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FOR KARNATAKA CLASS 12 PREPARATION

Karnataka 2nd PUC Model Question Paper 2027 for Physics (Paper 4)

EXAM	YEAR	TYPE	SUBJECT
Karnataka Class 12	2027	Sample Paper	Physics

GOVERNMENT OF KARNATAKA

KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD

6TH CROSS, MALLESHWARAM, BENGALURU - 560003

2026-27 II PUC MODEL QUESTION PAPER-4

SUBJECT: PHYSICS (33) **MAXIMUM MARKS: 70**

TIME: 3 HOURS **NUMBER OF QUESTIONS: 45**

General Instructions:

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

PART – A

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

1. **The charge acquired by a neutral body when 6.25×10^{18} electrons are added to it is:**

   (a) -1 C (b) $+1.6$ C (c) $+1$ C (d) -1.6 C

2. **A and B are two points on the axial line and equatorial plane of a point dipole respectively. If V_A and V_B are the electric potentials corresponding to those two points, then:**

   (a) $V_A = V_B = 0$ (b) $V_A \neq 0$ *and* $V_B = 0$

   (c) $V_A = 0$ *and* $V_B \neq 0$ (d) $V_A \neq 0$ *and* $V_B \neq 0$

3. **In case of electrolytic solutions, the charge carriers are:**

   (a) electrons. (b) positive and negative ions.

   (c) electrons and positive ions. (d) positive ions.

4. **The expression for the angular frequency of a charged particle of mass *m* and charge *q* describing circular path while moving perpendicular to a magnetic field *B* is:**

   (a) $\frac{m}{q\,B}$ (b) $\frac{B}{q\,m}$ (c) $\frac{q\,B}{m}$ (d) $\frac{q^2\,B}{m}$.

5. **In the following table, column-I is the list of magnetic materials and column-II is the list of different numerical relations between μ and μ_0. Identify the correct match.**

Column – I	Column - II
(i) Paramagnetic material	(p) $\mu < \mu_0$
(ii) Diamagnetic material	(q) $\mu >> \mu_0$
(iii) Ferromagnetic material	(r) $\mu > \mu_0$

   (a) (i) → (q), (ii) → (r), (iii) → (p) (b) (i) → (r), (ii) → (p), (iii) → (q)

   (c) (i) → (r), (ii) → (q), (iii) → (p) (d) (i) → (p), (ii) → (q), (iii) → (r)

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6. Magnetic flux through a plane surface placed in magnetic field is maximum when the angle between the area vector and magnetic field vector is:

(a) 0° (b) 90° (c) 45° (d) 60°

7. Which one of the following statements is WRONG in case of a series LCR ac circuit at resonance?

(a) Inductive reactance is equal to capacitive reactance.

(b) Impedance is equal to resistance.

(c) Current and voltage are in phase.

(d) Power dissipated in the circuit is minimum.

8. The primary and secondary coils of a transformer are wound one over the other to reduce:

(a) hysteresis loss. (b) eddy loss. (c) flux loss. (d) heat loss.

9. Ampere-Maxwell law can be given by (symbols have usual meanings):

(a) $\oint \vec{E} \cdot d\vec{A} = \frac{Q}{\varepsilon_0}$ (b) $\oint \vec{B} \cdot d\vec{A} = 0$

(c) $\oint \vec{B} \cdot d\vec{l} = \mu_o i_c + \mu_o \varepsilon_o \frac{d\phi_E}{dt}$ (d) $\oint \vec{E} \cdot d\vec{l} = -\frac{d\phi_B}{dt}$

10. A real object is placed in front of a convex mirror at a distance equal to its focal length. The image formed is:

(a) virtual and diminished. (b) real and magnified.

(c) virtual and magnified (d) real and diminished

11. When a plane wavefront passes through an optical medium, it emerges as a plane wavefront. The optical medium may be:

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

12. In a photon-particle collision:

(a) only total energy is conserved.

(b) only total momentum is conserved.

(c) both total energy and total momentum are conserved.

(d) neither the total energy nor the total momentum is conserved.

13. The radius of n^{th} orbit of hydrogen atom is directly proportional to:

(a) n (b) n^2 (c) $\frac{1}{n}$ (d) $\frac{1}{n^2}$

14. The phenomenon in which an unstable nucleus emits a helium nucleus is called:

(a) α - decay (b) γ – decay (c) β^+- decay (d) β^- – decay

15. A device is used to convert only half of the input ac into pulsating dc. The device is a:

(a) filter. (b) transformer.

(c) full wave rectifier. (d) half wave rectifier.

II. Fill in the blanks by choosing the appropriate answer given in the bracket for ALL the following questions: **5 × 1 = 5**

[*greater, paramagnetic, polaroid, smaller, inductance, ferromagnetic*]

16. The formation of domains is observed in _____ materials.

17. The ratio of magnetic flux linked with a coil to the current through it is called _____ of the coil.

18. If a ray of light undergoes refraction from a denser medium to a rarer medium obliquely, then the angle of refraction is _____ than the angle of incidence.

19. The transverse nature of light can be demonstrated using a _____.

20. The de Broglie wavelength is _____ for particles of greater momentum.

PART – B

III. Answer any FIVE of the following questions: **5 × 2 = 10**

21. Define the term 'linear charge density'. Mention its SI unit.

22. Write two properties of equipotential surfaces.

23. Draw the graphs to show the variation of resistivity with temperature in case of

a) conductors and b) semiconductors.

24. A straight wire of length 0.5 m carrying a current of 2 A is placed a uniform magnetic field of 0.3 T. Calculate the maximum magnetic force on the wire.

25. State and explain Faraday's law of electromagnetic induction.

26. Name the electromagnetic waves generated by:

(a) The accelerated motion of charges in conducting wires.

(b) The bombardment of a metal target by high energy electrons.

27. 'Stable structure of an atom as given by Rutherford model is not possible according to classical electromagnetic theory'. Explain this statement.

28. What are dopants? Name the type of dopants used to obtain *p*-type semiconductors.

PART – C

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

29. Show that the total electric flux through the surface of a sphere enclosing a point charge 'q' at its centre is $\frac{q}{\varepsilon_0}$.

30. Derive an expression for the potential energy of a system of two point charges in the absence of external electric field.

31. Explain the conversion of galvanometer into a voltmeter using relevant circuit diagram and expression.

32. What are paramagnetic substances? Mention two factors on which susceptibility of a paramagnetic material depends.

33. Derive the expression for the emf generated in the coil of an AC generator.

34. What are reflecting telescopes? Explain the advantages of mirror objectives used in them.

35. Give any three experimental results of photoelectric effect.

36. Calculate the energy equivalent of one atomic mass unit (1 u) in joules.

Given: Mass of Carbon - 12 atom is 1.992647×10^{-26} kg.

PART – D

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

37. Derive an expression for the capacitance of a parallel plate capacitor with air between the plates. Also write the general expression for the capacitance of a parallel plate capacitor with a dielectric medium.

38. Obtain the expressions for equivalent emf and equivalent internal resistance of two cells of different emfs and different internal resistances connected in parallel.

39. i) Obtain the expression for the torque acting on a rectangular current loop placed in a uniform magnetic field. (3)

ii) When is the torque on the current loop

a) maximum and b) zero? (2)

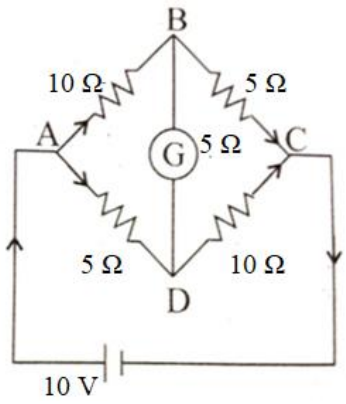
40. Derive Lens maker's formula for a convex lens.

41. With the help of experimental circuit and *V* - *I* characteristics, explain the action of a *p* - *n* junction diode under forward bias.

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

42. A pendulum bob of mass 80 mg and carrying charge 2×10^{-8} C is at rest at a certain angle with the vertical in a horizontal uniform electric field of 20,000 V m^{-1}. Find the tension in the thread of the pendulum and the angle it makes with the vertical.

43. In the given circuit, calculate the current through the galvanometer (I_g)



44. A 50 Ω resistor, 0.5 H inductor and 200 μF capacitor are connected in series with 220 V and 50 Hz source. Calculate i) the impedance of the circuit and ii) the power factor of the circuit.

45. In Young's double slit experiment, the slits are separated by 0.3 mm and the screen is placed at a distance of 1 m from the slits. The distance between the first dark fringe and fourth bright fringe is found to be 0.6 cm. Calculate the wavelength of the light used.

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