JAIN COLLEGE, JAYANAGAR
II PUC Mock Paper -I
Subject : Physics (33)

Duration: 3 hrs 15 minutes Max. Marks: 70

Instructions:

a) **All parts are compulsory.**
b) **Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.**
c) **Direct answers to the numerical problems without detailed solutions will not carry any marks.**

PART – A

I. Answer all of the following: - 10 x 1 = 10

1. How does a free electron at rest move in an electric field?
2. What is the SI unit of conductivity?
3. The susceptibility of magnetic substance is 1000. Name the type of magnetic substance.
4. A cyclotron cannot accelerate uncharged particles like neutrons. Why?
5. What is self induction?
6. Name the phenomenon which illustrates the particle nature of light.
7. How does the de-Broglie wavelength of a photon changes if its velocity is increased?
8. Define work function of a metal surface.
9. Define activity of a radioactive sample.
10. Write the Boolean expression for NAND gate.

PART –B

II. Answer any FIVE of the following questions: - 5 x 2 = 10

11. Write Coulomb's law in vector form and explain.
12. Mention the factors on which resistance of a conductor depends.
13. When is the torque on a magnetic dipole in an uniform magnetic field be:
    (i) minimum (ii) maximum.
14. What is a transformer? Define turns ratio of a transformer.
15. Define (a) Mean value of an ac (b) rms value of an ac
16. Mention the artificial source of IR rays & one application.
17. Give the pictorial representation of plane polarised and unpolarised light.
18. What is meant by doping? What are dopants?

PART –C

III. Answer any FIVE of the following questions: - 5 x 3 = 15

19. Derive an expression for the relation between electric field and potential.
20. Derive an expression for magnetic field due to a straight conductor of infinite length carrying current.
21. Compare the features of electrostatic field and magnetic field.
22. Describe the coil and magnet experiment to demonstrate electromagnetic induction.
23. Draw the ray diagram for image formation in astronomical telescope and write the expression for magnifying power.
24. Obtain an expression for the radius of the electron in the n^{th} orbit.
25. Explain the working of a p-n junction diode in forward bias.
26. Mention the band width for (a) Speech (b) TV (c) Digital data

PART-D

IV. Answer any TWO of the following: 2x 5=10

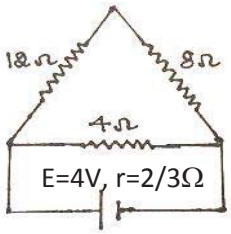
27. Derive an expression for the capacitance of a parallel plate capacitor with dielectric.
28. Obtain an expression for effective resistance of two resistors connected in parallel.
29. Give the theory of a moving coil galvanometer. Define current sensitivity.

V. Answer any TWO of the following: 2x 5=10

30. Obtain an expression for fringe width using Young's double slit experiment.
31. Write Einstein's photoelectric equation. Mention the experimental observations of photoelectric effect based on Einstein's photoelectric equation.
32. Write the neat circuit diagram of a full wave rectifier and explain its working. Draw the input and output waveforms.

VI. Answer any THREE of the following: 3x 5=15

33. Two fixed point charges +4μC and +1μC are separated by 30cm in air. Find the position between them at which the resultant electric field is zero.
34. Three resistors of resistance 12Ω, 8Ω and 4Ω are connected as shown in the circuit diagram. Calculate the current in each branch of the circuit.



35. A sinusoidal voltage of peak value 283V and frequency 50Hz is applied to a series LCR circuit in which R=3Ω, L=25.38μH and C=796μF. Find
    a) The impedance of the circuit
    b) The phase difference between the voltage across the source and the current
    c) Power dissipated in the circuit
    d) Power factor
36. Two Plano- convex lenses are placed in contact such that their curved surfaces are facing each other. The radius of curvature of the curved surfaces is 0.10cm and 0.15m respectively. The space between them is filled with water of refractive index 1.33. If the refractive index of glass is 1.5 find the focal length of the combination.
37. Calculate the energy released in Mev by 1g of U^{235} in the following fission reaction.

$_{92}U^{235} + {}_{0}n^{1} \rightarrow {}_{56}Ba^{141} + {}_{36}Kr^{92} + 3{}_{0}n^{1}$

Given, mass of U^{235} = 235.04394 amu
mass of Kr^{92}= 91.88544 amu
mass of Ba^{141}= 140.91784 amu
mass of neutron = 1.00874 amu

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