MODEL QUESTION PAPER – 3 BRIKS ACADEMY PADMANABHANAGARA 2023-24

II PUC - PHYSICS (33)

Time: 3 hours 15 min. Max Marks: 70

General Instructions:

1. **All parts are compulsory.**
2. **For Part – A questions, first written-answer will be considered for awarding marks.**
3. **Answers without relevant diagram / figure / circuit wherever necessary will not carry any marks.**
4. **Direct answers to numerical problems without detailed solutions will not carry any marks.**

PART–A

I. Pick the correct option among the four given options for ALL of the following questions: 15×1= 15

1. A charge q_1 exerts force F on a second charge q_2. If a third charge q_3 is brought near q_2, now F' is the new force exerted by q_1 on q_2 then,
   a) $F > F'$ b) $F < F'$ c) $F = F'$ d) $F = -F'$
2. The angle between electric field and equipotential surface is
   a) 0^0 b) 90^0 c) $0^0 < \theta < 90^0$ d) $90^0 < \theta < 180^0$
3. A battery converts _____ energy into _____ energy.
   a) electrical, mechanical b) chemical, electrical
   c) electrical, chemical d) kinetic, electrical
4. A galvanometer can be converted into an ammeter by connecting
   a) a low resistance in series b) a high resistance in parallel
   c) a low resistance in parallel d) a high resistance in series
5. The dimensions of magnetic intensity is same as
   a) Magnetization b) magnetic moment c) magnetic field d) magnetic susceptibility
6. When north pole of a magnet is moved towards a closed coil, the direction of induced current with respect magnet is
   a) clockwise b) anticlockwise
   c) clockwise only if the speed is very less d) clockwise only if the speed is high
7. The motional emf induced across a conductor moving through a magnetic field does not depend on its
   a) length b) radius c) velocity d) orientation
8. When an ac circuit is under resonance, the power factor is
   a) < 1 b) > 1 c) = 1 d) zero
9. An accelerated charges provide
   a) β rays b) α rays c)gamma rays d) electromagnetic waves

10. An oil drop in water behaves as

a) convex lens b) concave lens c) convex mirror d) concave mirror

11. Wave nature of light is not supported by

a) interference b) diffraction c) polarization d) photoelectric effect

12. In photoelectric effect, electrons are emitted from metals if the incident light has certain maximum

a) wavelength b) frequency c) amplitude d) phase

13. Atomic spectra is an example of

a) line spectra b) continuous spectra

c) band spectra d) both line and continuous spectra

14. Nuclides with the same mass number but different atomic number are called

a) isotones b) isobars c) isomers d) isotopes

15. The net charge of a p-type semiconductor is

a) positive b) negative c) zero d) highly positive

II.Fill in the blanks by choosing appropriate answer given in the brackets for <u>ALL</u> the following questions: 5×1=5

(electric field, helical, rectifier, energy, nucleons)

16. A moving charge enters a uniform magnetic field at an angle less than 90^0. The path described by the charge will be _____.

17. The production of induced current in a coil because of the variation of magnetic flux in it is in accordance with law of conservation of _____.

18. The polarization of light is due to the confinement of _____ component of the wave in the plane of crystal axis.

19. The collection name for protons and neutrons is called _____.

20. Device which converts AC to DC is _____.

PART –B

III. Answer any <u>FIVE</u> of the following questions: 5 ×2=10

21. Sketch the electric field lines around a) isolated point charge b) Electric dipole.

22. What is electrostatic shielding? Mention one application.

23. Give the expression for Lorentz force and explain the terms.

24. Define magnetization. Mention its SI unit.

25. State and explain Lenz law.

26. Define rms value of current. Find the rms value of current if the peak value is 1.41 A.

27. Write any two uses of IR waves.

28. State the conditions for TIR.

29. Differentiate between p and n type of semiconductor.

PART–C

IV. Answer any FIVE of the following questions: **5×3=15**

30. Mention the properties of charges.

31. Derive an expression for combination of capacitors in parallel.

32. Mention the limitations of Ohm's law.

33. State and explain Biot-Savart's law.

34. Derive the relation between relative permeability and magnetic susceptibility.

35. Explain Faraday's coil magnet experiment.

36. Derive an expression for effective focal length of lenses in contact.

37. Mention the postulates of Bohr's atomic model.

38. Mention the properties of nuclear forces.

PART–D

V. Answer any THREE of the following questions: **3×5=15**

39. Derive an expression for electric potential at a point due to an isolated point charge.

40. Derive an expression for resistivity of a material.

41. Derive an expression for magnetic field at a point on the axis of a circular current carrying loop.

42. (A) Mention the condition for constructive and destructive interference in terms of path difference.

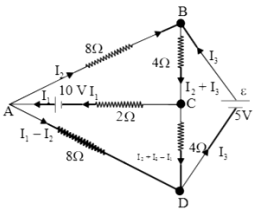
(B) Mention the laws of photoelectric effect.

43. Explain the working of p-n junction diode in forward biasing.

VI. Answer any TWO of the following questions: **2×5=10**

44. Two point charges + 4μC and 32 μC are separated in air at a distance 0.12 m apart. Find the position of neutral point along the line joining the point charges.

45. Find the currents I_1, I_2 and I_3 in the given circuit.



46. A 20Ω resistor, 1.5 H inductor and 35 μF capacitor are connected in series with 220 V, 50 Hz ac supply. Calculate the impedance of the circuit and also find the current through the circuit.

47. Refractive index of an equilateral prism is 1.532. Calculate the angle of minimum deviation when it is immersed in water of refractive index 1.33.