

**SEC****Physics****Lesson 1 – Electrostatics****Time : 1.15 Hrs****Marks : 40****I.Choose the best answer:****5 \* 1 = 5**

1.Which charge configuration produces a uniform electric field?

- (a) point charge (b) infinite uniform line charge  
(c) uniformly charged infinite plane (d) uniformly charged spherical shell

2.An electric dipole is placed at an alignment angle of  $30^\circ$  with an electric field of  $2 \times 10^5 \text{ N C}^{-1}$ . It experiences a torque equal to  $8 \text{ N m}$ . The charge on the dipole if the dipole length is  $1 \text{ cm}$  is-

- (a)  $4 \text{ mC}$  (b)  $8 \text{ mC}$  (c)  $5 \text{ mC}$  (d)  $1 \text{ mC}$

3.An electric field  $\vec{E} = 10 \times \hat{i}$  exists in a certain region of space. Then the potential difference  $V = V_0 - V_A$ , Where  $V_0$  is the potential at the origin and  $V_A$  is the potential at  $x = 2 \text{ m}$  is-

- (a)  $10 \text{ J}$  (b)  $-20 \text{ J}$  (c)  $+ 20 \text{ J}$  (d)  $- 10 \text{ J}$

4.A parallel plate capacitor stores a charge  $Q$  at a voltage  $V$ . Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change?

- (a) Capacitance (b) Charge (c) Voltage (d) Energy density

5.Two metallic spheres of radii  $1 \text{ cm}$  and  $3 \text{ cm}$  are given charges of  $-1 \times 10^{-2} \text{ C}$  and  $5 \times 10^{-2} \text{ C}$  respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is

- (a)  $3 \times 10^{-2} \text{ C}$  (b)  $4 \times 10^{-2} \text{ C}$  (c)  $1 \times 10^{-2} \text{ C}$  (d)  $2 \times 10^{-2} \text{ C}$

**II.Answer any 5 of the following:****5 \* 2 = 10**

6. What is mean by 'Electric field lines'?
7. Define 'Electric dipole'
8. Write a short note on superposition principle..
9. What is meant by quantisation of charges?
10. Define 'electric flux'.
11. What is Polarisation?

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

**III. Answer the following:**

**5 \* 3 = 15**

11. What are the differences between Coulomb force and gravitational force?
12. Write a short note on 'electrostatic shielding'.
13. Give the relation between electric field and electric potential.
14. What are the properties of an equipotential surface?
15. What is corona discharge?

**IV. Answer any 2 of the following:**

**2 \* 5 = 10**

16. Derive an expression for electrostatic potential due to an electric dipole.
17. Explain in detail the construction and working of a Van de Graaff generator.
18. Discuss the basic properties of electric charges.
19. Calculate the electric field due to a dipole on its axial line and equatorial plane.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**

**SEC****Physics****Lesson 2 – Current Electricity****Time : 1.15 Hrs****Marks : 40****I.Choose the best answer:****5 \* 1 = 5**

1.A toaster operating at 240 V has a resistance of 120  $\Omega$ . The power is

- (a) 400 W                      (b) 2 W                      (c) 480 W                      (d) 240 W

2.In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1kW are connected. The voltage of electric mains is 220 V. The minimum capacity of the main fuse of the building will be (IIT-JEE 2014)

- (a) 14 A                      (b) 8 A                      (c) 10 A                      (d) 12 A

3.A carbon resistor of  $(47 \pm 4.7)$  k  $\Omega$  to be marked with rings of different colours for its identification. The colour code sequence will be

- (a) Yellow – Green – Violet – Gold                      (b) Yellow – Violet – Orange – Silver  
(c) Violet – Yellow – Orange – Silver                      (d) Green – Orange – Violet – Gold

4.Two wires of A and B with circular cross section made up of the same material with equal lengths. Suppose  $R_A = 3 R_B$ , then what is the ratio of radius of wire A to that of B?

- (a) 3                      (b)  $\sqrt{3}$                       (c)  $\frac{1}{\sqrt{3}}$                       (d)  $\frac{1}{3}$

5.A wire connected to a power supply of 230 V has power dissipation  $P_1$  Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is  $P_2$ . The ratio  $\frac{P_2}{P_1}$  is.

- (a) 1                      (b) 2                      (c) 3                      (d) 4

**II.Answer the following:****5 \* 2 = 10**

6. State macroscopic form of Ohm's law.

7. Why current is a scalar?

8. Define electrical resistivity

9. State Kirchhoff's Current law.

10.Define Current density.

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

**III. Answer the following:**

**5 \* 3 = 15**

11. Distinguish between drift velocity and mobility.
12. What is Electric power and Electric energy.
13. State microscopic form of Ohm's law.
14. What is Peltier and Thomson Effect.
15. State the applications of Seebeck Effect.

**IV. Answer any 2 of the following:**

**2 \* 5 = 10**

1. Explain the equivalent resistance of a series resistor network.
2. Explain the equivalent resistance of a parallel resistor network.
3. State and explain Kirchhoff's rules.
4. Explain the determination of the internal resistance of a cell using voltmeter.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**

**SEC****Physics****Lesson 3 – Magnetism and Magnetic effect of Electric Current****Time : 1.15 Hrs****Marks : 40****I.Choose the best answer:****5 \* 1 = 5**

1. A thin insulated wire forms a plane spiral of  $N = 100$  tight turns carrying a current  $I = 8$  m A (milli ampere). The radii of inside and outside turns are  $a = 50$  mm and  $b = 100$  mm respectively. The magnetic induction at the center of the spiral is

- (a)  $5 \mu\text{T}$       (b)  $7 \mu\text{T}$       (c)  $8 \mu\text{T}$       (d)  $10 \mu\text{T}$

2. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?

- (a)  $30^\circ$       (b)  $45^\circ$       (c)  $60^\circ$       (d)  $90^\circ$

3. Two short bar magnets have magnetic moments  $1.20 \text{ Am}^2$  and  $1.00 \text{ Am}^2$  respectively. They are kept on a horizontal table parallel to each other with their north poles pointing towards the south. They have a common magnetic equator and are separated by a distance of  $20.0$  cm. The value of the resultant horizontal magnetic induction at the mid-point O of the line joining their centers is (Horizontal components of Earth's magnetic induction is  $3.6 \times 10^{-5} \text{ Wb m}^{-2}$ )

- (a)  $3.60 \times 10^{-5} \text{ Wb m}^{-1}$       (b)  $3.5 \times 10^{-5} \text{ Wb m}^{-1}$   
 (c)  $2.56 \times 10^{-4} \text{ Wb m}^{-1}$       (d)  $2.2 \times 10^{-4} \text{ Wb m}^{-1}$

4. Three wires of equal lengths are bent in the form of loops. One of the loops is circle, another is a semi-circle and the third one is a square. They are placed in a uniform magnetic field and same electric current is passed through them. Which of the following loop configuration will experience greater torque ?

- (a) circle      (b) semi-circle      (c) square      (d) all of them

5. A non-conducting charged ring of charge  $q$ , mass  $m$  and radius  $r$  is rotated with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is

- (a)  $\frac{q}{m} M$       (b)  $\frac{2q}{3} M$       (c)  $\frac{q}{2m} M$       (d)  $\frac{q}{4m} M$

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

**II. Answer the following:**

5 \* 2 = 10

6. Define magnetic flux.
7. State Ampere's circuital law.
8. State Coulomb's inverse law.
9. What is meant by hysteresis?
10. Define magnetic dipole moment.

**III. Answer the following:**

5 \* 3 = 15

11. State Biot-Savart's law.
12. What is magnetic susceptibility?
13. What is magnetic permeability?
14. What is meant by magnetic induction?
15. Compare dia, para and ferromagnetism.

**IV. Answer any 2 of the following:**

2 \* 5 = 10

1. Discuss the working of cyclotron in detail.
2. Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current.
3. Explain the principle and working of a moving coil galvanometer.
4. Deduce the relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

**SEC****Physics****Lesson 4 – Electromagnetic Induction and Alternating Current****Time : 1.15 Hrs****Marks : 40****I.Choose the best answer:****5 \* 1 = 5**

1. A circular coil with a cross-sectional area of  $4 \text{ cm}^2$  has 10 turns. It is placed at the centre of a long solenoid that has 15 turns/cm and a cross-sectional area of  $10 \text{ cm}^2$ . The axis of the coil coincides with the axis of the solenoid. What is their mutual inductance?

(a)  $7.54 \mu\text{H}$  (b)  $8.54 \mu\text{H}$  (c)  $9.54 \mu\text{H}$  (d)  $10.54 \mu\text{H}$

2. The flux linked with a coil at any instant  $t$  is given by  $\Phi_B = 10t^2 - 50t + 250$ . The induced emf at  $t = 3\text{ s}$  is

(a)  $-190 \text{ V}$  (b)  $-10 \text{ V}$  (c)  $10 \text{ V}$  (d)  $190 \text{ V}$

3. When the current changes from  $+2\text{ A}$  to  $-2\text{ A}$  in  $0.05 \text{ s}$ , an emf of  $8 \text{ V}$  is induced in a coil. The co-efficient of self-induction of the coil is-

(a)  $0.2 \text{ H}$  (b)  $0.4 \text{ H}$  (c)  $0.8 \text{ H}$  (d)  $0.1 \text{ H}$

4. In a transformer, the number of turns in the primary and the secondary are 410 and 1230, respectively. If the current in primary is  $6\text{ A}$ , then that in the secondary coil is-

(a)  $2 \text{ A}$  (b)  $18 \text{ A}$  (c)  $12 \text{ A}$  (d)  $1 \text{ A}$

5. A step-down transformer reduces the supply voltage from  $220 \text{ V}$  to  $11 \text{ V}$  and increase the current from  $6 \text{ A}$  to  $100 \text{ A}$ . Then its efficiency is

(a)  $1.2$  (b)  $0.83$  (c)  $0.12$  (d)  $0.9$

**II.Answer the following:****5 \* 2 = 10**

6. What do you mean by self-induction?

7. What is meant by mutual induction?

8. What is meant by electromagnetic induction?

9. Define electric resonance.

10. State Lenz's law.

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

**III. Answer the following:**

**5 \* 3 = 15**

11. How is Eddy current produced? How do they flow in a conductor?
12. State Faraday's laws of electromagnetic induction.
13. Give the principle of AC generator.
14. Mention the ways of producing induced emf.
15. State Fleming's right hand rule.

**IV. Answer any 2 of the following:**

**2 \* 5 = 10**

1. Give the uses of Foucault current.
2. How will you induce an emf by changing the area enclosed by the coil?
3. Obtain an expression for motional emf from Lorentz force.
4. Using Faraday's law of electromagnetic induction, derive an equation for motional emf.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**



**SEC****Physics****Lesson 1 & 2****Time : 1.45 Hrs****Marks : 60****I.Choose the best answer:****5 \* 1 = 5**

1.A toaster operating at 240 V has a resistance of 120  $\Omega$ . The power is

- (a) 400 W                      (b) 2 W                      (c) 480 W                      (d) 240 W

2.In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1kW are connected. The voltage of electric mains is 220 V. The minimum capacity of the main fuse of the building will be (IIT-JEE 2014)

- (a) 14 A                      (b) 8 A                      (c) 10 A                      (d) 12 A

3.A carbon resistor of  $(47 \pm 4.7)$  k  $\Omega$  to be marked with rings of different colours for its identification. The colour code sequence will be

- (a) Yellow – Green – Violet – Gold                      (b) Yellow – Violet – Orange – Silver  
(c) Violet – Yellow – Orange – Silver                      (d) Green – Orange – Violet – Gold

4.Two wires of A and B with circular cross section made up of the same material with equal lengths. Suppose  $R_A = 3 R_B$ , then what is the ratio of radius of wire A to that of B?

- (a) 3                      (b)  $\sqrt{3}$                       (c)  $\frac{1}{\sqrt{3}}$                       (d)  $\frac{1}{3}$

5.A wire connected to a power supply of 230 V has power dissipation  $P_1$  Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is  $P_2$ . The ratio  $\frac{P_2}{P_1}$  is.

- (a) 1                      (b) 2                      (c) 3                      (d) 4

**II.Answer any 7 of the following:****7 \* 2 = 14**

6. What is mean by 'Electric field lines'?
7. Write a short note on superposition principle..
8. Define 'electric flux'.
9. What is Polarisation?
10. Why current is a scalar?

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

11. Define electrical resistivity
12. Define 'Electric dipole'
13. State Kirchhoff's Current law.
14. Define Current density.

**III. Answer any 7 of the following:**

**7 \* 3 = 21**

15. Give the relation between electric field and electric potential.
16. Distinguish between drift velocity and mobility.
17. What is Electric power and Electric energy.
18. What are the differences between Coulomb force and gravitational force?
19. What are the properties of an equipotential surface?
20. What is corona discharge?
21. State the applications of Seebeck Effect.
22. Write a short note on 'electrostatic shielding'.

**IV. Answer any 4 of the following:**

**4 \* 5 = 20**

23. Explain the equivalent resistance of a series resistor network.
24. Derive an expression for electrostatic potential due to an electric dipole.
25. Explain in detail the construction and working of a Van de Graaff generator.
26. Discuss the basic properties of electric charges.
27. State and explain Kirchhoff's rules.
28. Explain the determination of the internal resistance of a cell using voltmeter.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**

**SEC****Physics**  
**Lesson 2 & 3****Time : 1.45 Hrs****Marks : 60****I.Choose the best answer:****5 \* 1 = 5**

1. A thin insulated wire forms a plane spiral of  $N = 100$  tight turns carrying a current  $I = 8$  m A (milli ampere). The radii of inside and outside turns are  $a = 50$  mm and  $b = 100$  mm respectively. The magnetic induction at the center of the spiral is

- (a)  $5 \mu\text{T}$       (b)  $7 \mu\text{T}$       (c)  $8 \mu\text{T}$       (d)  $10 \mu\text{T}$

2. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?

- (a)  $30^\circ$       (b)  $45^\circ$       (c)  $60^\circ$       (d)  $90^\circ$

3. 4.Two wires of A and B with circular cross section made up of the same material with equal lengths. Suppose  $R_A = 3 R_B$ , then what is the ratio of radius of wire A to that of B?

- (a) 3      (b)  $\sqrt{3}$       (c)  $\frac{1}{\sqrt{3}}$       (d)  $\frac{1}{3}$

4. A toaster operating at 240 V has a resistance of  $120 \Omega$ . The power is

- (a) 400 W      (b) 2 W      (c) 480 W      (d) 240 W

5. A non-conducting charged ring of charge  $q$ , mass  $m$  and radius  $r$  is rotated with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is

- (a)  $\frac{q}{m} M$       (b)  $\frac{2q}{3} M$       (c)  $\frac{q}{2m} M$       (d)  $\frac{q}{4m} M$

**II.Answer any 7 of the following:****7 \* 2 = 14**

6. Define magnetic flux.
7. State Ampere's circuital law.
8. State Coulomb's inverse law.
9. Why current is a scalar?

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

10. Define electrical resistivity
11. What is meant by hysteresis?
12. Define magnetic dipole moment.
13. State Kirchhoff's Current law.
14. Define Current density
15. State Coulomb's inverse law.

**III. Answer any 7 of the following:**

7 \* 3 = 21

16. State the applications of Seebeck Effect.
17. State Biot-Savart's law.
18. What is magnetic susceptibility?
19. Distinguish between drift velocity and mobility.
20. What is Electric power and Electric energy.
21. What is magnetic permeability?
22. What is meant by magnetic induction?
23. State microscopic form of Ohm's law.
24. State the applications of Seebeck Effect.

**IV. Answer any 2 of the following:**

4 \* 5 = 20

25. State and explain Kirchhoff's rules.
26. Discuss the working of cyclotron in detail.
27. Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current.
28. Explain the equivalent resistance of a series resistor network.
29. Explain the determination of the internal resistance of a cell using voltmeter
30. Explain the principle and working of a moving coil galvanometer.
31. Deduce the relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

**SEC****Physics****Lesson 3&4****Time : 1.45 Hrs****Marks : 60****I.Choose the best answer:****5 \* 1 = 5**

1. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?

- (a) 30°      (b) 45°      (c) 60°      (d) 90°

2. The flux linked with a coil at any instant  $t$  is given by  $\Phi_B = 10t^2 - 50t + 250$ . The induced emf at  $t = 3s$  is

- (a) -190 V      (b) -10 V      (c) 10 V      (d) 190 V

3. When the current changes from +2A to -2A in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is-

- (a) 0.2 H      (b) 0.4 H      (c) 0.8 H      (d) 0.1 H

4. In a transformer, the number of turns in the primary and the secondary are 410 and 1230, respectively. If the current in primary is 6A, then that in the secondary coil is-

- (a) 2 A      (b) 18 A      (c) 12 A      (d) 1 A

5. A non-conducting charged ring of charge  $q$ , mass  $m$  and radius  $r$  is rotated with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is

- (a)  $\frac{q}{m}$  M      (b)  $\frac{2q}{3}$  M      (c)  $\frac{q}{2m}$  M      (d)  $\frac{q}{4m}$  M

**II. Answer any 7 of the following:****7 \* 2 = 14**

6. What do you mean by self-induction?

7. State Ampere's circuital law.

8. State Coulomb's inverse law.

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**

9. Define magnetic dipole moment.
10. What is meant by electromagnetic induction?
11. Define magnetic flux.
12. Define electric resonance.
13. State Lenz's law.

**III. Answer any 7 of the following:**

**7 \* 3 = 21**

14. State Faraday's laws of electromagnetic induction.
15. State Biot-Savart's law.
16. What is magnetic susceptibility?
17. What is magnetic permeability?
18. What is meant by magnetic induction?
19. Give the principle of AC generator.
20. Mention the ways of producing induced emf.
21. State Fleming's right hand rule.

**IV. Answer any 4 of the following:**

**4 \* 5 = 20**

22. Give the uses of Foucault current.
23. How will you induce an emf by changing the area enclosed by the coil?
24. Discuss the working of cyclotron in detail.
25. Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current.
26. Explain the principle and working of a moving coil galvanometer.
27. Deduce the relation for the magnetic induction at a point due to an infinitely long straight conductor carrying current.
28. Obtain an expression for motional emf from Lorentz force.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**

**SEC****Physics****Lesson 1,2 and 3****Time : 2.30 Hrs****Marks : 75****I.Choose the best answer:****15 \* 1 = 15**

1. A thin insulated wire forms a plane spiral of  $N = 100$  tight turns carrying a current  $I = 8$  mA (milli ampere). The radii of inside and outside turns are  $a = 50$  mm and  $b = 100$  mm respectively. The magnetic induction at the center of the spiral is

- (a)  $5 \mu\text{T}$       (b)  $7 \mu\text{T}$       (c)  $8 \mu\text{T}$       (d)  $10 \mu\text{T}$

2. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?

- (a)  $30^\circ$       (b)  $45^\circ$       (c)  $60^\circ$       (d)  $90^\circ$

3. A toaster operating at 240 V has a resistance of  $120 \Omega$ . The power is

- (a) 400 W      (b) 2 W      (c) 480 W      (d) 240 W

4. In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1kW are connected. The voltage of electric mains is 220 V. The minimum capacity of the main fuse of the building will be (IIT-JEE 2014)

- (a) 14 A      (b) 8 A      (c) 10 A      (d) 12 A

5. A carbon resistor of  $(47 \pm 4.7) \text{ k}\Omega$  to be marked with rings of different colours for its identification. The colour code sequence will be

- (a) Yellow – Green – Violet – Gold      (b) Yellow – Violet – Orange – Silver  
(c) Violet – Yellow – Orange – Silver      (d) Green – Orange – Violet – Gold

6. Which charge configuration produces a uniform electric field?

- (a) point charge      (b) infinite uniform line charge  
(c) uniformly charged infinite plane      (d) uniformly charged spherical shell

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**

7. An electric dipole is placed at an alignment angle of  $30^\circ$  with an electric field of  $2 \times 10^5 \text{ N C}^{-1}$ . It experiences a torque equal to  $8 \text{ N m}$ . The charge on the dipole if the dipole length is  $1 \text{ cm}$  is-

- (a)  $4 \text{ mC}$                       (b)  $8 \text{ mC}$                       (c)  $5 \text{ mC}$                       (d)  $1 \text{ mC}$

8. An electric field  $\vec{E} = 10 \times \hat{i}$  exists in a certain region of space. Then the potential difference  $V = V_0 - V_A$ , Where  $V_0$  is the potential at the origin and  $V_A$  is the potential at  $x = 2 \text{ m}$  is-

- (a)  $10 \text{ J}$                       (b)  $-20 \text{ J}$                       (c)  $+20 \text{ J}$                       (d)  $-10 \text{ J}$

9. A parallel plate capacitor stores a charge  $Q$  at a voltage  $V$ . Suppose the area of the parallel plate capacitor and the distance between the plates are each doubled then which is the quantity that will change?

- (a) Capacitance                      (b) Charge                      (c) Voltage                      (d) Energy density

10. Two metallic spheres of radii  $1 \text{ cm}$  and  $3 \text{ cm}$  are given charges of  $-1 \times 10^{-2} \text{ C}$  and  $5 \times 10^{-2} \text{ C}$  respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is

- (a)  $3 \times 10^{-2} \text{ C}$                       (b)  $4 \times 10^{-2} \text{ C}$                       (c)  $1 \times 10^{-2} \text{ C}$                       (d)  $2 \times 10^{-2} \text{ C}$

11. Two wires of A and B with circular cross section made up of the same material with equal lengths. Suppose  $R_A = 3 R_B$ , then what is the ratio of radius of wire A to that of B?

- (a) 3                      (b)  $\sqrt{3}$                       (c)  $\frac{1}{\sqrt{3}}$                       (d)  $\frac{1}{3}$

12. A wire connected to a power supply of  $230 \text{ V}$  has power dissipation  $P_1$ . Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is  $P_2$ . The ratio  $\frac{P_2}{P_1}$  is.

- (a) 1                      (b) 2                      (c) 3                      (d) 4

13. A non-conducting charged ring of charge  $q$ , mass  $m$  and radius  $r$  is rotated with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is

- (a)  $\frac{q}{m} M$                       (b)  $\frac{2q}{3} M$                       (c)  $\frac{q}{2m} M$                       (d)  $\frac{q}{4m} M$

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**



14. Two short bar magnets have magnetic moments  $1.20 \text{ Am}^2$  and  $1.00 \text{ Am}^2$  respectively. They are kept on a horizontal table parallel to each other with their north poles pointing towards the south. They have a common magnetic equator and are separated by a distance of 20.0 cm. The value of the resultant horizontal magnetic induction at the mid-point O of the line joining their centers is (Horizontal components of Earth's magnetic induction is  $3.6 \times 10^{-5} \text{ Wb m}^{-2}$ )

- (a)  $3.60 \times 10^{-5} \text{ Wb m}^{-1}$                       (b)  $3.5 \times 10^{-5} \text{ Wb m}^{-1}$   
 (c)  $2.56 \times 10^{-4} \text{ Wb m}^{-1}$                       (d)  $2.2 \times 10^{-4} \text{ Wb m}^{-1}$

15. Three wires of equal lengths are bent in the form of loops. One of the loops is circle, another is a semi-circle and the third one is a square. They are placed in a uniform magnetic field and same electric current is passed through them. Which of the following loop configuration will experience greater torque ?

- (a) circle      (b) semi-circle      (c) square      (d) all of them

**II. Answer any 7 of the following:**

**7 \* 2 = 14**

16. Why current is a scalar?
17. Define electrical resistivity
18. State Kirchhoff's Current law.
19. What is mean by 'Electric field lines'?
20. Define 'Electric dipole'
21. Define 'electric flux'.
22. Define magnetic flux.
23. State Ampere's circuital law.
24. State Coulomb's inverse law.
25. Define magnetic dipole moment.

**III. Answer any 7 of the following:**

**7 \* 3 = 21**

26. State Biot-Savart's law.
27. Distinguish between drift velocity and mobility.
28. What is Electric power and Electric energy.
29. What are the differences between Coulomb force and gravitational force?
30. Write a short note on 'electrostatic shielding'.
31. Give the relation between electric field and electric potential.

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

32. What are the properties of an equipotential surface?
33. What is corona discharge?
34. State the applications of Seebeck Effect.
35. What is meant by magnetic induction?

**IV. Answer any 5 of the following:**

**5 \* 5 = 25**

- 36(a). Discuss the working of cyclotron in detail. **(OR)**
- 36(b). Explain the principle and working of a moving coil galvanometer.
  
- 37(a). Explain the equivalent resistance of a series resistor network. **(OR)**
- 37(b). Explain the equivalent resistance of a parallel resistor network.
  
- 38(a). State and explain Kirchhoff's rules. **(OR)**
- 38(b). Derive an expression for electrostatic potential due to an electric dipole.
  
- 39(a). Explain the determination of the internal resistance of a cell using voltmeter. **(OR)**
- 39(b). Discuss the basic properties of electric charges.
  
- 40(a). Calculate the electric field due to a dipole on its axial line and equatorial plane. **(OR)**
- 40(b). Explain in detail the construction and working of a Van de Graaff generator.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,  
9677170609**

**Youtube Channel  
SEC Mathematics**

**SEC****Physics****Lesson 2, 3 and 4****Time : 2.30 Hrs****Marks : 75****I.Choose the best answer:****15 \* 1 = 15**

1. A circular coil with a cross-sectional area of  $4 \text{ cm}^2$  has 10 turns. It is placed at the centre of a long solenoid that has 15 turns/cm and a cross-sectional area of  $10 \text{ cm}^2$ . The axis of the coil coincides with the axis of the solenoid. What is their mutual inductance?  
(a)  $7.54 \mu\text{H}$  (b)  $8.54 \mu\text{H}$  (c)  $9.54 \mu\text{H}$  (d)  $10.54 \mu\text{H}$
2. The flux linked with a coil at any instant  $t$  is given by  $\Phi_B = 10t^2 - 50t + 250$ . The induced emf at  $t = 3\text{s}$  is  
(a)  $-190 \text{ V}$  (b)  $-10 \text{ V}$  (c)  $10 \text{ V}$  (d)  $190 \text{ V}$
3. A thin insulated wire forms a plane spiral of  $N = 100$  tight turns carrying a current  $I = 8 \text{ mA}$  (milli ampere). The radii of inside and outside turns are  $a = 50 \text{ mm}$  and  $b = 100 \text{ mm}$  respectively. The magnetic induction at the center of the spiral is  
(a)  $5 \mu\text{T}$  (b)  $7 \mu\text{T}$  (c)  $8 \mu\text{T}$  (d)  $10 \mu\text{T}$
4. The vertical component of Earth's magnetic field at a place is equal to the horizontal component. What is the value of angle of dip at this place?  
(a)  $30^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$
5. Two short bar magnets have magnetic moments  $1.20 \text{ Am}^2$  and  $1.00 \text{ Am}^2$  respectively. They are kept on a horizontal table parallel to each other with their north poles pointing towards the south. They have a common magnetic equator and are separated by a distance of  $20.0 \text{ cm}$ . The value of the resultant horizontal magnetic induction at the mid-point  $O$  of the line joining their centers is (Horizontal components of Earth's magnetic induction is  $3.6 \times 10^{-5} \text{ Wb m}^{-2}$ )  
(a)  $3.60 \times 10^{-5} \text{ Wb m}^{-1}$  (b)  $3.5 \times 10^{-5} \text{ Wb m}^{-1}$   
(c)  $2.56 \times 10^{-4} \text{ Wb m}^{-1}$  (d)  $2.2 \times 10^{-4} \text{ Wb m}^{-1}$
6. A toaster operating at  $240 \text{ V}$  has a resistance of  $120 \Omega$ . The power is  
(a)  $400 \text{ W}$  (b)  $2 \text{ W}$  (c)  $480 \text{ W}$  (d)  $240 \text{ W}$

**V.Manikandan M.sc.,  
9677170609****Youtube Channel  
SEC Mathematics**

7. In a large building, there are 15 bulbs of 40 W, 5 bulbs of 100 W, 5 fans of 80 W and 1 heater of 1kW are connected. The voltage of electric mains is 220 V. The minimum capacity of the main fuse of the building will be (IIT-JEE 2014)

- (a) 14 A                      (b) 8 A                      (c) 10 A                      (d) 12 A

8. A carbon resistor of  $(47 \pm 4.7) \text{ k } \Omega$  to be marked with rings of different colours for its identification. The colour code sequence will be

- (a) Yellow – Green – Violet – Gold                      (b) Yellow – Violet – Orange – Silver  
(c) Violet – Yellow – Orange – Silver                      (d) Green – Orange – Violet – Gold

9. Two wires of A and B with circular cross section made up of the same material with equal lengths. Suppose  $R_A = 3 R_B$ , then what is the ratio of radius of wire A to that of B?

- (a) 3                      (b)  $\sqrt{3}$                       (c)  $\frac{1}{\sqrt{3}}$                       (d)  $\frac{1}{3}$

10. A wire connected to a power supply of 230 V has power dissipation  $P_1$ . Suppose the wire is cut into two equal pieces and connected parallel to the same power supply. In this case power dissipation is  $P_2$ . The ratio  $\frac{P_2}{P_1}$  is.

- (a) 1                      (b) 2                      (c) 3                      (d) 4

11. Three wires of equal lengths are bent in the form of loops. One of the loops is circle, another is a semi-circle and the third one is a square. They are placed in a uniform magnetic field and same electric current is passed through them. Which of the following loop configuration will experience greater torque ?

- (a) circle                      (b) semi-circle                      (c) square                      (d) all of them

12. A non-conducting charged ring of charge  $q$ , mass  $m$  and radius  $r$  is rotated with constant angular speed  $\omega$ . Find the ratio of its magnetic moment with angular momentum is

- (a)  $\frac{q}{m} M$                       (b)  $\frac{2q}{3} M$                       (c)  $\frac{q}{2m} M$                       (d)  $\frac{q}{4m} M$

13. When the current changes from +2A to -2A in 0.05 s, an emf of 8 V is induced in a coil. The co-efficient of self-induction of the coil is-

- (a) 0.2 H                      (b) 0.4 H                      (c) 0.8 H                      (d) 0.1 H

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

14. In a transformer, the number of turns in the primary and the secondary are 410 and 1230, respectively. If the current in primary is 6A, then that in the secondary coil is-  
(a) 2 A      (b) 18 A      (c) 12 A      (d) 1 A

15. 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

**II. Answer any 7 of the following:**

7 \* 2 = 14

16. What is meant by electromagnetic induction?
17. Define magnetic flux.
18. State Coulomb's inverse law.
19. Define magnetic dipole moment.
20. Define electric resonance.
21. Why current is a scalar?
22. Define electrical resistivity
23. State Kirchhoff's Current law.
24. Define Current density.
25. State Lenz's law.

**III. Answer any 7 of the following:**

7 \* 3 = 21

26. How is Eddy current produced? How do they flow in a conductor?
27. State Faraday's laws of electromagnetic induction.
28. Distinguish between drift velocity and mobility.
29. What is Electric power and Electric energy.
30. State the applications of Seebeck Effect.
31. State Biot-Savart's law.
32. What is meant by magnetic induction?
33. Give the principle of AC generator.
34. Mention the ways of producing induced emf.
35. State Fleming's right hand rule.

**IV. Answer any 5 of the following:**

5 \* 5 = 25

- 36(a). Give the uses of Foucault current. **(OR)**
- 36(b). Obtain an expression for motional emf from Lorentz force.

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

37(a). How will you induce an emf by changing the area enclosed by the coil? **(OR)**

37(b). Discuss the working of cyclotron in detail.

38(a). Obtain a relation for the magnetic induction at a point along the axis of a circular coil carrying current. **(OR)**

38(b). Explain the principle and working of a moving coil galvanometer.

39(a). State and explain Kirchhoff's rules. **(OR)**

39(b). Explain the determination of the internal resistance of a cell using voltmeter.

40(a). Explain the equivalent resistance of a series resistor network. **(OR)**

40(b). Using Faraday's law of electromagnetic induction, derive an equation for motional emf.

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

*\*For more question paper kindly subscribe the youtube Channel*

**V.Manikandan M.sc.,**  
**9677170609**

**Youtube Channel**  
**SEC Mathematics**

[www.Padasalai.Net](http://www.Padasalai.Net)