CLASS: 12 UNIT: 1 ELECTROSTATICS – I MARKS: 30

TIME: 1 HR PART – A 8 X 1 = 8

1. Two points A and B are maintained at a potential of 7 V and – 4 V respectively. The W.D. in moving 50 electrons from A and B is

   a) 8.80×10^{-17} J b) -8.80×10^{-17} J c) 4.40×10^{-17} J d) 5.80×10^{-17} J

2. An electric dipole is placed at an alignment angle of 30^0 with an electric field of 2×10^5 N C^{-1}. It experiences a torque equal to 8 N m. The charge on the dipole if The dipole length is 1 cm is

   a) 4 mC b) 8 mC c) 5 mC d) 7 mC

3. Rank the electrostatic potential energies for the given system of charges in increasing order

   a) 1 = 4 < 2 < 3 b) 2 = 4 < 3 < 1 c) 2 = 3 < 1 < 4 d) 3 < 1 < 2 < 4

4. The unit of permittivity is

   a) N m^2 C^{-1} b) N m C^{-1} c) N m^{-2} C^{-1} d) N^{-1} m^{-2} C^2

5. The number of electrons in one coulomb of negative charge is

   a) 62.5×10^8 b) 6.25×10^{18} c) 2.65×10^{18} d) 5.26×10^{18}

6. Which one of the following is an example for permanent electric dipole?

   a) N_2 b) CO_2 c) CO d) H_2

7. A dipole is placed in a uniform electric field with its axis parallel to the field. It experiences

   a) net force only b) torque only c) both net force and torque

   d) neither a net force and torque

8. Four charges +q, -q, -q and + q respectively are placed at the corners A,B,C and D of a square of side a. The electric potential at the centre O of the square is

   a) $q / 4\pi\varepsilon_0 a$ b) $2q / 4\pi\varepsilon_0 a$ c) $4q / 4\pi\varepsilon_0 a$ d) zero

ANSWER ANY 4 QUESTIONS PART – B 3 X 2 = 6

9. Write a note on conservation of charge.
10. State Coulomb's inverse square law
11. Define electric field. Write its unit.
12. Define electric dipole moment.
13. What is electrostatic potential?
14. Write a note on microwave oven.
15. A sample of HCl gas is placed in a uniform electric field of magnitude 3×10^4 N C^{-1}. The dipole moment of each HCl molecule is 3.4×10^{-30} Cm. Calculate the maximum torque experienced by each HCl molecule.

ANSWER ANY TWO QUESTIONS PART – C 2 X 3 = 6

16. Write the Coulomb's law in vector diagram. Write any three differences between Coulomb force and gravitational force.
17. Derive an expression for torque acting on an electric dipole in a uniform electric field.
18. Obtain an expression for the electrostatic potential energy on a dipole in a uniform electric field.
19. Derive an expression for electrostatic potential energy due to a collection of three point charges.
20. Deduce an expression for the electrostatic potential at a point due to a point charge.
21. 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.

ANSWER ANY TWO QUESTIONS PART – D 2 X 5 = 10

22. Calculate the electric field due to a dipole on its axial line.
23. Calculate the electric field due to a dipole on its equatorial line.
24. Derive an expression for electrostatic potential due to an electric dipole.

FAILURE WILL NEVER OVERTAKE ME
IF MY DETERMINATION TO SUCCEED
IS STRONG ENOUGH.
- Dr. A. P. J. ABDUL KALAM

CLASS: 12 UNIT: 1 ELECTROSTATICS – II MARKS: 30

TIME: 1 HR PART – A 8 X 1 = 8

1. If voltage applied on a capacitor is increased from V to 2 V, then

   a) Q remains the same, C is doubled b) Q is doubled, C doubled

   c) C remains same, Q doubled d) Both Q and C remain same

2. Two metallic spheres of radii 1 cm and 3 cm are given charges of $-1x10^{-2}$ C and 5×10^{-2} C respectively. If these are connected by a conducting wire, the final charge on the bigger sphere is

   a) 3×10^{-2} C b) 4×10^{-2} C c) 1×10^{-2} C d) 2×10^{-2} C

3. Which charge configuration produces a uniform electric field?

   a) point charge b) uniformly charged infinite line

   c) uniformly charged infinite plane d) uniformly charged spherical shell

4. The total flux over a closed surface enclosing a charge q in N m^2 C^{-1}

   a) 8 π q b) 9×10^9 q c) $36 \pi \times 10^9$ q d) 8.854×10^{-12} q

5. The electric field intensity at a point 2 cm from an infinite line charge of linear charge density 10^{-7} C m^{-1} is ..... N C^{-1}

   a) 4.5×10^4 b) 9×10^4 c) 4.5×10^2 d) 18×10^4

6. A hollow metal ball carrying an electric charge produces no electric field at points

   a) outside the sphere b) on its surface

   c) inside the sphere d) at a distance more than twice

7. A PPC stores a charge Q at a voltage V. Suppose the area of the PPC 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

8. Two capacitors of unknown capacitances are connected in series and parallel. If the net capacitance in the combination are 6 μ F and 25 μ F respectively, then the capacitances are a) 15,10 b) 10, 20 c) 20, 10 d) 2, 4

Answer three questions PART – B 3 x 2 = 6

9. Define electric flux. State its unit.
10. What is meant by electrostatic energy density?
11. Define capacitance. Give its unit.
12. What is corona discharge?
13. Write any 4 applications of capacitors.
14. A parallel plate capacitor has square plates of side 5 cm and separated by a distance of 1 mm. Calculate the capacitance of this capacitor.

Answer two questions PART – C 2 x 3 = 6

15. Obtain Gauss law from Coulomb's law.
16. Derive an expression for the capacitance of a parallel plate capacitor.
17. Obtain an expression for the energy stored in a capacitor.
18. Derive an expression for the effective capacitance of capacitors in series or parallel.
19. Dielectric strength of air is 3×10^6 V m^{-1}. Suppose the radius of a hollow sphere in the Van de Graaff generator is R = 0.5 m, find the maximum potential difference created by the generator.

PART – D 2 X 5 = 10

20. State Gauss law. Obtain an expression for the electric field due to an infinite line charge.
21. State Gauss law. Obtain an expression for electric field due to a uniformly charged spherical shell.
22. Explain in detail the effect of dielectric placed in a parallel plate capacitor.
23. Explain in detail the principle, construction and working of Van de Graaff generator.

IF YOU CAN STAY POSITIVE IN
NEGATIVE SITUATION THEN
YOU WIN EVERY TIME – Dr. A.P.J.

CLASS: 12 UNIT: 2 CURRENT ELECTRICITY MARKS: 30

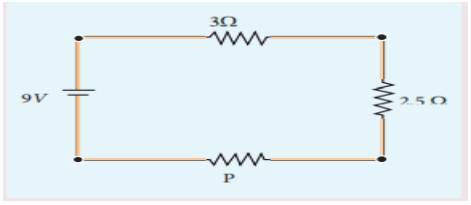
TIME: 1 HR PART – A 8 X 1

1. The resistance of a carbon resistor having colours brown,black and red is

a) 100 k Ω b) 10 k Ω c) 1 k Ω d) 1000 k Ω

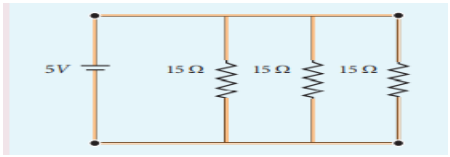
2. The temperature coefficient or resistance of a wire is 0.00125 per ^{0}C. At 20^0 C, its resistance is 1 Ω. The resistance of the wire will be 2 Ω at

a) 800^0 C b) 700^0 C c) 850^0 C d) 820^0 C



3. A current of 1 A flows in the circuit. The resistance of P is

a) 1.5 Ω b) 2.5 Ω c) 3.5 Ω d) 4.5 Ω



4. The current drawn out from the battery is

a) 1 A b) 2 A c) 3 A d) 4 A

5. When n resistors of equal resistances are connected in series and parallel respectively, then the ratio of their effective resistance is

a) 1 : n^2 b) n^2 : 1 c) n : 1 d) 1 : n

6. The resistance of the filament of a 110 W, 220 V electric bulb is

a) 440 Ω b) 220 Ω c) 484 Ω d) 848 Ω

7. An emf of 2.2 V sends a current of 0.2 A through a resistance of 10 Ω. The internal resistance of the cell is a) 0.1 Ω b) 1 Ω c) 2 Ω d) 1.33 Ω

8. In a metre bridge with a standard resistance of 15 Ω in the right gap, the ratio of balancing lengths is 3 : 2. The other resistance is

a) 22.5 Ω b) 10 Ω c) 2.5 Ω d) 5.2 Ω

PART – B 3 X 2 = 6

9. Distinguish between drift velocity and mobility.

10. Define resistivity. State its unit

11. Why current is a scalar?

12. What is Peltier effect?

13. Differentiate electric power from electric energy.

14. What are super conductors?

15. A copper wire of cross sectional area 0.5 mm^2 carries a current of 0.2 A. If the free electron density of copper is 8.4 x 10^{28} m^{-3} then compute the drift velocity of free electrons.

16. Find the number of electrons flowing per second through a conductor, when 32 A current flows through it.

PART – C 2 X 3 = 6

17. Derive an expression for power in an electrical circuit.
18. Derive an expression for effective resistance of resistors connected in series or parallel.
19. Explain the series or parallel connection of cells with a neat circuit.
20. What is Seebeck effect? Write the applications. or Explain Thomson effect in detail.
21. Define temperature coefficient of resistance. If the resistance of coil is 3 Ω at 20^0 C and α = 0.004 $/^0$ C , then determine its resistance at 100^0 C.
22. State Kirchoff's current and voltage rule in current electricity.

PART – D 2 X 5 = 10

23. Explain microscopic form of Ohm's law or Explain macroscopic form of Ohm's law
24. How will you determine internal resistance of a cell using a voltmeter? or
    How will you determine internal resistance of a cell using potentiometer?
25. Obtain the condition for bridge balance in Wheatstone's bridge or
    How will you determine specific resistance using metre bridge.

DREAM, DREAM, DREAM.

DREAMS TRANSFORM INTO THOUGHTS

AND THOUGHTS RESULT IN ACTION.

- THE MISSILE MAN

CLASS: 12 UNIT: 3 MAGNETISM AND MAGNETIC MARKS: 30

TIME: 1 HR EFFECTS OF ELECTRIC CURRENT - I

PART – A 8 X 1 = 8

1. An electron moves in a straight line inside a charged PPC of uniform charge density σ. The time taken by the electron to cross the PPC undeflected when the plates of the capacitor are kept under constant magnetic field of induction B is

   a) ε_0 e l B / σ b) ε_0 l B / σ l c) ε_0 l B / e σ d) ε_0 l B / σ

2. A circular coil of radius 5 cm and 50 turns carries a current of 3 A. The magnetic dipole moment of the coil is nearly a) 1 A m^2 b) 1.2 A m^2 c) 0.5 A m^2 d) 0.8 A m^2

3. 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) 30^0 b) 45^0 c) 60^0 d) 90^0

4. When a bar magnet of magnetic moment $\vec{p}_m$ and length 2l is cut into two pieces along its Length. The new magnetic moment will be a) 2 $\vec{p}_m$ *b*) $\vec{p}_m/2$ *c*)$\vec{p}_m/4$ *d*) $3\vec{p}_m$

5. Unit and dimensional formula for magnetic flux is

   a) Wb & $[ML^2 T^{-2} A^{-1}]$ b) Wb & $[ML^{-1} T^2 A^{-1}]$ c) T & $[ML^2 T^{-2} A^{-1}]$ d) T & $[MLT^{-2}]$

6. The direction of magnetic moment associated with the loop is given by .... rule /law

   a) Right hand cork screw b) Biot-Savart c) End d) Right hand Thumb

7. The value of Bohr magneton is ..... A m^2

   a) 9.27×10^{-24} b) 9.24×10^{-27} c) 9.42×10^{-24} d) 8.78×10^{10}

8. The magnitude of the magnetic field of a long, straight wire carrying a current of 1 A at distance of 1 m from it is .... T a) 2×10^{-4} b) 2×10^{-5} c) 1 d) 2×10^{-7}

PART – B 3 X 2 = 6

9. Define magnetic dipole moment. State its unit. 10. Define magnetic flux.

11. State Coulomb's inverse square law. 12. What is gyro magnetic ratio? Write its value.

13. Write the differences between Coulomb's law and Biot-Savart's law.

14. Calculate the magnetic field inside a solenoid when

    a) length becomes twice with fixed number of turns

    b) the number of turns becomes twice for fixed length

PART – C 2 X 3 = 6

15. Write any three properties of magnetic field lines.

16. The repulsive force between two magnetic poles in air is 9×10^{-3} N. If the two poles are equal in strength and are separated by a distance of 10 cm, calculate the pole strength of each pole.
17. State and explain Biot – Savart law.
18. Explain the concept of current loop as a magnetic dipole and arrive at the equation for magnetic dipole moment.
19. Calculate the magnetic field at the centre of a square loop which carries a current of 1.5 A, length of each side being 50 cm.

PART – D 2 X 5 = 10

20. Deduce the relation for the magnetic field at a point due to an infinitely long straight conductor carrying current OR

    Obtain a relation for the magnetic field at a point along the axis of a circular coil carrying current.
21. Find the magnetic field due to a long straight conductor using Ampere's circuital law

    OR

    Calculate the magnetic field inside and outside of the long solenoid using Ampere's circuital law.

IF YOU WANT TO SHINE LIKE A SUN, FIRST BURN LIKE A SUN.

Dr. A.P.J. KALAM

CLASS: 12 UNIT: 3 MAGNETISM AND MAGNETIC MARKS: 30

TIME: 1 HR EFFECTS OF ELECTRIC CURRENT - II

PART – A 8 X 1 = 8

1. The vector notation of magnetic Lorentz force is

   a) $\vec{F}_m = q [\vec{v} x \vec{B}]$ b) $\vec{F}_m = q [\vec{B} x \vec{v}]$ c) $\vec{F}_m = B [\vec{v} x \vec{q}]$ d) $\vec{F}_m = v [\vec{q} x \vec{B}]$

2. The cyclotron period is a) 2πm / Bq b) Bq / 2πm c) mv /Bq d) p / Bq

3. The expression for gyro frequency is a) Bq / m b) m / Bq c) 2πr / v d) mv^2 / r

4. When the plane of the loop is ⊥ to the magnetic field, torque acting on the current loop is

   a) maximum b) zero c) finite minimum d) infinity

5. Galvanometer constant is a) NAB/K b) B/ NAK c) K/NAB d) G θ

6. Current required to produce a deflection of one scale division in the galvanometer is

   a) Current sensitivity b) Voltage sensitivity c) Figure of merit d) Sensitivity

7. Phosphor bronze wire is used in MCG because

   a) large couple per unit twist b) small couple per unit twist

   c) it produces radial magnetic field d) it produces torque

8. The resistance of ideal voltmeter and ammeter are ..... and ..... respectively.

   a) infinity and high b) zero and high c) high and zero d) infinity and zero

PART – B 3 X 2 = 6

9. Define Current sensitivity and voltage sensitivity 10. How will you increase C.S.?

11. State Fleming's left hand rule 12. Define Tesla 13. Define ampere

14. Increasing C.S. does not necessarily increase V.S. Why?

15. Why is the path of a charged particle not a circle when its velocity is not ⊥ to field?

PART – C 2 X 3 = 6

16. Write the special features of magnetic Lorentz force.

17. Explain the motion of a charged particle in a uniform magnetic field.

18. Explain the concept of velocity selector.

19. An electron moving perpendicular to a uniform magnetic field 0.500 T undergoes circular motion of radius 2.50 mm. What is the speed of the electron?

20. How will you convert G.M. into A.M.? 21. How will you convert G.M. into V.M.?

PART – D 2 X 5 = 10

22. Derive an expression for the force on a current carrying conductor in a magnetic field.

23. Derive the expression for the force between two parallel, current carrying conductors.

24. Describe the principle, construction and working of moving coil galvanometer.

WORK HARD BE SIMPLE BE HONEST

CLASS: 12 UNIT: 5 ELECTROMAGNETIC WAVES MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. The dimension of $\frac{1}{\mu_0 \varepsilon_0}$ is a) [L T^{-1}] b) [L^2 T^{-2}] c) [L^{-1} T] d) [L^{-2} T^2]
2. Which of the following EM radiations is used for studying the structure of molecules?
   a) Micro waves b) UV rays c) Visible light d) X- rays
3. Which is false for EM waves?
   a) transverse b) longitudinal c) produced by accelerating charges d) non mechanical
4. Which is used to kill pathogenic microorganism in food industry?
   a) Radio waves b) IR rays c) Gamma rays d) UV rays
5. Fraunhofer lines is an excellent example for ..... spectrum
   a) Line emission b) Band absorption c) Band absorption d) Line absorption
6. The comet has tail shape because of ..... a) a) linear momentum of the Sun
   b) heat from the Sun c) Radiation from the Sun d) Earth's atmosphere
7. Time varying magnetic field produces an electric field is due to
   a) Hertz b) Maxwell c) Ampere d) Faraday
8. The relative magnetic permeability of the medium is 2.5 and the relative electrical permittivity of the medium is 2.25. The refractive index of the medium is
   a) 2.73 b) 3 x 10^8 c) 2.37 d) 1.5 x 10^8

PART – B 3 X 2 = 6

9. What is displacement current ?
10. What are electromagnetic waves?
11. Give two uses of IR radiation.
12. Write notes on Ampere – Maxwell law.
13. What is Maxwell's law of induction?
14. Give any two uses of UV radiation.
15. If the relative permeability and relative permittivity of a medium are 1.0 and 2.25 respectively, find the speed of the electromagnetic wave in this medium.
16. What are Fraunhofer lines?

PART – C 2 X 3 = 6

17. Discuss the Hertz experiment.
18. Write any six properties of electromagnetic waves.
19. Give the uses of (i) X – rays (ii) Microwaves
20. What are optical tweezers? Write the property of optical tweezers. Give the uses.
21. A magnetron in a microwave oven emits EM waves with frequency f= 2450 Hz. What magnetic field strength is required for electrons to move in circular paths with this frequency?
22. Explain the determination of speed of EM wave using microwave oven?
23. Explain the importance of Maxwell's correction.

PART – D 2 X 5 = 10

24. Write down Maxwell equations in integral form.
25. Explain the types of emission spectrum
26. Explain the types of absorption spectrum.
27. Explain Maxwell's modification of Ampere's circuital law.

MAN NEEDS DIFFICULTIES IN LIFE BECAUSE THEY ARE NECESSARY TO ENJOY SUCCESS. – Dr. A.P.J.

CLASS: 12 UNIT: 4 ELECTROMAGNETIC INDUCTION - I MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. 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 s is a) -190 V b) -10 V c) 10 V d) 190 V
2. When the current changes from + 2 A to – 2 A in 0.05 s, an emf of 8 V is induced in a coil. The coefficient of self-induction of the coil is a) 0.2 H b) 0.4 H c) 0.8 H d) 0.1 H
3. If the plane of an antenna of area 3 m^2 is inclined at 47^0 with the direction of earth's field. If the field at the place is 4.1 x 10^{-5} T, the magnetic flux linked with the antenna is
   a) 89.69 μ Wb b) 98.96 μ Wb c) 89.6 μ Wb d) 89.96 μ Wb
4. A cylindrical bar magnet is kept along the axis of a circular solenoid. If the magnet is rotated about its axis, the electric current induced in the coil
   a) is maximum b) is minimum c) zero d) flows in opposite direction
5. The unit of self induction is (i) ohm – s (ii) V s / A (iii) Wb / A iv) N / Am
   a) i,ii, iii are correct and iv false b) i is correct ii,iii, iv are false
   c) iv is correct, i,ii,iii are wrong d) ii and iii are correct, i and iv are wrong
6. The maximum value of induced emf is a) NBA b) NBAω c) NBA sinωt d) zero
7. Iron loss can be minimized by using a) silicon steel b) lamination c) thick wire d) thin wire
8. If an electric power of 2 MW is transmitted at 10000 V to a place through a transmission line of resistance 40 ohm, the power loss is a) 1.6 MW b) 6.1 MW c) 1.6 GW d) 1.6 kW

PART – B 3 X 2 = 6

9. What is EMI? 10. State Fleming's right hand rule. 11. Define Self-induction in terms of emf.
12. Write the methods of producing induced emf. 13. Distinguish step up from step down transformer.
14. Define efficiency of a transformer. 15. A circular loop of area 0.05 m^2 rotates in a uniform magnetic field of 0.2 T. If the loop rotates about its diameter which is ⊥ to the field, find the flux linked with loop when its plane is normal to the field.

PART – C 2 X 3 = 6

16. Explain the various energy losses of a transformer.
17. Derive an expression for the self-inductance of a long solenoid.
18. Obtain an expression for the energy associated with a long solenoid.
19. How will you induce emf by changing the area enclosed by a coil.
20. The self-inductance of an air core solenoid is 4.8 mH. If its core is replaced by iron core, then its self inductance becomes 1.8 H. Find out the relative permeability of iron.

PART – D 2 X 5 = 10

21. Derive an expression for the motional emf using Lorentz force OR
    Show that the mutual inductance between a pair of solenoids is same ($M_{12} = M_{21}$)
22. Show mathematically that the rotation of a coil in a magnetic field over one rotation induces an alternating emf of one cycle OR Describe the principle, construction and working of transformer.

CLASS: 12 UNIT: 4 ELECTROMAGNETIC INDUCTION - II MARKS: 30

TIME: 1.15 HR PART – A 8 X 1 = 8

1. In a series RL circuit, the resistance and inductive reactance are the same. Then the phase difference b/w the voltage and current in the circuit is a) $\pi/4$ b) $\pi/2$ c) $\pi/6$ d) zero
2. In a series RLC circuit, the voltage across 100 Ω resistor is 40 V. The resonant frequency is 250 rad/s. If the value of C is 4 μF, then the voltage across L is
   a) 600 V b) 4000 V c) 400 V d) 1 V
3. An inductor, capacitor and resistor of 20 mH, 50 μF and 40 Ω are connected in series across a source of emf V=10 sin 340 t. The power loss is a) 0.76 W b) 0.89 W c) 0.46 W d) 0.67 W
4. The alternating current in a circuit leads applied voltage by a phase angle of $\pi/2$. The a.c. circuit must consist of a) inductor b) capacitor c) resistor d) all the three
5. A capacitor offers ..... reactance to the flow of d.c.
   a) unit b) zero c) maximum d) infinite
6. For a pure resistive circuit, the power factor is a) 1 b) 0 c) b/w 0 and 1 d) -1
7. Wattless current occurs in ..... circuit. a) inductive b) capacitive c) resistive d) both a and b
8. Q factor is represented by a) ω_r L / C b) ω_r R / C ω_r L / R ω_r C / R

PART – B 3 X 2 = 6

9. Define mean value of AC 10. Define RMS value of AC 11. Define Q factor
12. Define power factor 13. Distinguish inductive reactance from capacitive reactance.
14. What is resonant frequency? 15. What is wattless current?
16. The equation for an alternating current is given by i = 77 sin 314 t. Find the peak current, frequency and time period.

PART – C 2 X 3 = 6

17. Derive an expression for the mean value of a.c.
18. Derive an expression for the rms value of a.c.
19. Obtain the phase relationship between applied voltage and current in an a.c. circuit containing a resistor. 20. Derive an expression for average power in an a.c. circuit.
21. The current in an inductive circuit is given by 0.3 sin (200 t – 40^0) A. Write the equation for the Voltage across it if the inductance is 40 m H.

PART – D 2 X 5 = 10

22. Find out the phase relationship between voltage and current in a pure inductive circuit. OR
    Obtain the phase relationship between voltage and current in a pure capacitive circuit.
23. Describe the RLC circuit in detail with a neat phasor diagram OR
    Prove that the total energy is conserved during LC oscillations.

CLASS: 12 FIRST VOLUME TEST - PHYSICS MARKS: 50

TIME: 2 HRS PART – A 8 X 1 = 8

1. If a capacitor of capacitance 55 pF is charged to 1.6 V, the number of electrons on its negative plate is a) 55×10^7 b) 5.5×10^7 c) 550×10^7 d) 0.55×10^7
2. A current of 0.3 A from a cell of emf 1.5 V is passed through a resistance of 4 Ω. The internal resistance of the cell is a) 0.1 Ω b) 1 Ω c) 10 Ω d) 0.01 Ω
3. Angular frequency and period of rotation of a charged particle in a magnetic field is independent of ..... the particle. a) charge b) velocity c) mass and radius d) radius and velocity
4. A galvanometer of resistance 50 Ω is shunted with a wire of 10 Ω. The current in the circuit is 12 A then the current through the galvanometer is a) 3 A b) 2 A c) 5 A d) 6 A
5. A generator produces an emf given by $\varepsilon = 141 \sin 88 t$. The frequency and rms value of voltage is a) 50 Hz & 99.7 V b) 7 Hz & 49.5 V c) 14 Hz & 99.7 V d) 50 Hz & 49.5 V
6. At what rate must the current change in a 65 m H coil to have a 1 volt self - induced emf? a) 25 A s^{-1} b) 17 A s^{-1} c) 25.4 A s^{-1} d) 15.4 A s^{-1}
7. A copper wire of 10^{-6} m^2 area of cross section carries a current of 1 A. The current density is a) 2×10^6 A m^2 b) 0.1×10^6 A m^2 c) 1×10^{-6} A m^2 d) 1×10^6 A m^2
8. Electric filament lamp gives rise to ..... spectrum a) line b) continuous emission c) band d) line absorption

Answer 5 questions: PART – B 5 X 2 = 10

9. Define electrostatic potential. 10. State Fleming's left hand rule.
11. Two point charges +9 e and +1 e are kept at a distance of 16 cm from each other. At what point between these charges should a third charge q to be placed so that it remains in equilibrium?
12. Why current is a scalar? 13. Define Q factor or Power factor.
14. The resistance of a nichrome wire at 0^0 C is 10 Ω. If α is $0.004/^0$ C, find the resistance at boiling point of water. Comment on the result. 15. State Coulomb's inverse square law in magnetism.

Answer 4 questions: PART – C 4 X 3 = 12

16. Derive an expression for energy stored in a capacitor. 17. Derive ε = Blv for area enclosed by coil.
18. Obtain an expression for the effective resistance of resistors connected in series.
19. Three resistors of resistances 5 Ω, 3 Ω and 2 Ω are in series with a 10 V supply. Find the voltage drop across each resistor. 20. Write the special features of magnetic Lorentz force.
21. Describe the conversion of GM into AM 22. Describe Hertz experiment.

PART – D 4 X 5 = 20

23. Obtain an expression for electric potential due to dipole. OR Explain emission spectra in detail.
24. Explain the determination of internal resistance using potentiometer OR Explain RLC series circuit.
25. Find the magnetic field due to an infinitely long straight conductor carrying current. OR Find the phase relationship between voltage and current in a pure capacitive circuit.
26. Describe Van de Graaff generator OR Obtain bridge balance condition in Wheatstone's network.