



SAIVEERA ACADEMY TEST SERIES

12TH PHYSICS FIRST MIDTERM MODEL TEST -23



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SAIVEERA ACADEMY - WE CARE FOR YOUR FUTURE**COIMBATORE – 80988 50809****12****PHYSICS****Marks: 70****FIRST MIDTERM MODEL TEST****Duration: 2 ½ hours****PART – A****Answer all the questions .Each question carries one mark .****Choose the correct answer****15 × 1 = 15**

- 1.If the charge 50C is uniformly distributed in a volume 1 m^3 , then volume charge density is
 a) 500 Cm^{-3} b) 50 Cm^{-3} c) 5 Cm^{-3} d) 5 Cm^3
- 2.When the distance increases,the potential due to positive charge will be
 a) decreases b)remain same c)increases d)none of these
- 3.If electric field lines leaves the closed surface , then the electric flux will be
 a) Positive b) negative c)both a and b d)none of these
- 4.The electric field due to a infinitely plane sheet can be easily found by
 a) Gauss law b) Biot-savart law c)Ampere's circuital law d)Coulomb's law
5. The total charge stored in the capacitor will be
 a) Positive b) negative c)both a and b d)Zero
- 6.If the two charges placed in the vacuum are transferred to water , then the force between them will be
 a) Increased by 85 times b) increases by 80 times
 c) decreased by 85 times d) decreased by 80 times
- 7.If, electric field applied in the copper wire is 570 NC^{-1} then the acceleration experienced by the electron i will be
 a) $1.001 \times 10^{13} \text{ ms}^{-2}$ b) $1.001 \times 10^{14} \text{ ms}^{-2}$
 c) $1.001 \times 10^{15} \text{ ms}^{-2}$ d) $1.001 \times 10^{-14} \text{ ms}^{-2}$
8. In semiconductors when temperature decreases, then the overall resistivity becomes
 a) decreases b)remain same c)increases d)none of these
9. Silver & mercury are examples of which type of Thomson effect
 a) Positive & negative b) negative & negative
 c) negative & positive d)none of these
10. Pole strength does not depends on the

- a) nature of materials of the magnet
 b) area of cross- section
 c) magnetic permeability of material
 d) All of these

11. If a magnet is cut into two equal halves perpendicular the length, then pole strength will

- a) reduced to half b) reduced to $\frac{3}{4}$ c) remains same d) none of these

12. K is called reduction factor of tangent Galvanometer, where

- a) $K = \frac{4RBH}{N\mu_0}$ b) $K = \frac{RBH}{N\mu_0}$ c) $K = \frac{BH}{N\mu_r}$ d) $K = \frac{2RBH}{N\mu_0}$

13. The direction of magnetic field due to solenoid is given by

- a) Maxwell's cork screw rule b) Fleming left hand rule
 c) Right hand thumb rule d) Right hand thumb rule (mnemonic)

14. An electron moving perpendicular to a uniform magnetic field 0.500 T undergoes circular motion of radius 2.50 m. What will be a speed of electron?

- a) $2.195 \times 10^{-8} \text{ ms}^{-1}$ b) $2.195 \times 10^{12} \text{ ms}^{-1}$ c) $3.195 \times 10^{-8} \text{ ms}^{-1}$ d) $2.195 \times 10^8 \text{ ms}^{-1}$

15. In order to increase the range of an ammeter n times, the value of shunt resistance to be connected in parallel is

- a) $S = \frac{G}{n+1}$ b) $S = \frac{G}{n-1}$ c) $S = \frac{G}{1-n}$ d) $S = \frac{G}{-n-1}$

PART – B

Answer any 6 questions in which Q.No .22 is compulsory

6 × 2 = 12

16. What is an equipotential surface and write down its properties
 17. Write down the difference between polar and non polar molecule
 18. Define capacitance and give its unit
 19. Define temperature coefficient of resistance
 20. Define Magnetic declination
 21. State Fleming's left hand rule
 22. Calculate the magnetic field at the center of a square loop which carries a current of 1.5 A, length of each loop is 50 cm.
 23. Define Curie-Weiss law
 24. A potential difference across 24 Ω resistor is 12 V. What is the current through the resistor?

PART – C

Answer any 6 questions in which Q.No .28 is compulsory

6 × 3 = 18

25. Obtain the expression for potential energy of dipole in uniform electric field
26. Find the magnetic induction due to a straight conductor using ampere's circuital law
27. Obtain expression for electric field due to charged infinite plane sheet
28. When two resistances connected in series and parallel their equivalent resistances are 15Ω and $56/15 \Omega$ respectively. Find the individual resistances
29. Explain determination of internal resistance of a cell using voltmeter
30. State and explain Kirchhoff's rules
31. What are Applications of hysteresis loop (any two)
32. Discuss the conversion of galvanometer into an voltmeter
33. Consider a point charge $+q$ placed at the origin and another point charge $-2q$ placed at a distance of 9 m from the charge $+q$. Determine the point between the two charges at which electric potential is zero.

PART – D

Answer the following questions .

$5 \times 5 = 25$

34.a) Discuss the working of cyclotron in detail with its limitations

OR

b) Describe the microscopic model of current and obtain general form of Ohm's law

35.a) Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current.

OR

b) Derive an expression for electrostatic potential due to an electric dipole with its special cases

36.a) Derive an expression for Force acting between two long parallel current carrying conductors

OR

b) Obtain the condition for bridge balance in Wheatstone's bridge

37.a) Derive an expression for Force on a current carrying conductor placed in a magnetic field

OR

b) Derive an expression for the electric field due to infinitely charged wire .

38.a) Calculate the electric field due to a dipole on an equatorial plane

OR

b) Deduce the relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current

**“ My best successes
came on the heels of failures”**

– Barbara Corcoran

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12th Physics First midterm model question paper with key

Part-A

1.c 5 C m^{-3}

Volume charge density = Q/V

$$= 50\text{C} / 10 \text{ m}^3$$

$$= 5 \text{ Cm}^{-3}$$

2.c) increases

For negative charge $V = - q / 4 \pi \epsilon_0 r$

When distance increases v increases

3.b) Negative

4.d) coulomb's law (Because it has no symmetry)

5.d) Zero

6.d) decreased by 80 times

Because relative permeabilty of water is 80

7.d) 570 NC^{-1}

$$a = \frac{eE}{m}$$

$$E = \frac{ma}{e} = 9.1 \times 10^{-31} \times 1.001 \times 10^{14} / 1.6 \times 10^{-19}$$

$$= 570 \text{ NC}^{-1}$$

8.a) decreases

Temperature decreases , n increases , τ decreases , but n is dominant so decreases

The resistivity of material is inversely proportional to number density (n) of electrons

9.c) negative & positive

10.d) All of these

11.c) remains same

$$12.d) K = \frac{2RB_H}{N\mu_0}$$

13.d) right hand rule (mnemonic rule)

14.d) $2.195 \times 10^8 \text{ m/s}$

$$v = |q| \frac{rB}{m} = 1.6 \times 10^{-19} \times 0.500 / 9.1 \times 10^{-31}$$

$$= 2.195 \times 10^8 \text{ m/s}$$

15.b) $S = G / n-1$

Part – B

$$22. B = \frac{\mu_0}{4\pi a} [\sin\theta_1 + \sin\theta_2]$$

$$\theta_1 = 45^\circ \quad \theta_2 = 45^\circ$$

$$a = l/2$$

square has four sides

$$\text{so } B = 4 \times \frac{\mu_0}{4\pi a} [\sin\theta_1 + \sin\theta_2]$$

$$B = 3.4 \times 10^{-6} \text{ T}$$

24.Example 2.5

Part - C

$$28. R_s = R_1 + R_2 = 15 \quad \dots (1)$$

$$R_p = R_1 R_2 / R_1 + R_2 = 56/15 \quad \dots (2)$$

Solving 1 & 2

$$R_1 R_2 = 56$$

$$R_2 = 56/R_1$$

Sub above in 1

$$R_1^2 + 56 = 15 R_1$$

$$R_1 = 8 \text{ OR } 7 \Omega$$

$$R_2 = 7 \text{ or } 8 \Omega$$

33.Example 1.13

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