 10**
11. On what factor does the capacitance of parallel plate capacitors depends?
  12. State Kirchoff's laws of electrical network.
  13. Define the terms (i) Magnetic declination and (ii) Dip at a place.
  14. Write the expression for magnetic potential energy of a magnetic dipole kept in a uniform magnetic field and explain the terms.
  15. What are eddy currents? Mention any one application of eddy currents.
  16. Mention any two applications of ultraviolet radiations.
  17. Write any two uses of polaroids.
  18. Calculate de Broglie wavelength associated with an electron moving with a speed of  $2 \times 10^5 \text{ms}^{-1}$  (Given  $h = 6.625 \times 10^{-34} \text{Js}$   $m_e = 9.1 \times 10^{-31} \text{kg}$ ).

**PART-C**

- III. Answer all the following questions:** **3 × 5 = 15**
19. Derive the expression for torque acting on an electric dipole placed in a uniform electric field.
  20. What is a toroid? Write the expression for magnetic field at a point well inside a toroid and explain the terms.
  21. State and explain Gauss's law in magnetism.
  22. Explain briefly the coil and magnet experiment to demonstrate electromagnetic induction.
  23. Show that voltage leads current when AC voltage is applied to a pure inductor.
  24. Drive the relation  $f = R/2$  in the case of a concave mirror where the symbols have their usual meaning.
  25. Give any three characteristics of photon.
  26. Explain the working of Zener diode as a voltage regulator.

**PART-D**

**IV. Answer all the following questions:**

**2 x 5 = 10**

27. Define electric potential due to a point charge and arrive an expression for the electric potential at a point due to a point charge.
28. Obtain the expression for effective emf and effective internal resistance when two different cells are connected in parallel.
29. Derive an expression for the intensity of magnetic field at any point on the axis of a circular current loop.

**V. Answer all the following questions:**

**2 x 5 = 10**

30. Obtain the expression for fringe width of interference fringes in Young's double slit experiment.
31. What is nuclear force? Write its four characteristics.
32. What is rectification? Describe the working of semiconductor diode as a half wave rectifier with a neat circuit diagram. Indicate input and output wave forms.

**VI. Answer all the following questions:**

**3 x 5 = 15**

33. Two point charges  $1 \times 10^{-8}$  C and  $4 \times 10^{-8}$  C are 0.06 m apart in air. Find the location of the point between them at which resultant electric field is zero.
34. Two cells A and B are connected in series, each having an emf of 1.5 V. The internal resistances of A and B are  $0.5 \Omega$  and  $0.25 \Omega$  respectively. The combination is connected across a resistance of  $2.25 \Omega$ . Calculate (i) the current in the circuit (ii) the potential difference across the terminals of each cell.
35. A sinusoidal voltage of peak value 285 V is applied to a series LCR circuit in which resistor of resistance  $5 \Omega$ , pure inductor of inductance 28.5 mH and capacitor of capacitance  $800 \mu\text{F}$  are connected.
  - a. Find the resonant frequency
  - b. Calculate the impedance, current and power dissipated at the resonance.
36. Two lenses of focal lengths 0.2 m and 0.3 m are kept in contact. Find the focal length of the combination. Calculate the powers of two lenses and combination.
37. Calculate the longest and shortest wavelengths of Lyman series of hydrogen atom.  
[ Given :  $R = 1.097 \times 10^7 \text{ m}^{-1}$ ]

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