+2 Physics Important FIVE marks Questions
English Medium : Volume -I

PRESENTED BY

B.ELANGOVAN. M.SC., M.ED., M.PHIL.,
( Dr. Radhakrishnan State level Best Teacher Award -2011 recipient)
P.G.TEACHER ( PHYSICS ), PACHAIYAPPA’S HR.SEC.SCHOOL,
KANCHEEPURAM - 631501.

www.Padasalai.Net
1. Write the properties of electric lines of forces. 
   \((M - 07, O - 07, M - 08, M - 10, O - 11, M - 11, J - 12)\)

2. Define electric potential at a point. Obtain an expression for electric potential due to a point charges. 
   \((M - 09)\)

3. What is electrostatic potential energy of a system of two point charges? Deduce an expression for it. 
   \((O - 09)\)

4. Prove that the energy stored in a parallel plate capacitors 
   \[ E = \frac{q^2}{2C} \]  
   \((M - 12)\)

5. Deduce an expression for the capacitance of the parallel plate capacitor. 
   \((J - 10)\)

6. Derive an expression for the torque on the electric dipole when placed in uniform electric field. 
   \((O - 10, O - 12)\)

7. Explain the effect of introducing a dielectric slab between the plates of parallel plate capacitor.

8. What is a capacitor? Explain the principle of a capacitor.

9. State Gauss law. Using this drive an expression for electric field due to two parallel charges sheets.

10. State Coulomb’s law in electrostatics and explain it in vector form.

11. A parallel plate capacitor has plates of area 200 cm² and separation between the plates 1 mm. Calculate (i) the potential difference between the plates if 1 nC charge is given to the capacitor (ii) with the same charge (1 nC) if the plate separation is increased to 2 mm, what is the new potential difference and (iii) electric field between the plates. 
   \((M - 06)\)

12. Three capacitors each of capacitance 9 pF are connected in series (i) What is the total capacitance of the combination? (ii) What is the potential difference across each capacitor, if the combination is connected to 120 V supply? 
   \((J - 06, O - 06, J - 11)\)

13. Two positive charges of 12 μC and 8 μC respectively are 10 cm apart. Find the work done in bringing them 4 cm closer, so that, they are 6 cm apart. 
   \((J - 08)\)

14. Two capacitors of unknown capacitances are connected in series and parallel. If the net capacitances in the two combinations are 6μF and 25μF respectively, find their capacitances. 
   \((O - 08)\)

Continued in the next page .................
15. (J-07)

Two capacitances 0.5 \( \mu F \) and 0.75 \( \mu F \) are connected in parallel and the combination to a 110 V battery. Calculate the charge from the source and charge on each capacitor.

(OR)

Calculate the electric potential at a point P, located at the centre of the square of point charges shown in the figure.

![Diagram](image)

16. (J-09)

The plates of a parallel plate capacitor have an area of 90 cm\(^2\) each and are separated by 2.5 mm. The capacitor is charged by connecting it to a 400 V supply. How much electrostatic energy is stored by the capacitor?

17. (J-11)

Three capacitors each of capacitance 9 pF are connected in series (i) What is the total capacitance of the combination? (ii) What is the potential difference across each capacitor, if the combination is connected to 120 V supply?

(OR)

Three charges \(-2 \times 10^{-9}C, +3 \times 10^{-9}C, -4 \times 10^{-9}C\) are placed at the vertices of an equilateral triangle ABC of side 20 cm. Calculate the work done in shifting the charges A, B and C to A\(_1\), B\(_1\) and C\(_1\) respectively which are the mid points of the sides of the triangle.

![Diagram](image)

***** BEST WISHES *****
1. Define mobility. Derive the relation between drift velocity and the current. (M-06)

2. Obtain the condition for bridge balance in Wheatstone's bridge. (M-06,J-06,O-06,M-08,J-09,M-10)

3. State and verify Faraday's second law of electrolysis. (J-06,M-08,M-11)

4. If two or more resistors are connected in parallel, derive the expression for the effective resistance. (O-06)

5. How will you compare the emfs of the two given cells using the Potentiometer? (M-07,O-10,O-11,M-12)

6. State and explain Faraday's second law for electrical network. (J-07)

7. Explain the working of Leclanche cell. (J-07,O-12)

8. Explain the principle of the potentiometer. (O-07)

9. Explain the working of lead acid accumulator. (O-07)

10. Explain the method to find the internal resistance of a cell using the potentiometer. (J-08,O-09,J-11)

11. State and explain Faraday's first law of electrolysis. (J-08,O-09)

12. Give any five applications of superconductors. (O-08,M-09,J-11,O-12)

13. Explain the construction and the working of a Daniel cell. (O-08,J-09,J-10,M-11)

14. Explain the variation of resistance with temperature using a graph. (J-12)

15. (M-09,J-10C)

What is the drift velocity of an electron in a copper conductor having area $10 \times 10^{-6} \text{m}^2$, carrying a current of 2 A. Assume that there are $10 \times 10^{28}$ electrons / m$^3$.

16. (M-10,O-11)

The effective resistances are 10$\Omega$, 2.4$\Omega$ when two resistors are connected in series and parallel. What are the resistances of individual resistors?

17. (J-10C,M-12)

Three resistors are connected in series with 10 V supply as shown in the figure. Find the voltage drop across each resistor.

---

Continued in the next page .................
18. (J-12)

An iron box of 400 W power is used daily for 30 minutes. If the cost per unit is 75 paise, find the weekly expense on using the iron box.

(OR)

In a metre bridge, the balancing length for a 10 \( \Omega \) resistance in left gap is 51.8 cm. Find the unknown resistance and specific resistance of a wire of length 108 cm and radius 0.2 mm.

19. (M-07)

In the given network, calculate the effective resistance between points A and B

![Network Diagram]

20. (O-10)

Find the current flowing across three resistors 3\( \Omega \), 5\( \Omega \) and 2\( \Omega \) connected in parallel to a 15 V supply. Also find the effective resistance and total current drawn from the supply.

( OR )

In a metre bridge, the balancing length for a 10 \( \Omega \) resistance in left gap is 51.8 cm. Find the unknown resistance and specific resistance of a wire of length 108 cm and radius 0.2 mm.

***** BEST WISHES *****
+2 Physics  UNIT : 3  Effects of Electric current

1. What are the special features of magnetic Lorentz force? (J-07,M-11)
2. Explain the conversion of moving coil galvanometer into an ammeter. (M-08,J-12)
3. Explain the principle and the construction of tangent galvanometer. (O-08)
4. State and explain Biot-Savart law. (J-09)
5. Explain the conversion of moving coil galvanometer into an ammeter. (M-10,J-11,M-12)

6. A circular coil of radius 20 cm has 100 turns wire and it carries a current of 5A. Find the magnetic induction at a point along its axis at a distance of 20 cm from the centre of the coil. (M-06,O-06,M-09C)

7. A rectangular coil of 500 turns and of area $6 \times 10^{-4}$ m$^2$ is suspended inside a radial magnetic field of induction $10^{-4}$ T by a suspension wire of torsional constant $5 \times 10^{-10}$ Nm per degree. Calculate the current required to produce a deflection of $10^5$. (J-06,O-09C)

8. A moving coil galvanometer of resistance 20 $\Omega$ produces full scale deflection for a current of 50 mA. How you will convert the galvanometer into (i) an ammeter of range 20 A and (ii) a voltmeter of range 120 V. (M-07,M-09C)

9. In a hydrogen atom electron moves in an orbit of radius 0.5 $\AA$ making $10^{16}$ revolutions per second. Determine the magnetic moment associated with orbital motion of the electron. (J-08)

10. Two parallel wires each of length 5m are placed at a distance of 10 cm apart in air. They carry equal currents along the same direction and experience a mutually attractive force of $3.6 \times 10^{-4}$ N. Find the current through the conductors. (O-09C,J-10)

11. Two straight infinitely long parallel wires carrying equal currents and placed at a distance of 20 cm apart in air experience a mutually attractive force of $4.9 \times 10^{5}$ N per unit length of the wire. Calculate the current. (O-11)

12. A galvanometer has a resistance of 40 $\Omega$. It shows full scale deflection for a current of 2 mA. How you will convert the galvanometer into a voltmeter of range 0 to 20V? (O-10)

13. The deflection in a galvanometer falls from 50 divisions to 10 divisions when 12 $\Omega$ resistance is connected across the galvanometer. Calculate the galvanometer resistance. (O-12)

***** BEST WISHES *****

www.Padasalai.Net
+2 Physics  UNIT : 4 Electromagnetic Induction and Alternating Current

**Five Marks Questions**

1. Obtain the phase relation between the current and the voltage in an AC circuit containing an inductor only. Draw the corresponding graph.  
   
   (M-06,M-08)

2. What are the various types of energy losses in a transformer? Explain how these losses can be minimized.  
   
   (J-06,O-06,O-09,J-10,O-10,M-11)

3. Explain the applications of eddy currents.  
   
   (M-07,O-08,M-10)

4. Explain how an emf can be produced by changing the area enclosed by a coil. (J-07,O-07,M-09,O-12)

5. Explain the mutual induction between two long solenoids. Derive an expression for the mutual inductance between two long solenoids.  
   
   (J-08,M-12)

6. State and explain Faraday’s laws and Lenz law in electromagnetic induction. (J-11)

7. Obtain the phase relation between the current and the voltage in an AC circuit containing a resistor only. Draw the corresponding graph.  
   
   (O-11,J-12)

8. (J-09)

   An a.c. generator consists of a coil of 10,000 turns and of area 100 cm\(^2\). The coil rotates at an angular speed of 140 rpm in a uniform magnetic field of 3.6 × 10\(^{-2}\) T. Find the maximum value of the emf induced.
1. Writs a note on pile of plates. \( \text{(M-06,J-09)} \)
2. State and prove Brewster’s law. \( \text{(J-06,O-06,J-07,J-08,M-09,J-10,O-12)} \)
3. Write a note on Nicol prism. \( \text{(M-07,O-09,O-11)} \)
4. Distinguish between interference and diffraction. \( \text{(O-10)} \)
5. Derive the radius of the \( n \)th dark ring in Newton’s ring experiment \( \text{(J-11,M-12)} \)
6. A soap film of refractive index 1.33, is illuminated by white light incident at an angle 30°. The reflected light is examined by spectroscope in which dark band corresponding to the wavelength 6000Å is found. Calculate the smallest thickness of the film. \( \text{(O-07C)} \)
7. In Young’s experiment a light of frequency \( 6 \times 10^{14} \) Hz is used. Distance between the centres of adjacent fringes is 0.75 mm. Calculate the distance between the slits, if the screen is 1.5 m away. \( \text{(M-08,M-10C,J-12)} \)
8. A parallel beam of monochromatic light is allowed to incident normally on a plane transmission grating having 5000 lines per centimetre. A second order spectral line is found to be diffracted at an angle 30°. Find the wavelength of the light. \( \text{(M-10C)} \)
9. In a Newton’s rings experiment the diameter of the 20th dark ring was found to be 5.82 mm and that of the 10th ring 3.36 mm. If the radius of the plano-convex lens is 1 m. Calculate the wavelength of light used. \( \text{(M-11)} \)
10. A monochromatic light of wavelength 589 nm is incident on a water surface having refractive index 1.33. Find the velocity, frequency and wavelength of light in water.

\( \text{(OR)} \)

A plano - convex lens of radius 3 m is placed on an optically flat glass plate and is illuminated by monochromatic light. The radius of the 8th dark ring is 3.6 mm. Calculate the wavelength of light used.