



**JAIN COLLEGE, J C Road Bangalore**  
**Mock Paper -1, December - 2017**  
**II PUC- Physics (33)**

**Time: 3 Hours 15 Minutes**

**Max. Marks: 70**

**PART-A**

**I. Answer ALL the questions** **1 × 10 = 10**

1. A cube encloses a charge of 1 C. What is the electric flux through the surface of the cube?
2. Give the SI unit of current density.
3. What is the resistance of an ideal ammeter?
4. Define Curie temperature.
5. State Lenz's law.
6. What is displacement current?
7. Can two independent sources of light produce interference pattern?
8. What is impact parameter?
9. On what principle does a nuclear reactor work?
10. What is the signal bandwidth offered by a coaxial cable?

**PART-B**

**II. Answer any FIVE of the questions** **2 × 5 = 10**

11. State Coulomb's law in electrostatics and explain it in the case of free space.
12. Draw a neat labeled diagram of cyclotron.
13. Define retentivity and coercivity.
14. State Faraday's laws of electromagnetic induction.
15. How can resolving power of a microscope be increased?
16. Derive an expression for de Broglie wavelength in terms of accelerating potential.
17. Mention any two uses of Light emitting diode.
18. Draw the block diagram of communication system.

**PART - C**

**III. Answer any FIVE of the following** **3 × 5 = 15**

19. Derive an expression for potential energy due to system of three point charges.
20. Derive an expression for equivalent emf of two cells connected in series.
21. Distinguish between diamagnetic and paramagnetic substances.
22. Derive an expression for energy stored in an inductor.
23. Show that the current leads the voltage by  $\pi/2$ , when a capacitor is connected to **ac**.
24. Derive mirror's formula.
25. Mention the experimental observations of photoelectric effect.
26. Explain the working of transistor as a switch with a neat circuit diagram.

**PART - D**

**IV. Answer any TWO of the following** **5 × 2 = 10**

27. Derive an expression for electric field due to a dipole for axial point.
28. Arrive at a relation between current and drift velocity.
29. Derive an expression for force between two infinitely long straight parallel current carrying conductors and hence define an ampere.

**V. Answer any TWO of the following** **5 × 2 = 10**

30. Give the theory of interference and arrive at the condition for destructive interference.
31. Derive an expression for total energy of electron in the  $n^{\text{th}}$  orbit of hydrogen atom.
32. What is rectification? Explain with a neat circuit diagram and relevant input and output waveforms of a half wave rectifier.

**VI. Answer any THREE of the following** **5 × 3 = 15**

33. Two capacitors of capacitances of  $1\mu\text{F}$  and  $3\mu\text{F}$  are charged to 80V and 40V respectively. Find the common potential difference, the charge on each capacitor and the energy loss when they are connected in parallel.
34. In a Wheat stone's bridge, the four resistance arms of the bridge are  $AB=2\Omega$ ,  $BC=3\Omega$ ,  $CD=4\Omega$  and  $DA=1\Omega$ . A cell of emf 2V and negligible internal resistance is connected across AC and a galvanometer of resistance  $10\Omega$  is connected between B and D. Find the current through the galvanometer.
35. An **ac** source of 220V, 50Hz is connected to a circuit consisting of an electric lamp rated 100W, 50V and an inductor in series, what should be the inductance of the inductor to work the lamp with the rated value?
36. Focal length of a convex lens is 0.3m and the radii of curvature of its surfaces are 0.25m. A liquid lens is formed between a plane surface and one face of the lens. The converging combination has a focal length of 0.5m. Calculate the focal length of the Liquid lens and refractive index of the liquid.
37. Calculate the activity of 0.001gm of Radium-226 in curie, whose half-life is 1620years.



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**Mock Paper -2, December - 2017**  
**II PUC- Physics (33)**

**Time: 3 Hours 15 Minutes**

**Max. Marks :70**

**PART-A**

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

1. What is meant by electric flux through a surface?
2. Define mobility.
3. Write the expressions for magnetic field due a toroid.
4. Give the unit of magnetic flux.
5. Mention any one power loss of a transformer.
6. State Brewster's law.
7. How does stopping potential vary with intensity of incident light?
8. Why nuclear fusion reaction is called as thermonuclear reaction?
9. Draw the logic symbol of NAND gate.
10. What is repeater in the communication system?

**PART-B**

**II. Answer any five question: 2 × 5 = 10**

11. Write two properties of equipotential surfaces.
12. Derive  $\sigma = ne^2\tau/m$
13. What is declination and inclination?
14. Mention any two uses of eddy currents.
15. Give the expression for Maxwell-Ampere's law and explain the terms.
16. Distinguish between interference and diffraction.
17. Show that,  $1\text{amu} = 931\text{meV}$ .
18. Draw the block diagram of communication system.

**PART-C**

**III. Answer any FIVE of the following 3 × 5 = 15**

19. Derive an expression for electric field due to infinite plane sheet using Gauss's law.
20. Derive an expression for equivalent resistance of resistors when connected in parallel.
21. State and explain Biot Savart's law.
22. Derive an equation for motional emf.
23. Mention any three advantages of ac over dc.
24. Arrive at a relation between focal length and radius of curvature of a mirror.
25. List out any three characteristics of nuclear forces.
26. With a neat circuit diagram, explain Zener diode as a voltage regulator in reverse bias.

**PART-D**

**IV. Answer any two questions: 2 × 5 = 10**

27. Derive an expression for potential due to a dipole.
28. Arrive at an expression for magnetic field for a bar magnet as an equivalent to a solenoid.
29. Show that the voltage leads the current by  $\pi/2$  when an inductor is connected to an **ac**.

**V. Answer any two questions: 2 × 5 = 10**

30. Derive an expression for fringe width obtained in Young's double slit experiment.
31. Derive an expression for radius of  $n^{\text{th}}$  orbit of hydrogen atom.
32. With the neat diagram, explain the working of a transistor as an amplifier in CE mode.

**VI. Answer any three questions:**

**3 × 5 = 15**

33. A pendulum bob of mass 80mg and carrying a charge of 20nC is at rest in a horizontal uniform electric field of strength  $20,000\text{NC}^{-1}$ . Find the tension in the thread of the pendulum and the angle it makes with the vertical.
34. A uniform copper wire of length 2m and cross-sectional area  $5 \times 10^{-7}\text{m}^2$  carries a current of 2A. Assuming that there are  $8 \times 10^{28}$  free electrons per  $\text{m}^3$  of copper, calculate the drift velocity of electrons. How long will an electron take to drift from one end of the wire to the other?
35. The magnetic fields at two points on the axis of a circular coil at distances 0.05m and 0.2m from the centre are in the ratio 8:1. Find the radius of the coil.
36. A ray of light is incident on one face of an equivalent prism of glass having refractive index 1.55 at an angle of  $40^\circ$ , calculate the angle of deviation produced by the prism.
37. Light of frequency  $8 \times 10^{15}\text{Hz}$  is incident on a substance of Photo electric work function 6.125eV. calculate the max velocity of the emitted photoelectrons.

Given: the mass of the electron =  $9.1 \times 10^{-31}\text{kg}$  & Planck's constant =  $6.625 \times 10^{-34}\text{Js}$