

SRI KRISHNA MATRIC HR. SEC. SCHOOL, ODDANCHATRAM,
I TERMINAL EXAMINATION – 2022-2023

STD: XII

MARKS: 70

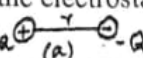
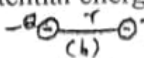
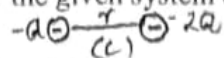
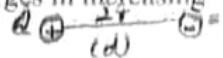

SUBJECT: PHYSICS

TIME: 3 HRS.

PART-A

I. CHOOSE THE CORRECT ANSWER:

15X1=15

1. Rank the electrostatic potential energies for the given system of charges in increasing order.
- (a)  (b)  (c)  (d) 
- (a) $1 = 4 < 2 < 3$ (b) $2 = 3 < 1 < 4$ (c) $2 = 4 < 3 < 1$ (d) $3 < 1 < 2 < 4$
2. An electric dipole of moment \vec{P} is placed in a uniform electric field \vec{E} . Then
- (i) the torque on the dipole is $\vec{P} \times \vec{E}$
 (ii) the potential energy of the system is $\vec{P} \cdot \vec{E}$
 (iii) the resultant force on the dipole is zero. Choose the correct option.
- (a) (i), (ii) and (iii) are correct (b) (i) and (iii) are correct and (ii) is wrong
 (c) only (i) is correct (d) (i) and (ii) are correct and (iii) is wrong
3. When air is replaced by a dielectric medium of constant K, the maximum force of attraction between two charges separated by a distance
- (a) increases K times (b) remains unchanged
 (c) decreases K times (d) increases K^{-1} times
4. If the resistance of coil is 3Ω at 20°C and $\alpha = 0.004/^\circ\text{C}$ then its resistance at 100°C .
- (a) 15Ω (b) 3.96Ω (c) 2.5Ω (d) 2.16Ω
5. A wire of resistance 2 ohms per meter is bent to form a circle of radius 1m. The equivalent resistance between its two diametrically opposite points, A and B as shown in the figure is
- (a) $\pi \Omega$ (b) $\pi/2 \Omega$
 (c) $2\pi \Omega$ (d) $\pi/4 \Omega$
- 
6. The repulsive force between two magnetic poles in air is $9 \times 10^{-3} \text{ N}$. If the two poles are equal in strength and are separated by a distance of 10 cm, then the pole strength of each pole.
- (a) 15 NT^{-1} (b) 35 NT^{-1} (c) 25 NT^{-1} (d) 30 NT^{-1}
7. A thin insulated wire forms a plane spiral of $N = 100$ tight turns carrying a current $I = 8 \text{ mA}$. The radii of inside and outside turns are $a = 50 \text{ mm}$ and $b = 100 \text{ mm}$ respectively. The magnetic induction at the centre of the spiral is
- (a) $5 \mu\text{T}$ (b) $7 \mu\text{T}$ (c) $8 \mu\text{T}$ (d) $10 \mu\text{T}$
8. Two α -particles have the ratio of their velocities as 3 : 2 on entering the field. If they move in different circular paths, then the ratio of the radii of their paths is
- (a) 2 : 3 (b) 3 : 2 (c) 9 : 4 (d) 4 : 9
9. A step-down transformer reduces the supply voltage from 220 V to 11 V and increase the current from 6 A to 100 A. Then its efficiency is
- (a) 1.2 (b) 0.83 (c) 0.12 (d) 0.9
10. For purely capacitive circuits, power factor is:
- (a) 0 (b) -1 (c) 1 (d) infinity
11. Self inductance of a long straight wire
- (a) $\frac{1}{2} LI^2$ (b) $L = \mu_0 N^2 A$ (c) $L = \mu Ni$ (d) zero
12. The specific resistance of a conductor increases with :
- (a) increase in temperature (b) increase in cross-sectional area
 (c) decrease in length (d) decrease in cross-sectional area
13. Consider an oscillator which has a charged particle oscillating about its mean position with a frequency of 300 MHz. The wavelength of electromagnetic waves produced by this oscillator is
- (a) 1 m (b) 10 m (c) 100 m (d) 1000 m

14. Fraunhofer lines are an example of _____ spectrum.
 (a) line emission (b) line absorption (c) band emission (d) band absorption
15. Displacement current is always :
 (a) equal to conduction current (b) less than conduction current
 (c) greater than conduction current
 (d) the sum of current due to flow of positive and negative ions.

PART- B

II. Answer any six questions. Qn.No.24 is compulsory.

6X2=12

16. What is displacement current?
 17. How will you define Q-factor?
 18. State Ampere's circuital law.
 19. A 400 mH coil of negligible resistance is connected to an AC circuit in which an effective current of 6 mA is flowing. Find out the voltage across the coil if the frequency is 1000 Hz.
 20. What is Thomson effect?
 21. Find the heat energy produced in a resistance of $10\ \Omega$ when 5 A current flows through it for 5 minutes.
 22. Write a short note on 'electrostatic shielding'.
 23. What are the differences between Coulomb force and gravitational force?
 24. Compute the speed of the electromagnetic wave in a medium if the amplitude of electric and magnetic fields are $3 \times 10^4\ \text{N C}^{-1}$ and $2 \times 10^{-4}\ \text{T}$, respectively.

PART-C

III. Answer any six questions. Qn.No.33 is compulsory.

6x3=18

25. Write down the properties of electromagnetic waves.
 26. Mention the various energy losses in a transformer.
 27. A closed coil of 40 turns and of area $200\ \text{cm}^2$, is rotated in a magnetic field of flux density $2\ \text{Wb m}^{-2}$. It rotates from a position where its plane makes an angle of 30° with the field to a position perpendicular to the field in a time 0.2 s. Find the magnitude of the emf induced in the coil due to its rotation.
 28. Give an account of magnetic Lorentz force.
 29. A coil of a tangent galvanometer of diameter 0.24 m has 100 turns. If the horizontal component of Earth's magnetic field is $25 \times 10^{-6}\ \text{T}$ then, calculate the current which gives a deflection of 62° .
 30. Derive the equivalent emf, resistance and current of combination of cells in series.
 31. Obtain the expression for capacitance of a parallel plate capacitor.
 32. Distinguish between polar and non-polar molecules.
 33. Two resistors when connected in series and parallel, their equivalent resistances are $15\ \Omega$ and $56/15\ \Omega$ respectively. Find the values of the resistances.

PART-D

IV. Answer the following questions in detail.

5X5=25

34. Explain in detail the construction and working of a Van de Graaff generator. (OR) Discuss the working of cyclotron in detail.
 35. Explain the determination of unknown resistance using meter bridge. (OR) Find out the phase relationship between voltage and current in a pure inductive circuit.
 36. Calculate the magnetic field at a point on the axial line of a bar magnet. (OR) Explain the types of emission spectrum.
 37. Derive an expression for electrostatic potential due to an electric dipole. (OR) Write down Maxwell equations in integral form.
 38. Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle. (OR) Explain the equivalent resistance of a series and parallel resistor network.