GOVERNMENT OF KARNATAKA

KARNATAKA SCHOOL EXAMINATION AND ASSESSMENT BOARD

6TH CROSS, MALLESHWARAM, BENGALURU - 560003

2025-26 II PUC MODEL QUESTION PAPER-1

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: **1 × 15 = 15**

1. **The electric flux over a closed surface enclosing a charged particle is $-\frac{q}{6\varepsilon_o}$. The charge of the particle is:**

   (a) $+\frac{q}{6}$ (b) $+6q$ (c) $-\frac{q}{6}$ (d) $-6q$

2. **Two capacitors of capacitance C_1 and C_2 ($C_1 \neq C_2$) are connected in parallel to an external source of potential difference 'V. The equation which is not applicable for the given combination is (Symbols have their usual meanings):**

   (a) $Q = Q_1 + Q_2$ (b) $V = V_1 + V_2$ (c) $C = C_1 + C_2$ (d) $V_1 = V_2$

3. **In case of metals, with increase in temperature:**

   (a) the conductivity decreases. (b) the average speed of conduction electrons decreases.

   (c) the resistivity decreases. (d) the number of conduction electrons increases.

4. **A galvanometer can be converted into a voltmeter by connecting:**

   (a) a low resistance in series with it. (b) a high resistance in parallel with it.

   (c) a low resistance in parallel with it. (d) a high resistance in series with it.

5. **In the following table, column-I is the list of magnetic property and column-II is the list of an item related to magnetic property. Identify the correct match.**

Column - I	Column - II
(i) Paramagnetism	(p) Magnetic property common to all substances.
(ii) Diamagnetism	(q) Domain formation
(iii) Ferromagnetism	(r) Sodium is an example for this magnetic property.

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

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

6. **Magnetic flux is:**

(a) a scalar and its SI unit is Wbm^{-2}.

(b) a scalar and its SI unit is Wb.

(c) a vector and its SI unit is Wbm^{-2}.

(d) a vector and its SI unit is Wb.

7. **The resonance frequency of a series *LCR* circuit remains constant even if there is any variation in the value/values of:**

(a) L (b) C (c) both L and R (d) R

8. **Electromagnetic waves are produced by:**

(a) charges in uniform motion .

(b) stationary charges.

(c) accelerated charges.

(d) steady current flowing through a conductor.

9. **A real object is placed between the pole and principal focus of a concave mirror. The image formed is:**

(a) virtual and magnified.

(b) real and magnified.

(c) virtual and diminished

(d) real and diminished

10. **The waves coming from two coherent sources overlap at a point to give maximum intensity. The phase difference between the superposing waves may be:**

(a) 3π (b) 6π (c) 5π (d) 7π

11. **Identify the correct statement.**

(a) Light waves exhibit diffraction but not sound waves.

(b) Sound waves exhibit diffraction but not light waves.

(c) Light waves exhibit diffraction but not polarization.

(d) Light waves exhibit both diffraction and polarization.

12. **In a photoelectric experiment, the graph related to two quantities is a straight-line with slope equal to $\frac{h}{e}$. Then it is a graph of:**

(a) kinetic energy of photoelectrons versus intensity of incident light.

(b) photocurrent versus intensity of incident light.

(c) stopping potential versus frequency of incident light.

(d) photocurrent versus collector plate potential.

13. **The total energy of an electron revolving in n^{th} orbit of hydrogen atom is the least for:**

(a) $n = 3$ (b) $n = 1$ (c) $n = 2$ (d) $n = 4$

14. **An example for isobars is:**

(a) ${}_{1}^{2}H$ and ${}_{1}^{3}H$ (b) ${}_{1}^{2}H$ and ${}_{2}^{4}He$ (c) ${}_{80}^{198}Hg$ and ${}_{79}^{197}Au$ (d) ${}_{1}^{3}H$ and ${}_{2}^{3}He$

15. **When a *p-n* junction diode is reverse biased**

(a) both the barrier height and width of depletion region increase.

(b) the barrier height increases but the width of depletion region decreases.

(c) the barrier height decreases but the width of depletion region increases.

(d) both the barrier height and the width of depletion region decrease.

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

[*90°, magnitude, magnetization, work function, 0°, polarity*]

16. The net magnetic moment acquired per unit volume of a sample is called _____.

17. Lenz's law gives the _____ of the induced emf.

18. The phase difference between voltage and current in a pure resistive AC circuit is _____.

19. If the angle of incidence for a ray of light in denser medium is equal to critical angle, then the angle of refraction in rarer medium is equal to_____.

20. The minimum energy required by an electron to escape from the metal surface is called_____.

PART – B

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

21. Define electric field at a point. What is meant by 'source charge'?

22. The electrostatic potential energy of a system of two like charges is positive. Explain.

23. Name the mobile charge carriers in metals. Write the expression for mobility in terms of average collision time (relaxation time) for charge carriers.

24. What is the nature of the force between two parallel conductors carrying currents in the (a) same direction and (b) opposite direction?

25. Calculate the magnetic energy stored in a coil of self – inductance 0.05 H carrying a current of 0.2 A.

26. Name the electromagnetic waves used in:

(i) The radar systems of aircraft. (ii) The laser assisted eye surgery (*LASIK*).

27. Give any two limitations of Bohr's atomic model.

28. List out two differences between *p*-type and *n*-type semiconductors.

PART – C

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

29. Derive an expression for torque acting on an electric dipole placed in a uniform electric field.

30. What is a capacitor? Mention any two factors on which capacitance of a parallel plate capacitor depends.

31. In a chamber, a uniform magnetic field of 6.5×10^{-4} T is maintained. An electron is shot into the field with a speed of 4.8×10^{6} m s^{-1} normal to the field. Determine the radius of the circular orbit.

Given: $e = 1.6 \times 10^{-19}$ C and $m_e = 9.1 \times 10^{-31}$ kg.

32. Mention any three properties of magnetic field lines.

33. Describe the coil and bar magnet experiment to demonstrate the phenomenon of electromagnetic induction.

34. Draw the ray diagram for the formation of image by a compound microscope. Write the expression for linear magnification produced by the objective of compound microscope in terms of its tube length.

35. What are matter waves? Explain the de Broglie hypothesis of matter waves.

36. Differentiate between nuclear fission and nuclear fusion.

PART – D

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

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

38. Assuming the expression for drift velocity, derive the expression for conductivity of a material $\sigma = \frac{ne^2\tau}{m}$ where symbols have their usual meaning.

39. Derive an expression for the magnetic field at a point on the axis of a circular current loop using Biot-Savart's law.

40. (i)What is a wavefront? (1)

(ii) Derive Snell's law for a plane wave undergoing refraction using Huygens principle. (4)

41. What is a half-wave rectifier? Draw a neat labelled circuit diagram and input-output waveforms for half-wave rectifier. Explain the working of half-wave rectifier.

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

42. A positively charged spherical conductor of radius 0.1 m produces an electric field of 1.8×10^3 NC^{-1} at a point 'P' distant 0.2 m from its centre. Calculate the magnitude of the charge present on the spherical conductor. Also find the magnitude of new charge produced on the same spherical conductor if 5×10^{10} extra electrons are removed from it.

43. The terminal potential difference of a cell connected to an external resistance of 4 Ω is 2.4 V. When the same cell is connected to an external resistance of 9 Ω, the new terminal potential difference becomes 2.7 V. Find the emf and internal resistance of the cell.

44. A resistor of 10 Ω and an inductor of self-inductance 0.05 H are connected in series to an AC source of 200 V, 50 Hz. Find the impedance of the circuit and current in the circuit.

45. Double convex lenses are to be manufactured from a glass of refractive index 1.55 with both faces of the same radius of curvature. Find the radius of curvature required if the focal length is to be 20 cm. Also find the new focal length of the lens if it is immersed in water of refractive index 1.33.

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