Jain College, Jayanagar

II PUC Mock Paper - I JAN 2020

Subject: Physics (33)

Duration: 3.15 hrs **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. What is the unit of electrical permittivity of free space?
2. What is the effect of temperature on the drift speed of electrons in a metallic conductor?
3. Soft iron is used to make electromagnets. Give reason.
4. What is phase of an AC?
5. Name the electromagnetic wave which is having high penetrating power.
6. A Castor oil drop is inside water. How does it behave?
7. When does the diffractions effects are observed?
8. Mention the expression for de-Broglie wavelength in terms of Kinetic energy
9. Mention the principle of LED.
10. Write the circuit symbol of NOR gate.

PART – B

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

11. Sketch the electric field lines in case of an electric dipole.
12. Find the value of the resistance using color code.

    Red Red Green – Silver
13. Define Retentivity and Coercivity.
14. State Faraday's law of electromagnetic induction.
15. What is a Wavefront? What kind of beam of light represents spherical wavefront?
16. What are (i) Isotopes (ii) Isobars.
17. Write the circuit symbol of Zener diode. Explain the principle of Zener diode.
18. Write two uses of Polaroids

PART – C

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

19. Derive an expression for equivalent capacitance of two capacitors connected in series.
20. Obtain an expression for radius of a circular path described by a charge in uniform magnetic field.
21. Differentiate between paramagnetic and ferromagnetic substances.
22. Derive an expression for motional electromotive force.
23. Derive an expression for instantaneous current through a circuit containing an inductor and a source of AC.
24. Obtain the mirror equation.
25. Differentiate between nuclear fission and nuclear fusion.
26. Distinguish between conductors, insulators and semi conductors based on band theory of solids .

PART-D

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

27. State Gauss's law. Derive an expression for electric field due to a long straight infinite charged wire.
28. Derive an expression for balance condition for Wheatstone network.
29. Derive an expression for force acting between two straight infinitely long parallel conductor and hence define one ampere.

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

30. Give the theory of interference. Discuss the condition for constructive and destructive interference.
31. Deduce the expression for the radius of electron in the n^{th} stationary orbit of hydrogen atom.
32. What is a pn junction?Explain the formation of pn junction .

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

33. Point charges of +2nC, +4nC and +8nC are placed at the corners A,B and C respectively of a square ABCD of side 0.2m. Calculate the work required to transfer a charge of +2nC from D to the center of the square.
34. A resistance of 9Ω is connected to a cell. A voltmeter connected across the cell reads 1.8V. When a resistance of 10Ω is connected in series with 9Ω, the voltmeter reading changes to 1.9V. Calculate the emf of the cell and its internal resistance.
35. A resistance of 600Ω, an inductor of 0.4H and a capacitor of 0.01μF are connected in series to an AC source of variable frequency. Find the frequency of AC source for which current in the circuit is maximum. Also calculate the bandwidth and quality factor for the circuit.

36. A biconvex lens of refractive index 1.5 has a focal length 10cm. Calculate the radius of curvature. Find the position and nature of the image of an object held at a distance 10cm from the lens.

37. The threshold wavelength of a photosensitive metal is 662.5nm. If this metal is irradiated with a radiation of wavelength 331.3nm, find the maximum kinetic energy of the photoelectrons. If the wavelength of radiation is increased to 496.5nm, calculate the change in maximum kinetic energy of the photoelectrons. (Planck's constant, $h = 6.625 \times 10^{-34}$ Js and speed of light in vacuum= 3×10^{8} ms^{-1})

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