LIONS PUBLIC SCHOOL
I BLOCK PHASE- 1 ASHOK VIHAR
DELHI: 110052
(SESSION: 2025-26)

CLASS XII A- SCIENCE

ENGLISH

Assignment: Journey to the End of the Earth by

Tishani Doshi

Choose the correct option for each question.

1. Assertion (A): Antarctica helps us understand the significance of Cordilleran folds and ozone depletion.

Reason (R): The continent has an untouched geological history.

a) Both A and R are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

2. Assertion (A): Antarctica provides insight into Earth's past, present, and future.

Reason (R): It is the coldest, driest, and windiest continent on Earth.

a) Both A and R are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

3. Assertion (A): The author felt that visiting Antarctica was like walking into a giant pingpong ball.

Reason (R): The place lacked any human markers and had only ice and silence. a)

Both A and R are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true.

1. How does Antarctica serve as a powerful reminder of climate change and its consequences for the planet?

2. What role does the 'Students on Ice' program play in environmental awareness according to the chapter?

3. Explain the significance of the silence and vastness of Antarctica as described by the author. How does it contribute to her understanding of Earth?

Q. You are Tishani Doshi. Write a diary entry about your first day in Antarctica, capturing your emotions, observations, and reflections about the environment and its impact on your perspective.

Assignment: The Rattrap

1. Assertion (A): The peddler believed the world was a rattrap.

Reason (R): He felt that people were lured by material things and got caught like rats.

2. Assertion (A): The ironmaster mistook the peddler for his old regimental comrade.

Reason (R): The peddler looked like a well-dressed army officer.

3. Assertion (A): Edla's kindness and trust changed the peddler.

Reason (R): She treated him like a real guest despite knowing he was a thief.

1. Why did the peddler compare the world to a rattrap?

2. How did Edla’s behavior influence the peddler’s actions?

3.What message does The Rattrap convey about human nature?

4.Imagine you are the peddler. Write a diary entry after leaving the ironmaster’s house.

Assignment: A Thing of Beauty by John Keats

1. Assertion (A): A thing of beauty is a joy forever.

Reason (R): Beautiful things give us eternal happiness and never fade away.

2. Assertion (A): The poet mentions “gloomy days” and “dark spirits.”

Reason (R): He wants to show that life has only sorrow and no hope.

3. Assertion (A): The poet finds beauty in nature and heroic tales.

Reason (R): He believes only artificial things can give us real joy.

1. How does the poet describe the impact of beauty on our lives?

2. What examples of beauty in nature are mentioned in the poem?

3. : Explain the meaning of the line: “A bower quiet for us.”

4.Write a paragraph on how beauty can bring joy and hope into our lives, based on the poem.

Assignment: KEEPING QUIET by PABLO NERUDA

1. Assertion (A): The poet urges people to be still and quiet for a moment.

Reason (R): He believes silence can bring peace and self-reflection.

a) Both A and R are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

2. Assertion (A): Pablo Neruda promotes complete inactivity as a permanent state.

Reason (R): He feels action and progress are harmful.

a) Both A and R are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

3.Identify the poetic device in the line:

1.“Let’s not speak in any language.”

2.“Fishermen in the cold sea / would not

3.How does the poem suggest that keeping quiet can benefit mankind?

4.Write a paragraph on the importance of silence and self-reflection in today’s fast-paced world, with reference to the poem “Keeping Quiet.”

Assignment: The Tiger King by Kalki

1. Assertion (A): The Tiger King was determined to kill 100 tigers.

Reason (R): He wanted to prove the astrologer's prediction wrong.

a) Both A and R are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

2. Assertion (A): The king was truly powerful and wise. Reason

(R): He made thoughtful decisions and respected life.

a) Both A and R are true, and R is the correct explanation of A

b) Both A and R are true, but R is not the correct explanation of A

c) A is true, but R is false

d) A is false, but R is true

3.How did the propecy influence the life and actions of the Tiger King?

4. What irony is presented at the end of the story, and what message does it convey?

5.Imagine you are the Tiger King. Write a diary entry on the day you believe you have successfully killed the 100th tiger, expressing your thoughts and emotions.

Assignment: Writing Skills

1. You are Ranjan/Ranjana,the Cultural Secretary of Global Heights School Rohini Write a notice informing students about an inter-house poetry competition to be held in the school auditorium. Include details such as date, time, venue, and registration deadline.

2. You are Amit/Amita the Head Boy/Head Girl of ABC Public School. Write a notice for the school notice board informing students about a cleanliness drive being organized in collaboration with the local municipality.

1:

You are the Principal of Sunshine Public School Patna .You are organizing the Annual Day function at your school . Write a invitation letter inviting the Chief Guest, the District Magistrate, to grace the occasion and address the gathering.

2. Question 2:

You are the secretary of the Drama Club of your school. Write a formal invitation letter to a renowned theatre artist to inaugurate your school's Theatre Fest and motivate students with a short address.

Assignment: Deep Water.

Q1.Assertion (A): Douglas developed an aversion to water after his early childhood experience at California beach.

Reason (R): A strong wave knocked him over and swept him under water. a)

Both A and R are true, and R is the correct explanation of A.

b) Both A and R are true, but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Q2.Assertion (A): The author ultimately overcame his fear of water. Reason

(R): He was rescued in time by a lifeguard and never swam again.

a) Both A and R are true, and R is the correct explanation of A.

b) Both A and R are true, but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

Q3. What role did the Y.M.C.A pool incident play in intensifying the author's fear of water? How did it shape his later decisions?

Q4. Douglas says, “In death there is peace.” What does this reveal about his state of mind during the drowning incident.

Q5. How does the story Deep Water reflect the theme “Fear is only as deep as the mind allows”?

Q6. You are William Douglas. Write a diary entry describing your thoughts and feelings the day you finally swam across the lake alone, overcoming your lifelong fear.

PHYSICS

ASSIGNMENT-1 CH-1: ELECTRIC CHARGES AND FIELDS

❖ **Multiple Choice Questions.**

1. The electric field at a point is:- (a) Always continuous.
   (b) Continuous if there is a charge at that point.
   (c) Discontinuous only if there is a negative charge at that point. (d) Discontinuous if there is a charge at that point.
2. A hemisphere is uniformly charged positively. The electric field at a point on a diameter away from the centre is directed:- (a) Perpendicular to the diameter.
   (b) Parallel to the diameter.
   (c) At an angle tilted towards the diameter.
   (d) At an angle tilted away from the diameter.
3. A point charge +q, is placed at a distance 'd' from an isolated conducting plane. The field at a point P on the other side of the plane is:-
   (a) directed perpendicular to the plane and away from the plane.
   (b) directed perpendicular to the plane but towards the plane.
   (c) directed radially away from the point charge. (d) directed radially towards the point charge.
4. Consider a region inside which there are various types of charges but the total charge is zero. At points outside the region:- (a) the electric field is necessarily zero.
   (b) the electric field is due to the dipole moment of the charge distribution only.
   (c) the dominant electric field is $1/r^3$, for large r, where r is the distance from a origin in this region.
   (d) the work done to move a charged particle along a closed path, away from the region, will be zero.
5. A force of 4N is acting between two charges in air. If the space between them is completely filled with glass (relative permittivity = 8), then the new force will be:-
   (a) 2N (c) 0.2N
   (b) 5N (d) 0.5N
6. A charge 'q' is placed at the centre of the line joining two equal charges 'Q'. The system of three charges will be in equilibrium if 'q' is equal to:-

(a) –Q/2 (c) Q/4

(b) –Q/4 (d) Q/2

7. Two-point charges Q and -3Q are placed some distance apart. If the electric field at the location of Q is E, the field at the location of -3Q is:-

(a) E (b) –E

(c) E/3 (d) –E/3

8. Electric field lines provide information about:-

(a) Field strength. (c) Nature of charge. (b) Direction. (d) All of these.

9. There are two charges + 1mc and + 2mc kept at certain separation. The ratio of electro static forces acting on them will be in the ratio of:-

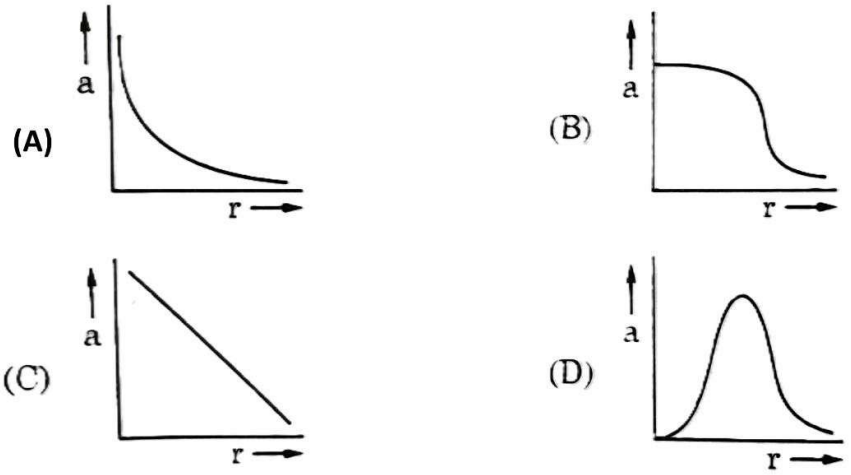
(a) 1 : 2 (c) 1 : 1 (b) 2 : 1 (d) 1 : 4

10. Electric field on the axis of a small electric dipole at a distance 'r' is E_1 and E_2 at a distance of '2r', on a line of perpendicular bisector. Then, (E_1 / E_2) is:-

(a) 2 (c) 8

(b) 4 (d) 16

11. A Charge Q is fixed in position. Another charge q is brought near charge Q and release from rest. Which of the following graphs is the correct representation of the



acceleration of the charge q as a function of the resistance r from the charge Q?

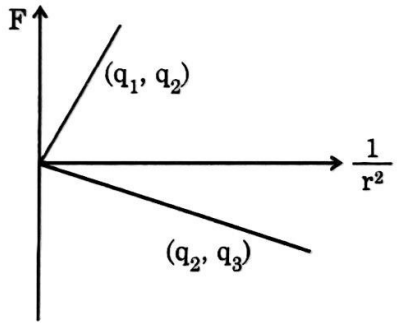
(CBSE 2025)

12. Figure shows variation of Coulomb Force acting between two point charges with $1/r^2$, r being the separation distance between the two charges (q1, q2) and (q2, q3). If q2 is positive and least in magnitude then the magnitudes of q1, q2 and q3 are:-

(CBSE 2025)

(a) q2 < q3 < q1 (c) q1 < q2 < q3

(b) q3 < q1 <q2 (d) q2 < q1 < q3



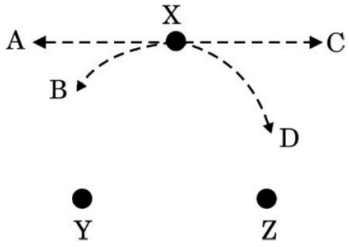
13. A thin plastic rod is bent into a circular ring of radius R. It is uniformly charged with charge density λ . The magnitude of the electric field at its centre is:-
(CBSE 2024)

(A) $\frac{\lambda}{2\varepsilon_0 R}$ (B) Zero (C) $\frac{\lambda}{4\pi\varepsilon_0 R}$ (D) $\frac{\lambda}{4\varepsilon_0 R}$

14. A charged sphere of radius 'r' has surface charge density 'σ'. The electric field on its surface is E. If the radius of the sphere is doubled, keeping charge density the same, the ratio of the electric field on the old sphere to that on the new sphere will be:-
(CBSE 2024)

(a) 1 (c) 1/4
(b) 1/2 (d) 4

15. Three small charged spheres X, Y and Z carrying charges + q, -q and + q respectively are placed equidistant from each other, as shown in the figure. The spheres Y and Z are held in place. Initially X is also held in place, but is otherwise free to move. When X is released, the path followed by it will be:- (CBSE 2024)



(a) A (c) C (b) B (d) D

16. An isolated conductor, with a cavity, has a net charge +Q. A point charge +q is inside the cavity. The charges on the cavity wall and the outer surface are respectively:-
(CBSE 2024)

(a) 0 and Q (c) -q and Q + q
(b) -q and Q - q (d) 0 and Q - q

❖ ASSERTION REASON

Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

1. Assertion (A): The electrostatics force increases with decrease the distance between the charges.

Reason (R): The electrostatic force of attraction or repulsion between any two stationary point charges is inversely proportional to the square of the distance between them.

2. Assertion (A): The Coulomb force between two points charges depend upon the dielectric constant of the intervening medium.
Reason(R): Coulomb's force varies inversely with the dielectric constant of medium.

3. Assertion(A): The charge given to a metallic sphere does not depend on whether it is hollow or solid.
Reason: The charge resides only at the surface of conductor.

4. Assertion (A): A comb run through one's dry hair attracts small bits of paper.
Reason(R): Molecules in the paper gets polarized by the charged comb resulting in net force of attraction.

5. Assertion(A): A proton is placed in a uniform electric field; it tends to move along the direction of electric field.
Reason(R): A proton is placed in a uniform electric field it experiences a force.

❖ CASE STUDY

For electrostatics, the concept of electric field is convenient, but not really necessary. Electric field is an elegant way of characterizing the electrical environment of a system of charges. Electric field at a point in the space around a system of charges tells you the force a unit positive test charge would experience if placed at that point (without disturbing the system). Electric field is a characteristic of the system of charges and is independent of the test charge that you place at a point to determine the field. The term field in physics generally refers to a quantity that is defined at every point in space and may vary from point to point. Electric field is a vector field, since force is a vector quantity.

1. Which of the following statement is correct? The electric field at a point is (a) always continuous.
(b) continuous if there is a charge at that point.
(c) discontinuous only if there is a negative charge at that point. (d) discontinuous if there is a charge at that point.

2. The force per unit charge is known as
(a) electric flux (c) electric potential
(b) electric field (d) electric current

3. The SI unit of electric field is
(a) N/m (b) N-m (c) N/C (d) N/C^2

4. The magnitude of electric field intensity E is such that, an electron placed in it would experience an electrical force equal to its weight is given by
(a) mge (b) mg/e (c) e/mg (d) e^2g/m^2

5. At a particular point, Electric field depends upon (a) Source charge Q only.
(b) Test Charge q_0 only.

(c) Both q and q_0.

(d) Neither Q nor q_0

❖ THEORY QUESTIONS/NUMERICALS

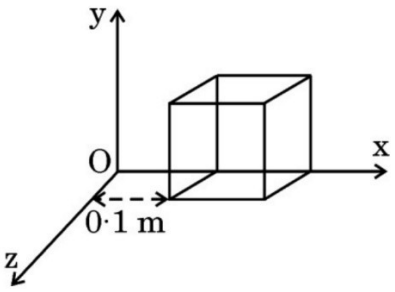
1. A Gaussian surface encloses an electric dipole within it. What is the total flux across sphere?
2. Find the dimension of $1/2\varepsilon_o E^2$.
3. If Coulomb law involves $1/r^3$ instead of $1/r^2$ dependence, would Gauss law be still true?
4. An electrostatic field line can't be discontinuous, why?
5. Three charges, each equal to +2C are placed at the corners of an equilateral triangle. If the force between any two charges be F, then what will be the net force on either Charge?
6. An electric dipole of dipole moment 20×10^{-6} Cm is enclosed by a closed surface. What is the net flux coming out of the surface?
7. Write the magnitude and direction of electric field intensity due to an electric dipole of length 2a at the mid-point of the line joining the two charges.
8. A charged particle is free to move in an electric field. Will it always move along an electric line of force?
9. Charge of 2C is placed at the centre of a cube of volume 8 cm^3. What is the electric flux passing through one face?
10. A charged particle q is shot towards another charged particle Q which is fixed, with a speed v. It approaches Q up to a closest distance r and then returns. If q were given a speed 2v, then find the closest distance of approach.
11. Eight identically charged drops are joined to form bigger drop. What will be the ratio of the electric field due to a smaller charged drop to the bigger charged drop?
12. A uniform electric field of 2 k NC^{-1} is in the x-direction. A point charge of 3 μC initially at rest at the origin is released. What is the kinetic energy of this charge at x = 4m?
13. An infinite number of charges each having charge 'q' along x-axis at x=1 ,x=2, x=4 ,x=8 and so on. Find the electric field at x=0 due to these charges.
14. Two small spheres each having mass 'm' kg and charge 'q' coulomb are suspended from a point by insulating thread each 'L' metre long but of negligible mass. If θ is the angle, each thread makes with the vertical when equilibrium has been attained. Show that : $\mathbf{q^2 = (4mgL^2 \sin^2\theta \tan\theta)\, 4\pi\varepsilon_0}$.
15. Using Gauss law, derive an expression for the electric field intensity at any point outside a uniformly charged thin spherical shell of radius R and surface charge density σ C/m^2 . Draw the field lines when the charge density of the sphere is (i) positive, (ii) negative.

16. A particle of mass m and charge (–q) enters the region between the two charged plates initially moving along x-axis with speed v_x. The length of plate is L and an uniform electric field E is maintained between the plates. Show that the Vertical deflection of the particle at the far edge of the plate is : **$Y = qEL^2/(2m\,v_x^2)$.**

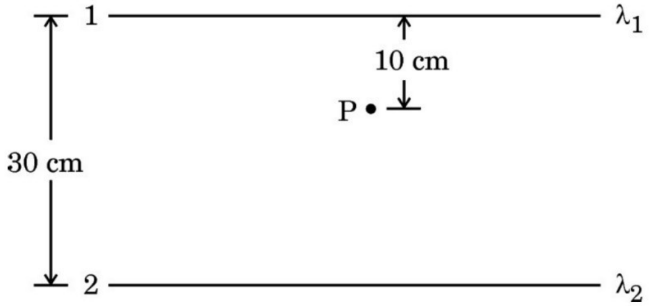
17. An early model for an atom considered it to have a positively charged point nucleus of charge Ze, surrounded by a uniform density of negative charge up to a radius R. The atom as a whole is neutral. For this model, what is the electric field at a distance r from the nucleus?

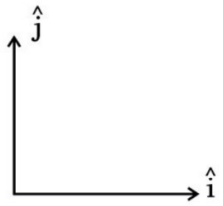
18. Two point charges of 3 mC and 4 mC are kept in air at (0·3 m, 0) and (0, 0.3 m) in xy plane. Find the magnitude and direction of the net electric field produced at the origin (0, 0). (CBSE 2024)

19. A cube of side 0·1 m is placed, as shown in the figure, in a region where electric field $E = 500x\hat{i}$ exists. Here x is in meters and E in NC^{-1}. Calculate : (a) the flux passing through the cube, and (b) the charge within the cube. (CBSE 2024)



20. Two long straight wires 1 and 2 are kept as shown in the figure. The linear charge density of the two wires





are $\lambda_1 = 10\ \mu C/m$ and $\lambda_2 = -20\ \mu C/m$. Find the net force Fexperienced by an electron held at point P. (CBSE 2024)

21. Show that the electric field for same charge density (σ) is twice in case of a conducting plate or surface than in a non-conducting sheet.
(CBSE 2024)

ANSWERS

MCQ

1. d 3. a 5. d 7. c 9. c
2. a 4. c and d 6. d 8. d 10. c
11. a 12. a 13. b 14. a 15. b
16. c

ASSERTION REASON

1. A 2. A 3. A 4. A 5. B

CASE STUDY: 1. b 2. b 3. c 4. b 5. A

THEORY QUESTIONS/NUMERICALS

1. Zero.
2. $ML^{-1}T^{-2}$.
3. No.
4. An electrostatic field line cannot be discontinuous because it represents the continuous path a test charge would take in an electric field, meaning a charge cannot "jump" from one point to another, so the field line must be a smooth, unbroken curve without sudden breaks.
5. Each charge experiences two forces each of magnitude F inclined at an angle of 60^0.Their resultant is given by $[F^2 + F^2 + 2F^2\cos 60]^{1/2} = \sqrt{3}F$
6. Flux = 0, since $Q_{en} = 0$
7. Electric field at the midpoint of a dipole of length 2a is $2kq/a^3$ pointing towards the negative charge or in the direction opposite to the dipole moment.
8. No. If the initial velocity of the charged particle makes a certain angle with a line of force, then the charged particle shall not move along the line of force. **9.** Total $\phi = q_0/\varepsilon_o = 2/\varepsilon o$,→ flux through one face = $\phi/6 = 1/3\ \varepsilon_o$.

10.q →---------- Q $1/2mv^2 = kQq/r$ Or, $v^2 \alpha 1/r$ Or, $r \alpha 1/v^2$ Or, r' = r/4

11.1:2

12.24 mJ

13.$4Kq/3\ NC^{-1}$

17.$E = \frac{Ze}{4\pi\epsilon_0 r}\left[\frac{r_2}{R} = \frac{r_3}{R}\right]$

18.$E = 5 \times 10^5\ N/c$ and $\theta = \tan^{-1}\frac{4}{3}$.

19.(a) Net Flux = 0.5 Nm^2/c and (b) $q = 4.425 \times 10^{-12}C$

20.$F = 5.76 \times 10^{-13}\ N\ (\hat{j})$

ASSIGNMENT-2 CH-2: ELECTROSTATIC POTENTIAL AND CAPACITANCE

❖ Multiple Choice Questions

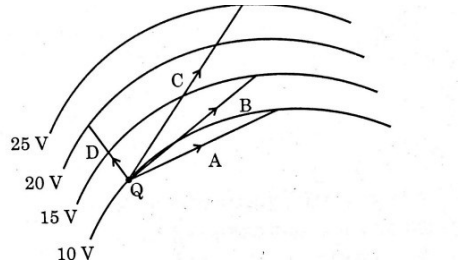
1. The electric potential V at any point x, y, z (all the coordinates are in metres) in space is given by $V = 4x^2$ volt. The electric field at the point (1m, 0.2 m) in volt metre^{-1} is:-

(a) 8 along negative X-axis. **(c)** 16 along negative X-axis. **(b)** 8 along positive X-axis. **(d)** 16 along positive X-axis.

2. A uniform electric field pointing in positive X-direction exists in a X-Y plane. Let A be the origin, B be the point on the X-axis at x = +1 cm and C be the point on the Yaxis at y = +1 cm. Then the potential at points A, B and C satisfy:-

(a) $V_A < V_B = V_C$ **(c)** $V_A = V_C > V_B$ **(b)** $V_B = V_A < V_C$ **(d)** $V_A = V_C < V_B$

3. In the figure curved lines represent equipotential surfaces. A charge Q is moved along



different paths A,B,C and D. The work done on the charge will be maximum along the path:- (CBSE 2025)

(a) A **(b)** B **(c)** C **(d)** D

4. The electric field at a point in a region is given by $\vec{E} = \alpha |\vec{r}|^3$, where α is a constant and r is the distance of the point from the origin. The magnitude of the potential of the point is:- (CBSE 2025)

(a) $\frac{\alpha}{r^2}$ **(c)** $\frac{2}{\alpha r^2}$ **(b)** $\frac{\alpha}{r^2}$ **(d)** $-\alpha r^2$

5. A solid sphere and a hollow sphere of equal diameters are raised to the same potential. Then,

(a) hollow sphere has more **(c)** only hollow sphere has charge. charge. **(d)** solid sphere has more charge.

(b) both have equal charge.

6. Two points P and Q are maintained at the potentials of 10 V and −4V respectively. The work done in moving 100 electrons from P to Q is:-

(a) -19×10^{-17} J **(c)** -2.24×10^{-10} J

(b) 9.60×10^{-17} J **(d)** 2.24×10^{-16} J

7. An electric charge 10^{-3} C is placed at the origin (0, 0) of X-Y co-ordinate system. Two points A and B are situated at $(\sqrt{2}, \sqrt{2})$ and (2,0) respectively. The potential difference between the points A and B will be:-

(a) 4.5 V **(b)** 9 V **(c)** Zero **(d)** 2 V

8. Ten charges are placed on the circumstance of a circle of radius R with constant angular separation between successive charges. Alternate charges 1, 3, 5, 7, 9 have charge (+q) each, while 2, 4, 6, 8, 10 have charge (−q) each. The potential V and the electric field E at the centre of the circle are respectively (Take V = 0 at infinity):-

(a) V = 0, E = 0 **(c)** $V = \frac{10q}{\quad}$; E = 0

(b) $V = \frac{}{4\pi 10\varepsilon q_0 R}$; $E = \frac{}{4\pi 10\varepsilon_0 q R^2}$ **(d)** $V = 4\pi 0;\varepsilon E_0 R = \frac{}{4\pi 10 \varepsilon_0 q R^2}$

9. Two thin wire rings each having a radius R are placed at a distance d apart with their axes coinciding. The charges on the two rings are +q and −q. The potential difference between the centres of the two rings is:-

(a) $\frac{}{\quad} \frac{q}{\pi \varepsilon_0 d R^2}$ **(c)** Zero

(b) $\frac{q}{2\pi\varepsilon_0}\left(\frac{1}{R} - \frac{1}{\sqrt{R^2+d^2}}\right)$ **(d)** $\frac{q}{4\pi\varepsilon_0}\left(\frac{1}{R} - \frac{1}{\sqrt{R^2+d}}\right)$

10. Concentric metallic hollow spheres of radii R and 4R hold charges Q_1 and Q_2 respectively. Given that surface charge densities for the concentric spheres are equal, the potential difference of spheres $V_R - V_{4R}$ is :-

(a) $\frac{3Q_2}{4\pi\varepsilon_0 R}$ **(c)** $\frac{Q_2}{4\pi\varepsilon_0 R}$ **(b)** $\frac{-3Q_1}{4\pi\varepsilon_0 R}$ **(d)** $\frac{-3Q_1}{16\pi\varepsilon_0 R}$

❖ ASSERTION REASON

Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

1. Assertion(A): The potential inside a hollow spherical charged conductor is zero.
Reason(R): Inside the hollow spherical conductor electric field is constant.

2. Assertion(A): Electric filed lines not form closed loops.
Reason(R): Electric filed lines are always normal to the surface of a conductor.

3. Assertion (A): No work is done in moving a test charge from one point to another over an equipotential surface.
Reason(R): Electric field is always normal to the equipotential surface at every point.

4. Assertion (A): No work is done in moving a point charge 'q' around a circular arc of radius 'r' at the centre of which another point charge 'Q' is located.
Reason(R): No work is done in moving a test charge from one point to another over an equipotential surface.

5. Assertion(A): A metal plate is introduced between the plates of a charged parallel plate capacitor, its capacitance increased.

Reason(R): A metal plate is introduced between the plates of a charged parallel plate capacitor, the effective separation between the plates is decreased.

❖ CASE STUDY

Dielectric with polar molecules also develops a net dipole moment in an external field, but for a different reason. In the absence of any external field, the different permanent dipoles are oriented randomly due to thermal agitation; so, the total dipole moment is zero. When an external field is applied, the individual dipole moments tend to align with the field. When summed overall the molecules, there is then a net dipole moment in the direction of the external field, i.e., the dielectric is polarized. The extent of polarization depends on the relative strength of two factors: the dipole potential energy in the external field tending to align the dipoles mutually opposite with the field and thermal energy tending to disrupt the alignment. There may be, in addition, the 'induced dipole moment' effect as for non-polar molecules, but generally the alignment effect is more important for polar molecules. Thus in either case, whether polar or non-polar, a dielectric develops a net dipole moment in the presence of an external field. The dipole moment per unit volume is called polarization.

1. The best definition of polarisation is:-

(a) Orientation of dipoles in random direction.

(b) Electric dipole moment per unit volume.

(c) Orientation of dipole moments.

(d) Change in polarity every dipole.

2. Calculate the polarisation vector of the material which has 100 dipoles per unit volume in a volume of 2 units.

(a) 200 **(b)** 50 **(c)** 0.02 **(d)** 100

3. The total polarisation of a material is the:- **(a)** Product of all types of polarisation.

(b) Sum of all types of polarisation.

(c) Orientation directions of the dipoles.

(d) Total dipole moments in the material.

4. Dipoles are created when dielectric is placed in:-

(a) Magnetic field. **(c)** Vacuum.

(b) Electric field. **(d)** Inert environment.

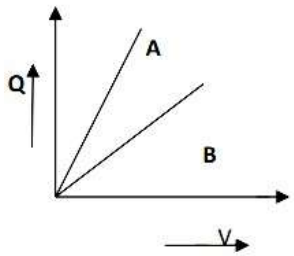
5. Identify which type of polarisation depend on temperature:-

(a) electronic **(c)** orientational

(b) ionic **(d)** interfacial

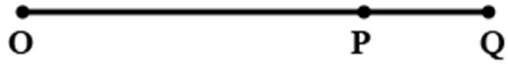
❖ THEORY QUESTIONS/NUMERICALS

1. The given graph shows that the variation of charge versus potential difference V for the two capacitors C_1 & C_2. The two capacitors have same plate separation but the plate area

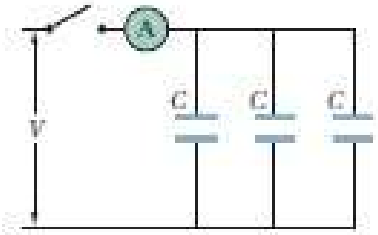


of C_2 is doubled than that of C_1. Which of the line in the graph corresponds to C_1 & C_2 and why?

2. A point charge q is placed at O as shown in the figure. Is $V_P - V_Q$ +ve or –ve : when (i) $q > 0$, (ii) $q < 0$? Justify your answer.
3. If V ($=q/4\pi\varepsilon_o r$) is the potential at a distance r due to a point charge q, then determine the electric field due to a point charge q, at a distance r.



4. Can electric potential at any point in space be zero while intensity of electric field at that point is not zero?
5. Each of the uncharged capacitor in the fig. has a capacitance of 25μF. What charge



shall flow through the meter A when the switch is closed? (V = 10 V)

6. Two capacitors of capacitance 6mF and 12mF are connected in series with the battery. The voltage across the 6mF capacitor is 2 Volts .Compute the total battery voltage.
7. A parallel plate capacitor with air between the plates has a capacitance of 8 pF . The separation between the plates is now reduced by half and the space between them is filled with a medium of dielectric constant 5. Calculate the value of capacitance of parallel plate capacitor in second case.
8. Five identical capacitors, each of capacitance C are connected between points X and Y. If the equivalent capacitance of the combination between X and Y is 5mF. Calculate the capacitance of each capacitor.
9. An uncharged capacitor is connected to a battery. Show that half of the energy supplied by the battery is lost as heat while charging the capacitor.
10. Two identical metal plates are given the charges Q_1 and Q_2 ($Q_2 < Q_1$) respectively. If they are now brought close together to form a parallel plate capacitor with capacitance C then what is the potential difference between them?
11. Three charges Q, +q and +q are placed at the vertices of a right angle isosceles triangle. Find the magnitude of Q for which net electrostatic energy of the configuration is zero.
12. The field potential inside a charged ball depends only on the distance from its centre as $V = ar^2+b$, where a and b are constants. Find the space charge distribution (r) inside the ball.

13. A slab of material of dielectric constant k has the same area as the plates of a parallel plate capacitor but has a thickness 3d/4, where d is the separation of the plate. How is the capacitance changed when the slab is inserted between the plates?

14. Describe schematically the equipotential surfaces corresponding to:- **(a)** a constant electric field in the z-direction.

(b) a field that uniformly increases in magnitude but remains in a constant (say, z) direction.

(c) a single positive charge at the origin.

(d) a uniform grid consisting of long equally spaced parallel charged wires in a plane.

15. A charge of 8 mC is located at the origin. Calculate the work done in taking a small charge of -2×10^{-9} C from a point P (0, 0, 3 cm) to a point Q (0, 4 cm, 0), via a point R (0, 6 cm, 9 cm).

16. A 600pF capacitor is charged by a 200V supply. It is then disconnected from the supply and is connected to another uncharged 600 pF capacitor. How much electrostatic energy is lost in the process?

17. Two point charges 5μC and -1μC are placed at points (-3 cm, 0, 0) and (3 cm, 0, 0) respectively. An external electric field $\vec{E} = \frac{A}{r^2}\hat{r}$ where A = 3×10^5 Vm is switched on

in the region. Calculate the change in electrostatic energy of the system due to the electric field. (CBSE 2025)

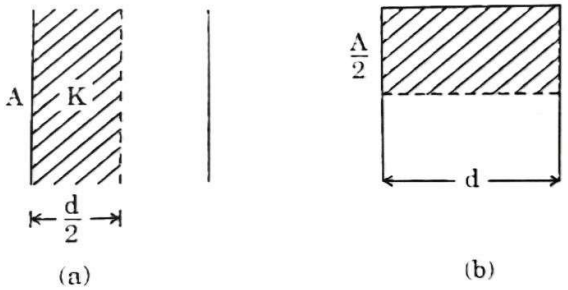
18. A system of two conductors is placed in air and they have net charge of +80μC and 80μC which causes a potential difference of 16 V between them.
(CBSE 2025)

(a) Find the capacitance of the system.

(b) If the air between the capacitor is replaced by a medium of dielectric constant 3, what will be the potential difference between the two conductors?

(c) If the charges on two conductors are changed to +160μC and -160μC, will the capacitance of the system change? Justify.

19. A parallel plate capacitor has plate area A and plate separation d. Half of the space between the plates is filled with a material of dielectric constant K in two ways as



shown in the figure. Find the values of capacitance of the capacitors in two cases.
(CBSE 2025)

ANSWERS

MCQ

$$C_b = \frac{2\varepsilon_0 A}{d}(K+1)$$

1. (a) 3. (c) 5. (b) 7. (a) 9. (b)
2. (c) 4. (d) 6. (d) 8. (a) 10. (b)

ASSERTION REASON

1. (d) **2.** (b) **3.** (a) **4.** (a) **5.** (a)

CASE STUDY

1. (b) 2. (a) 3. (b) 4. (b) 5. (c)

THEORY QUESTIONS/ NUMERICALS

1. Line A = C_2 and Line B = C_1
2. (i) When q > 0 then the Vp – Vq is +ve because Vp > Vq
   (ii) When q < 0 then the Vp – Vq is –ve because Vp < Vq
3. $E = \frac{q_2}{4\pi\varepsilon_0 r}$
4. Yes, any point on the equatorial line of an electric dipole.
5. 750 µF 13. $\frac{A}{\varepsilon_0}\left(\frac{4k}{k+3}\right)$ 18. (a) 5µF, (b) 16/3 V and
6. 3 V d

8. 180 mF pF 16.15. 61.2×10 J $^{-6}$J (c) No change in C
7.

10.(Q_1-Q_2

11.$-\frac{q\sqrt{2}}{4}$)/2C

12. $-6\varepsilon_o a$ 17. 40 J 19.

<u>ASSIGNMENT-3</u> CH-3: CURRENT

AND ELECTRICITY

❖ **Multiple Choice Question**

1. Which of the following characteristics of electrons determines the current in a conductor?

(a) Drift velocity alone.

(b) Thermal velocity alone.

(c) Both drift velocity and thermal velocity. **(d)** Neither drift nor thermal velocity.

2. Consider a current carrying wire (current I) in the shape of a circle. Note that as the current progresses along the wire, the direction of j (current density) changes in an exact manner, while the current I remain unaffected. The agent that is essentially responsible for is:-

(a) source of emf.

(b) electric field produced by charges accumulated on the surface of wire.

(c) the charges just behind a given segment of wire which push them just the right way by repulsion.

(d) the charges ahead.

3. A steady current flows in a metallic conductor of non-uniform cross-section. The quantity/quantities constant along the length of conductor is/are:- **(a)** current, electric field and drift speed.

(b) drift speed only.

(c) current and drift speed. **(d)** current only.

4. The potential difference applied to an X-ray tube is 5kV and the current through it is 3.2 mA. Then the number of electrons striking the target per second is:-

(a) $2\square10^{16}$ **(c)** $1\square10^{17}$ **(b)** $5\square10^{6}$ **(d)** $4\square10^{15}$

5. A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of:-

(a) Copper increases, germanium decreases.

(b) Copper decreases and germanium increase.

(c) Each of them increases. **(d)** each of them decreases.

6. The temperature coefficient of resistance of wire is $0.00125\square\ C^{\square1}$. At 300 K, its resistance is 1□. The resistance of the wire will be 2□ at:-

(a) 1154 K **(c)** 1400 K **(b)** 100 K **(d)** 1127 K

7. A 25 W-220 V bulb and a 100 W-220 V bulb are joined in series and connected to the mains. Which bulb will glow brighter?

(a) 25 W bulb **(d)** Both will glow with same **(b)** 100 W bulb brightness.

(c) First 25 W bulb and then 100 W bulbs.

8. The resistance of a wire of length L and radius r is R. Which one of the following would provide a wire of the same material of resistance R/2?

(CBSE 2025)

(a) Using a wire of same radius and twice the length. **(b)** Using a wire of same radius and half length.

(c) Using a wire of same length and twice the radius.

(d) Using a wire of same length and half the radius.

9. Two wires P and Q are made of same material. The wire Q has twice the diameter and half the length as that of wire P. If the resistance of P is R, the resistance of the Q will be:- (CBSE 2025)

(a) R **(b)** R/2 **(c)** R/8 **(d)** 2R

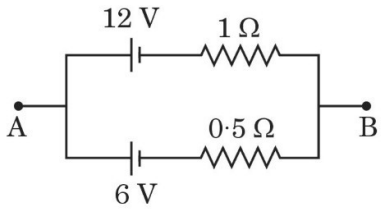
10. Two conductors A and B have the same material have their lengths in ratio 1:2 and radii in ratio 2:3. If they are connected in parallel across a battery the ratio V_A/V_B of the drift velocities of electrons:-

(a) 2 (CBSE 2025) **(b)** 1/2

(c) 3/2

(d) 8/9

11. Consider the circuit shown in the figure. The potential difference between points A and B is : (CBSE 2024)



(a) 6 V
(b) 8 V
(c) 9 V
(d) 12 V

12. A student is asked to connect four cells, each of emf E and internal resistance r, in series. But she/he connects one cell wrongly in series with the other cells. The equivalent emf and the equivalent internal resistance of the combination will be : (CBSE 2024)

(a) 4E and 2r **(c)** 3E and 4r
(b) 4E and 3r **(d)** 2E and 4r

❖ ASSERTION REASON QUESTIONS

Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false

1. Assertion(A): The possibility of an electric bulb fusing is higher at the time of switching ON and OFF.

Reason(R): Inductive effects produce a surge at the time of switch ON and OFF. **2.** Assertion(A): The 200 W bulbs glow with more brightness than 100 W bulbs.
Reason(R): A 100 W bulb has more resistance than a 200 W bulb.

3. Assertion(A): The internal resistance of the cell is constant. (CBSE 2023)

Reason (R): Ionic concentration of electrolyte remains constant during use of a cell.

4. Assertion(A): Two electric bulbs of 50 and 100 W are given. When connected in series 50 W bulb glows more but when connected parallel 100 W bulb glows more. Reason(R): In series combination, power is directly proportional to the resistance of the circuit. But in parallel combination, power is inversely proportional to the resistance of the circuit.

5. Assertion(A): Electric bulb starts glowing instantly as it is switched on. (CBSE 2024)

Reason(R): Drift velocity of electrons is very large in metallic conductors.

❖ CASE BASED QUESTIONS

A Wheatstone bridge is an electrical circuit used to measure an unknown electrical resistance by balancing two legs of a bridge circuit, one leg of which includes the unknown component. The primary benefit of the circuit is its ability to provide extremely accurate measurements. The resistance is adjusted until the bridge is 'balanced' and no current flows through the galvanometer. At this point, the voltage between the two

midpoints (B and D) will be zero. Therefore, the ratio of the two resistances in the known leg is equal to the ratio of the two resistances in the unknown leg.

1. In balanced Wheatstone bridge:
- **(a)** potential at points B and D remain same.
- **(b)** large current flows through the circuit.
- **(c)** battery becomes over heated. **(d)** resistances become small.

2. Wheatstone bridge is used to measure:
- **(a)** unknown current. **(c)** unknown charge.
- **(b)** unknown voltage. **(d)** unknown resistance.

3. Wheatstone bridge is implemented in lab using:
- **(a)** Ammeter. **(c)** meter bridge.
- **(b)** Voltmeter. **(d)** potentiometer.

4. Condition for balanced Wheatstone bridge:
- **(a)** $R_1/R_2 = R_3/R_x$ **(c)** $R_1 = R3 \times R_x$
- **(b)** $R3 = R_1 \times R_x$ **(d)** None of these

❖ THEORYQUESTIONS/ NUMERICALS

1. Magnese, Manganin is used for making standard resistors, why?

2. A wire of resistivity ρ is stretched to three times its initial length, what will be its new resistivity.

3. If the potential difference V applied across a conductor is increased to 2V, how will the drift velocity of the electrons change?

4. A 10Ω thick wire is stretched so that its length becomes three times. Assuming that there is no change in its density on stretching. Calculate the resistance of new wire.

5. You are given a 8 Ω resistor. What length of wire of resistivity 120 Ωm^{-1} should be joined in parallel with it to get a value of 6 Ω ?

6. A silver wire has a resistance of 2.1Ω at 27.5˚c and a resistance of 2.7Ω at 100˚c. Determine the temperature coefficient of resistivity of the silver wire.

7. If the length of the wire conductor is doubled by stretching it , keeping potential difference constant by what factor the drift speed of the electron changed.

8. A heater joined in series with the 60W bulb. With change of bulb with 100 W in the circuit, the rate heat produce by the heater will more or less or remain same.

9. Two 120V light bulbs, one of 25W and another of 200W are connected in series. One of the bulb burnt out instantaneously? Which one was burnt and why?

10. A cylindrical metallic wire is stretched to increase its length by 5%. Calculate the percentage change in resistances.

11. A wire of resistance 4R is bent in the form of circle. What is the effective resistance between the ends of diameter?

12. Two wires A and B have same lengths and material, have their cross sectional areas 1:4 , what would be the ratio of heat produced in these wires when the voltage across each is constant.

13. Two bulbs whose resistance is in the ratio of 1:2 are connected in parallel to a source of constant voltage. What will be the ratio of power dissipation in these?

14. Two batteries of emfs 3 volt and 6 volt in internal resistance 0.2 ohm and 0.4 ohm are connected in parallel. This combination is connected to a 4 ohm resistor. Find (CBSE 2025)

(a) the equivalent emf of the combination.

(b) the equivalent internal resistance of the combination. **(c)** the current drawn from the combination.

15. A conductor of length L is connected across an ideal cell of emf E. Keeping the cell connected the length of conductor is increased to 2L by gradually stretching it. If R and R' are initial and final values of resistance and V_D and V_D' are initial and final values of drift velocity, find the relation between R' and R and V_D' and V_D. (CBSE 2025)

16. When electrons drift in a conductor from lower to higher potential does it mean that all the free electrons of the conductor are moving in the same direction? (CBSE 2025)

17. A battery of emf E and internal resistance 'r' is connected to a rheostat. When a current of 2A is drawn from the battery, the potential difference across the rheostat is 5 V. The potential difference become 4 V when a current of 4A drawn from the battery. Calculate the value of E and r. (CBSE 2025)

18. 'n' identical sells each of emf E and internal resistance r, are connected in series. Later on it was found out that two cells X and Y are connected in reverse polarities. Calculate the potential difference across the cell 'X'. (CBSE 2025)

19. Find the temperature at which the resistance of a wire made of silver will be twice its resistance at 20º C. Take 20º C as the reference temperature and temperature coefficient of resistance of silver at 20º C = $4{\cdot}0 \times 10^{-3}$ K^{-1}. (CBSE 2024)

20. Define current density. Is it a scalar or a vector ? An electric field E is maintained in a metallic conductor. If 'n' be the number of electrons (mass m, charge e) per unit volume in the conductor and 'τ' its relaxation time, show that the current density $\vec{J} = \sigma\vec{E}$, where $\sigma = \frac{n}{m}e^2\tau$. (CBSE 2024)

❖ ANSWERS

MCQ

1. (a) 3. (d) 5. (b) 7. (a) 9. (c)
2. (b) 4. (a) 6. (d) 8. (b) 10.(a)
11. (b) 12. (d)

ASSERTION REASON

1. (a) 2. (a) 3. (d) 4. (a) 5. (c)

CASE STUDY

1. (a) 2. (d) 3. (c) 4. (a)

THEORY QUESTIONS/NUMERICALS

1. There thermal coefficient is almost zero.
2. No change
3. Drift velocity becomes double
4. 90 Ω
5. Length = 0.2 m
6. $\alpha = 0.00394\ ^{o}C^{-1}$
7. It reduces to half.
8. The rate of heat produced by the heater will be more.
9. The 25W bulb will burn out almost immediately. It will burn out because it has higher resistance than the 200W bulb.
10. 10.25 %
11. 2R
12. 1:4
13. 2:1
14. (a) 4V, (b) 0.133 Ω and (c) 0.96 A
15. The final resistance is four times the initial resistance, and the final drift velocity is half the initial drift velocity.
16. No, it doesn't mean that all free electrons in a conductor move in the same direction when they drift from lower to higher potential. While there's a net drift of electrons in one direction, they also experience random thermal motion.
17. EMF = 6 V and r = 0.5 Ω
18. 4E/r
19. 270 ºC

ASSIGNMENT-4 CH-4: MAGNETIC EFFECTS OF CURRENT

❖ Multiple Choice Question

1. An electron is projected with uniform velocity along the axis of a current carrying long solenoid. Which of the following is true?

(a) The electron will be accelerated along the axis.

(b) The electron path will be circular about the axis.

(c) The electron will experience a force at 45° to the axis and hence execute a helical path.

(d) The electron will continue to move with uniform velocity along the axis of the solenoid.

2. A circular loop of radius R, caring current I in clockwise sense, lies in x-y plane with its centre at origin. Total magnetic flux through x-y plane is:- **(a)** directly proportional to I along -z axis..

(b) directly proportional to R along -z axis. **(c)** inversely proportional to R^2 along z axis. **(d)** zero. **3.** A battery is connected between two points A and B on the circumference of a uniform conducting ring of radius r and resistance R. One of the arcs AB of the ring subtends an angel □ at the centre. The value of the magnetic field induction at the centre due to the current in the ring is :-

(a) a proportional to 2 (180□-□) **(c)** zero, only if □ = 180□

(b) inversely proportional to r **(d)** zero, for all values of □

4. A proton, a deuteron and an □-particle having the same kinetic energy are moving in circular trajectories in a constant magnetic field. If □p, □d and □□ denote respectively the radii of the trajectories of these particles then :-

(a) □□ = □p < □d **(c)** □□ = □p > □d

(b) □□ > □d > □p **(d)** □□ = □d = □p

5. A moving coil galvanometer has a coil with 175 turns and area 1 cm^2. It uses a torsion band of torsion constant $10^{□6}$ Nm/rad. The coil is placed in a magnetic field B parallel to its plane. The coil deflects by 1□ for a current of 1 mA. The value of B (in Tesla) is approximately:-

(a) $10^{□4}$ **(b)** $10^{□2}$ **(c)** $10^{□1}$ **(d)** $10^{□3}$

6. An ammeter reads up to 1 A. Its internal resistance is 0.81□. To increase the range to 10 A, the value of the required shunt is:-

(a) 0.03 □ **(b)** 0.3 □ **(c)** 0.9 □ **(d)** 0.09 □

7. A toroid of n turns, mean radius R and cross-sectional radius a carries current I. It is placed on a horizontal table taken as x-y plane. Its magnetic moment m:- **(a)** is non-zero and points in the z-direction by symmetry.

(b) points along the axis of the toroid (m = mφ ˆ).

(c) is zero, otherwise there would be a field falling as $1/r^3$ at large distances outside the toroid.

(d) is pointing radially outwards.

8. A loop carrying a current I clockwise is placed in x y plane, in a uniform magnetic field directed along z-axis. The tendency of the loop will be to:-
(CBSE 2024)

(a) move along x-axis. **(c)** Shrink.

(b) move along y-axis. **(d)** Expand.

9. A 10 cm long wire lies along y-axis. It carries a current of 1.0 A in positive y-direction. A magnetic field B = (5 mT)$\hat{}$j -(8 mT) $\hat{}$k exists in the region. The force on the wire is :-
(CBSE 2024)

(a) (0·8 mN)$\hat{}$i

(b) -(0·8 mN)$\hat{}$i

(c) (80 mN)$\hat{}$i

(d) -(80 mN)$\hat{}$I

10. A galvanometer of resistance G is converted into an ammeter of range 0 to I A. If the current through the galvanometer is 0.1% of I A, the resistance of the ammeter is:-
(CBSE 2024)

(a) G/999 **(c)** G/1001

(b) G/1000 **(d)** G/100·1

11. A piece of wire bent in the form of a circular loop A carries a current I. The wire is then bent into a circular loop B of two turns and carries the same current. The ratio of magnetic fields at the centre of loop A to that of loop B will be:-
(CBSE 2024)

(a) 1/16 **(b)** 16 **(c)** 4 **(d)** 1/4

❖ ASSERTION REASON

Two statements are given-one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true but R is NOT the correct explanation of A.

(c) A is true but R is false. (d) A is false and R is also false.

1. Assertion(A):The centripetal force on the test charge q_o is q_oVB, where V is the velocity of a particle and B is the magnetic field.

Reason (R):When a charged particle is fired at right angle to the magnetic field, the radius of its circular path is directly proportional to the kinetic energy of the particle.

2. Assertion (A):Magnetic field due to an infinite straight conductor varies inversely as the distance increases from it.

Reason (R):The magnetic field due to a straight conductor is in the form of concentric circles. **3.** Assertion (A):A rectangular current loop is in an arbitrary orientation in an

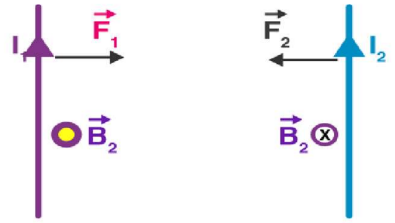
external uniform magnetic field. No work is required to rotate the loop about an axis perpendicular to the plane of loop

Reason (R):All positions represent the same level of energy.

4. Assertion (A):The magnitude of magnetic field in a region is equal to the number of magnetic field lines per unit area where area should be normal to the field. Reason (R): Magnetic field is tangential to a magnetic field line.
5. Assertion (A) : Two long parallel wires, freely suspended and connected in series to a battery, move apart.
   (CBSE 2024)
   Reason (R) : Two wires carrying current in opposite directions repel each other.

❖ **CASE STUDY**:

Two current-carrying conductors placed near each other will exert magnetic forces on each other. Ampere studied the nature of this magnetic force and its dependence on the product of magnitude of currents in both the conductors, on the shape and size of conductors as well as the distances between the conductors. Using Fleming's left hand rule, it is observed that currents flowing in the same direction attract each other and currents flowing in the opposite

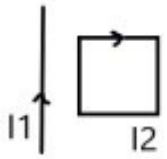


Current carrying conductors

directions repel each other. Thus, force per unit length acting on a conductor of infinite length is given by $F = \mu_0 2I_1I_2/4\pi d$

1. A vertical wire carries a current in upward direction. An electron beam sent horizontally from left towards the wire will be deflected:-
   (a) towards right **(c)** upwards
   (b) towards left **(d)** downwards
2. A current carrying, straight wire is kept along axis of a circular loop carrying a current. The straight wire:-
   (a) will exert an inward force on the circular loop.
   (b) will exert an outward force on the circular loop.
   (c) will not exert any force on the circular loop.
   (d) will exert a force on the circular loop parallel to itself.
3. A proton beam is going from north to south and electron beam is going from south to north. Neglecting the earth's magnetic field, the electron beam will be deflected:-
   (a) towards the proton beam. **(c)** Upwards.
   (b) away from the proton beam. **(d)** downwards

4. Consider the situation shown in fig. The straight wire is fixed but the loop can move under magnetic force. The loop will:- **(a)** remain stationary.



(b) move towards the wire.
(c) move away from the wire.
(d) rotate about the wire.

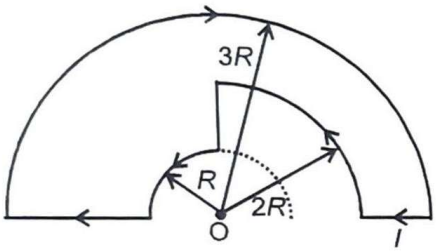
❖ THEORY QUESTIONS/NUMERICALS

1. Suppose a helical spring is suspended from the roof of a room and very small weight is attached to its lower end what will happen to the spring when a current is passed through it? Give reason to support your answer?

2. One alpha particle and a deuteron entered perpendicularly in a uniform magnetic field with same velocity. Which one follows the greater circle?

3. Proton is moving along the axis of a solenoid carrying current of 2 A and 50 number of turns per unit length. What will be the force acting on the particle?

4. What is the magnetic field at point O ?



5. Can a Moving Coil Galvanometer can be used to detect an A.C. in a circuit .Give reason.

6. Two wires of equal length are bent in the form of two loops. One loop is square whereas the other is circular. These are suspended in same magnetic field and same current is passed through them. Explain with reason which will experience greater torque?

7. The pole of a magnet is brought near to a stationary charge. What will be the force experienced by pole?

8. A charge particle moving in a magnetic field penetrates a layer of lead and thereby losses half of its kinetic energy. How does the radius of curvature of its path change?

9. A Current 'I' flows along the length of an infinitely long straight thin walled pipe. What is the magnetic field at any point on the axis of pipe?

10. What is the work done by a magnetic force, in displacing a charged particle?

11. What is the net magnetic flux from a north (or south) pole of a magnet (dipole) ?

12. Two long straight wires are set parallel to each other. Each carries a current I in the same direction and the separation between them is 2r. What is the intensity of the magnetic field midway between them?

13. A circular loop of radius R carrying current I, lies in X-Y plane with its centre at origin. What is the total magnetic flux through X-Y plane?

14. A circular current carrying coil has a radius R. What is the distance from the centre of the coil on its axis where the magnetic field is 1/8 th of its value at the centre?

15. A solenoid of length 0.6m has a radius of 1cm and is made up of 600 turns. It carries a current of 5A.What is the magnetic field inside and at ends of solenoid?

16. A current carrying solenoid of 100 turns has an area of cross section 10^{-4} m^2 .When suspended freely through its centre, it can turn in a horizontal plane. What is the magnetic moment of the solenoid for a current of 5A. Also calculate the net force and torque on solenoid if a uniform horizontal field of 10×10^{-2} T is set up at an angle of 30 degree with axis of solenoid when it is carrying the same current.

17. Two concentric circular coils A and B of radii 10 cm and 6 cm respectively, lie in the same vertical plane containing the north to south direction. Coil A has 30 turns and carries a current of 10 A . Coil B has 40 turns and carries a current of 15 A. The sense of the current in A is anticlockwise and clockwise in B for an observer looking at the coils facing west. Give the magnitude and direction of net magnetic field at the centre.

18. A wire of length l is in the form of a circular loop A of one turn. This loop is reshaped into loop B of three turns. Find the ratio of the magnetic fields at the centres of loop A and loop B for the same current through them.

19. An electron travelling west to east enters a chamber having an uniform electrostatic field in the north to south direction. Specify the direction in which a uniform magnetic field should be set up to prevent the electron from deflection from is straight line path.

[CBSE 2023]

20. A straight horizontal conducting rod of length 0.5 m and mass 50 g is suspended by two vertical wires at its ends. A current of 5A is set up in the rods through the wires.

(a) What magnetic field should be set up normal to the conductor in order that the tension in the wires is zero?

(b) What will be the tension in the wire if the direction of current is reversed keeping the magnetic field same as before? (neglect the mass and take $g=10m/s^2$)

21. A circular coil of 20 turns and radius 10cm is placed in a uniform magnetic field of 0.010T normal to the plane of the coil. If the current in the coil is 5A. What is the:- (a) Total torque on the coil.

(b) total force on the coil.

(c) average force on each electron in the coil due to the magnetic field. (coil is made of copper, A= 10^{-5} m^2 ,free electron density in copper is 10^{29} /m^3)

22. In an ammeter, 10% of main current is passing through the galvanometer. If the resistance of the galvanometer is G, then what is the shunt resistance in ohms?

23. In an exercise to increase current sensitivity of a galvanometer by 25 % , its resistance is increased by 1.5 times . How does the voltage sensitivity of the galvanometer be affected?

24. A proton with kinetic energy $1{\cdot}3384\times10^{-14}$ J moving horizontally from north to south, enters a uniform magnetic field B of $2{\cdot}0$ mT directed eastward. Calculate :-

(CBSE 2024)

(a) the speed of the proton.

(b) the magnitude of acceleration of the proton.

(c) the radius of the path traced by the proton [Take (q/m) for proton = $1{\cdot}0\times10^8$ C/kg]

25. Two long parallel straight wires A and B are 25 cm apart in air. They carry 5.0 A and 2.5 A currents respectively in opposite directions. Calculate the magnitude of the force exerted by wire A on a 10 cm length of wire B.

(CBSE 2023)

26. State Biot-Savart's law for the magnetic field due to current carrying element. Use this law to obtain an expression for the magnetic field at the centre of a current carrying loop of radius 'a' and carrying current I. Draw the magnetic field lines for a current loop indicating the direction of magnetic field. (CBSE 2023)

❖ ANSWERS

MCQ

1. (d) 2. (a) 3. (d) 4. (a) 5. (d) 6. (d) 7. (c) 8. (d) 9. (b) 10. (a) 11. (d)

ASSERTION REASON

1. (c) 2. (b) 3. (a) 4. (b) 5. (a)

CASE STUDY

1. (c) 2. (c) 3. (a) 4. (b)

THEORY QUESTIONS/NUMERICAL

1. When a current is passed through a helical spring, the spring will contract (get shorter), causing the small weight attached to its lower end to move upwards. This is because the current flowing through the spring's coils creates magnetic fields. Adjacent coils with current flowing in the same direction attract each other, causing the spring to shrink or contract.
2. Both the alpha particle and the deuteron will follow the same circular path (i.e., they will have the same radius)

$5\mu_0$ 3. The force acting on the proton will be zero. 4. $\vec{B} = \frac{I}{48R}$ and the direction of the magnetic field at point O will be into the page.

5. No, a moving coil galvanometer cannot be directly used to detect alternating current (AC) in a circuit. The reason is that the average value of AC current over a complete cycle is zero.
6. The **circular loop will experience greater torque. Reason:** For a fixed perimeter (equal length of wire), a circle encloses the maximum possible area compared to any other two-dimensional shape. Since the torque experienced by a current loop in a uniform magnetic field is directly proportional to the area enclosed by the loop ($\tau \propto A$), the circular loop, having a larger area than the square loop formed from the same length of wire, will experience a greater torque.
7. The force experienced by the pole of a magnet when brought near a stationary charge will be zero.
8. Radius will be decreased by the factor $1/\sqrt{2}$

9. The magnetic field at any point on the axis of an infinitely long, straight, thin-walled pipe carrying a current 'I' is zero.
10. Zero 11. Zero 12. Zero
13. Zero because circular loop behaves as a magnetic dipole whose one surface will be Npole and another will be S-pole. Therefore, magnetic lines a force emerges from N will meet at S.
14. The distance from the centre on the axis is $\sqrt{3}$R.
15. B (inside) = 6.28×10^{-3} T and B (outside) = 3.14×10^{-3} T
16. Magnetic moment: 5×10^{-2}Am^2. Net force = zero, Net torque = 0.25 Nm.
17. Net field = $14\pi \times 10^{-4}$ T.
18. 1:9
19. Vertically outward of the plane.
20. (a) 0.2 T and (b) 1 N
21. (a) 0 , (b) 0, (c) 5×10^{-25} N
22. (1/9) of G
23. It becomes 5/6 times of original Vs
24. (a) $1.77 \times 10^7 m/s$, (b) 3.37×10^{12}m/s^2 and (c) 5.9 mm
25. 10^{-6} N

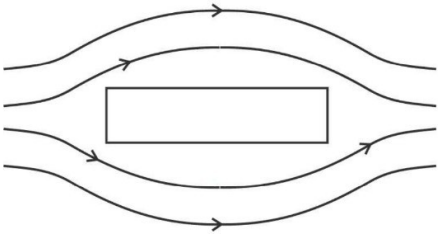
ASSIGNMENT-5 CH-5: MAGNETISM

❖ **Multiple Choice Question**

1. The gyro-magnetic ratio of an electron in an H-atom, according to Bohr model, is:- **(a)** independent of which orbit it is in. **(b)** positive.
(c) increases with the quantum number n. **(d)** none of the above.

2. In a permanent magnet at room temperature :- **(a)** magnetic moment of each molecule is zero.
(b) the individual molecules have non-zero magnetic moment which are all perfectly aligned.
(c) domains are partially aligned.
(d) domains are all perfectly aligned.

3. Which of the following cannot modify an external magnetic field as shown in the figure?



(CBSE 2023)
(a) Nickel **(c)** Sodium chloride
(b) Silicon **(d)** Copper

4. Which of the following has permeability less than that of free space? (CBSE 2023)

(a) Copper. **(c)** Copper Chloride.

(b) Aluminium. **(d)** Nickel

5. A diamagnetic substance is brought near the north or south pole of a bar magnet. It will be:-

(a) repelled by the north pole and attracted by the south pole. (CBSE 2023)

(b) attracted by both the poles.

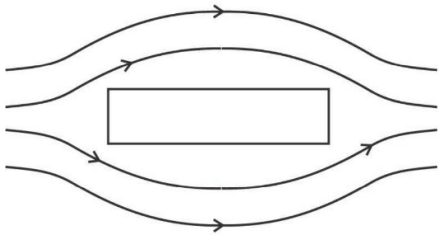
(c) repelled by both the poles.

(d) attracted by the north pole and repelled by the south pole.

6. The magnetic susceptibility of a diamagnetic material is:- (CBSE 2024)

(a) Small negative. **(c)** Large negative.

(b) Small positive. **(d)** Large positive.



7. The magnetic field lines near a substance are as shown in the figure. The substance is : (CBSE 2023)

(a) Iron **(c)** Aluminium

(b) Sodium **(d)** Copper

8. A bar magnet AB with magnetic moment M is cut into two equal parts perpendicular to its axis. One part is kept over the other so that the end B is exactly over A. what will be the magnetic moment of the combination so formed?

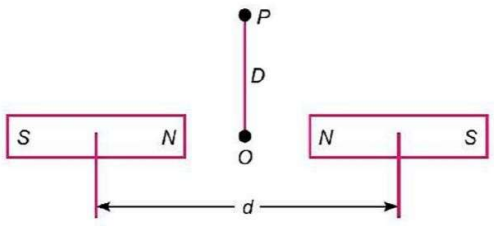
(a) M/4 **(b)** 3M/4 **(c)** Zero **(d)** M

9. The major contribution to magnetism in a substance is:- **(a)** Orbital motion of electrons

(b) Spin motion of electrons

(c) Equally due to orbital and spin motion of electrons **(d)** Hidden magnet

10. Two identical bar magnets are fixed with their centres at a distance 'd' apart. A stationary charge +Q is placed at P in between the gap of the two magnets at a distance D from the



centre O as shown in fig. The force on charge +Q is:- **(a)** Directed along OP

(b) Directed along PO

(c) Directed perpendicular to the plane of the paper

(d) Zero

❖ ASSERTION REASON

1. Assertion (A) : When a bar of copper is placed in an external magnetic field, the field lines get concentrated inside the bar.
(CBSE 2023)
Reason (R) : Copper is a paramagnetic substance.

2. Assertion (A) :- Diamagnetic substance exhibit magnetism.
(CBSE 2023)
Reason (R) :- Diamagnetic material do not have a permanent dipole magnetic moment.

3. Assertion (A) : When radius of a circular loop carrying a steady current is doubled, its magnetic moment becomes four times.
Reason (R): The magnetic moment of a circular loop carrying a steady current is proportional to the area of the loop.
(CBSE 2023)

❖ THEORY/ NUMERICAL QUESTION

1. A Magnetic dipole placed in a Magnetic Field experiences a net force. What can you say about the Nature of Magnetic Field?

2. Which type of Magnetism exists in all substances?

3. How does a ferromagnetic material change its Magnetic properties if it is heated beyond its curie temperature?

4. A bar magnet is cut into two pieces, along its length. How will its pole strength be affected?

5. A hypothetical bar magnet is cut into two equal pieces at its mid point. What is the magnetic moment of this arrangement?

6. An element dl = idx is placed at the origin and carries a large current I = 10A.What is the magnetic field on the y axis at a distance of 0.5m.

7. Find the magnetic moment of a wire of length l carrying current I bent in the form of a circle.

8. Draw diagrams to show behaviour of magnetic field lines near a bar of :- (a) Aluminium
(b) Copper
(c) mercury cooled to a very low temperature 4.2 K

9. A Rowland ring of mean radius 15 cm has 3500 turns of wore wound on a ferromagnetic core of relative permeability 800.What is the magnetic field B in the core for a magnetizing current of 1.2 A?

10. Write any two points of difference between a diamagnetic and a paramagnetic substance.
(CBSE 2023)

11. A bar magnet of magnetic moment 2·5 JT 1 lies aligned with the direction of a uniform magnetic field of 0·32 T. (a) Find the amount of work done to turn the magnet so as to align its magnetic moment (i) normal to the field direction, and (ii) opposite to the field direction. (b) What is the torque on the magnet in above cases (i) and (ii) ?

(CBSE 2024)

12. What are ferromagnetic materials? Explain ferromagnetism with the help of suitable diagram, Using the concept of magnetic domains.

(CBSE 2024)

ANSWERS

MCQ

1. (a)	**3. (a) 4.**	**5. (c)**	**7. (d)**	**9. (b)**
2. (c)	**(a)**	**6. (a)**	**8. (d)**	**10.(d)**

ASSERTION REASON

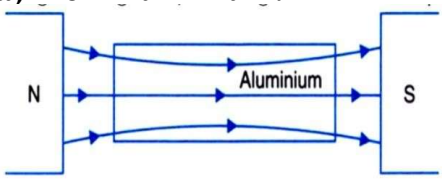
1. **(d)**
2. **(a)**
3. **(a)**

THEORY QUESTIONS / NUMERICALS

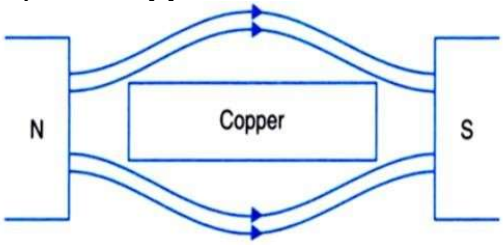
1. **The field is not uniform.**
2. **Diamagnetism.**
3. **It loses its ferromagnetic properties and converted into paramagnetic.**
4. **When a bar magnet is cut lengthwise into two pieces, its pole strength remains the same.**
5. **When a bar magnet is cut into two equal pieces at its midpoint, the magnetic moment of each piece becomes half of the original magnetic moment.**
6. **The magnetic field on the y-axis at a distance of 0.5m is 4 x 10^-6 T.**

7. $\frac{I}{}$ l^2

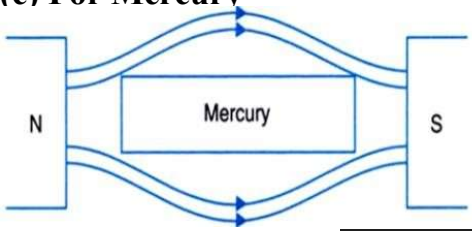
8. (a) For Aluminium.



(b) For Copper



(c) For Mercury



9. The magnetic field B $B = \mu_0 \mu_r \frac{NI}{2\pi r}$ in the core of the Rowland ring is approximately 4.48 T.

4π

11.(a) Work done to turn the magnet: (i) Normal to the field direction: 0.8 J (ii) Opposite to the field direction: 1.6 J

(b) Torque on the magnet: (i) Normal to the field direction: 0.8 Nm (ii) Opposite to the field direction: 0 Nm

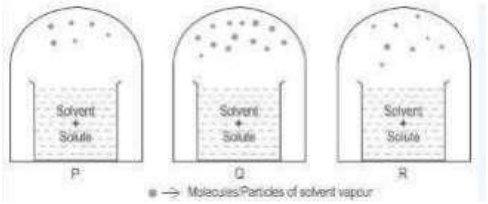
12.Ferromagnetic materials are substances that exhibit strong magnetism in the same direction of the applied magnetic field.

Ferromagnetism arises from the spontaneous alignment of magnetic domains within the material. These domains are regions where the magnetic moments of atoms are aligned. In an unmagnetized state, the domains are randomly oriented, resulting in no net magnetic moment. When an external magnetic field is applied, the domains align with the field, leading to strong magnetization. [Draw diagram]

CLASS 12 CHEMISTRY ASSIGNMENT

CHAPTER 1 - SOLUTIONS

Q1. The images below show the evaporation of the solvent on account of the presence of non-volatile solutes. In each of the three cases, the solvent taken is of the same type. The solvent is volatile and its quantity is the same in all three cases.



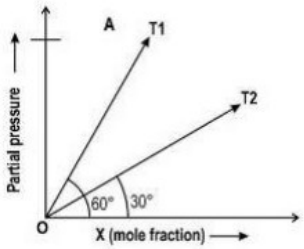
Which of the above three solutions has the least amount of solute in it? How did you reach that conclusion?

Q2. Some countries use the colligative property of solutions to remove the snow from the roads. The snow is salted with NaCl or $CaCl_2$, lowering its freezing point and causing it to melt and clear the space. Assuming that NaCl dissolves completely in ice and forms an ideal solution, what mass of NaCl must be dissolved in 5.5 kg of ice on the road to decrease the melting point of water to 10°C?

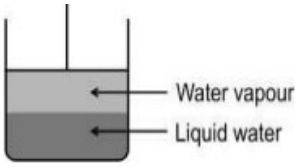
(K_f = 1.86 °C kg/mole; atomic mass of sodium = 23 g/mol, atomic mass of chlorine = 35.44 g/mol)

Q3. Aquatic animals feel more comfortable in cold water than warm water as the solubility of oxygen in cold water is more than that in warm water. The graph below shows the solubility of oxygen in the water as a function of pressure at different temperatures T1 and T2.

(i) Based on the above graph, what is the ratio of K_H at T1 and T2? (ii) Between T1 and T2, which one is greater?



Q4. Water vapor and liquid water are in equilibrium in the image shown below. At room temperature, the vapor pressure of water is 25 mmHg. The volume of water vapor is V.



What will be the vapor pressure of the water if the volume of water vapor becomes

(i) 2V when the piston is moved upwards

(ii) V/2 when the piston is moved downwards (iii) Explain the reasons for your answers for i and ii.

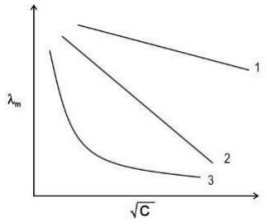
Q5. One of the key ingredients in some toothpastes is Sodium Fluoride. However, the concentration of this chemical compound is very low. This concentration can be expressed in ppm (parts per million) that is 1 ppm represents a concentration of 1 mg of sodium fluoride in 1 kg of the toothpaste.

(i) A 1.00 g sample of toothpaste was found to contain 2.88×10^{-5} mol of sodium fluoride. What is the concentration of sodium fluoride, in ppm, for this sample of toothpaste?

(ii) Sodium fluoride is toxic in high concentrations. Major health problems can occur if concentrations of sodium fluoride are greater than 3.19×10^{-2} g per kilogram of body mass. Deduce the maximum mass of sodium fluoride, in mg, that a 75 kg person could swallow without reaching the toxic concentration.

CHAPTER 2 – ELECTROCHEMISTRY

Q6. (i) The molar conductivity vs √c curves for NaCl, HCl, and NH_4OH are shown below in random order.



(i) Identify which graph corresponds to HCl, NaCl, and NH_4OH.

(ii) Give reasons to justify your answer in (i).

Q7. There are four electrodes A, B, C, and D. E^0 values of the electrodes are as follows. The combination of which of two electrodes will give the largest cell potential? Justify your answer. Also, find the emf of the cell.

Electrodes	Electrode Potential
A	$A/A^- = 0.96$ V
B	$B^-/B^{2-} = -0.12$V
C	$C^+/C = 0.18$V
D	$D^{2+}/D = -1.12$V

Q8. A rusted piece of iron undergoes electrochemical reactions. Write the chemical reactions taking place at the following spots of that rusting piece of iron:

a) At the spot that behaves as an anode

b) At the spot that behaves as a cathode

c) The overall balanced chemical reaction

d) Further oxidation of ferrous ion into rust

Q9. For an experiment, Aman prepared a 1-litre $FeSO_4$ solution of 1 M concentration and stored the solution in a glass jar. Before starting the experiment, Aman wants to stir the solution. Which of the following spoons should he use for this purpose and why?

Aluminium spoon ($Al^{3+}/Al = -1.66V$)

Copper spoon ($Cu^{2+}/Cu = 0.34V$)

(Given: E^0 /V $Fe^{2+}/Fe = -0.44V$)

Q10. Imagine you are in a chemistry lab and the teacher is explaining the electrolysis of $CuSO_4$ solution and the products liberated after electrolysis. The teacher made two Setups for the electrolysis process. In Set up-I, electrolysis of $CuSO_4$ solution is done by using Pt electrodes and in Set up-II electrolysis of $CuSO_4$ solution is done by using Cu electrodes. Answer the following questions based on this:

i) In which Set up I or II will the colour of $CuSO_4$ solution fade away and why?

ii) Write the chemical reaction taking place at the Cu anode in Set up II.

iii) Name the product obtained at the anode in Set up I. iv) Which out of Set up I or II depict refining of crude copper?

CHAPTER 3 – d and f BLOCK ELEMENTS

Q11. Why does manganese exhibit +7 oxidation state? Give an example of a compound of manganese with oxygen in which it shows highest oxidation state. Give reason. Write the formula and draw its structure. What is the oxidation state of Mn in this compound?

Q12. Oxide of a metal D in the lanthanoid series is used as phosphors in television screens and similar fluorescing surfaces.

a) State the valency of element D and the formula of its oxide in terms of 'D'.

b) What will the pH range of its aqueous solution be?

c) What role does it play in the petroleum industry?

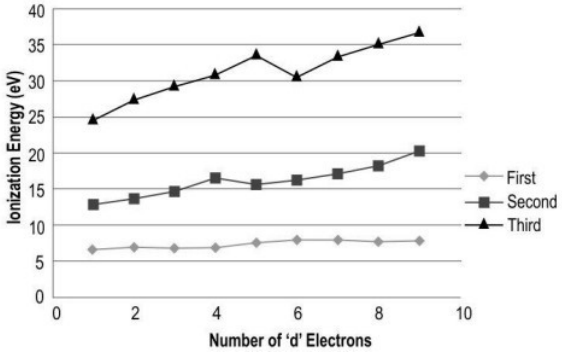
Q13. a) Which element is used in X-Ray tube for production of X-rays?

b) Why element is used for making filaments of electric bulbs and why?

c) Which elements are used for making brass and bronze?

d) Which solution is used by police to test that a person is drunk? How is it done?

Q14. The graph below shows the first, second and third ionisation energies of a set of elements

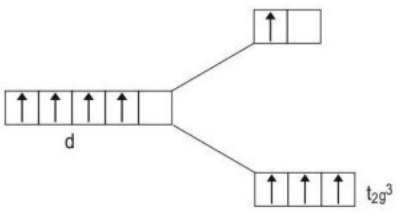


In the graph, we can see a deviation in the fifth element in the trend for second ionisation energy and a deviation in the sixth element in the trend for third ionisation energy. Identify the elements and explain why the deviation occurs.

Q15. Read the information given below on a transition metal M and answer the question that follows.

P) The M^{2+} state has d^4 configuration, where n = 4.

Q) The crystal field splitting for M ion is given below



(a) Is M^{2+} ion reducing or oxidising in nature? Explain.

(b) Identify the metal ion.

ANSWERS TO NUMERICAL PROBLEMS:

Ans 2. 1727.4 kg

Ans 3. $KH_1 : KH_2 = 3$

Ans 5. (i) 1210 ppm (ii) 2392 mg

Ans 7. 2.08 V

MATHEMATICS

ASSIGNMENT-DETERMINERS

Q1. If

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \quad \text{then } |A| = ?$$

a) 2 b) –2 c) 10 d) –10

Q2. The value of determinant

$$\begin{vmatrix} 1 & 0 & 2 \\ 3 & 2 & 1 \\ 1 & 2 & 1 \end{vmatrix}$$

is:

a) 0 b) 4 c) –2 d) 2

Q3. If the determinant of a matrix is zero, then the matrix is:

a) Singular b) Non-singular c) Identity d) Scalar

Q4. Evaluate the determinant:

$$\begin{vmatrix} 2 & 3 & 1 \\ 4 & 1 & -3 \\ 1 & 2 & 0 \end{vmatrix}$$

Q5. Show that the determinant

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (b-a)(c-a)(c-b)$$

Q6. If

$$\begin{vmatrix} x & 2 & 3 \\ 1 & x & 2 \\ 4 & 1 & x \end{vmatrix} = 0$$

Find the value(s) of x.

Q7. Using properties of determinants, prove that:

$$\begin{vmatrix} a & b & c \\ a^2 & b^2 & c^2 \\ a^3 & b^3 & c^3 \end{vmatrix} = (a-b)(b-c)(c-a)(a+b+c)$$

Q8. Using cofactor expansion, evaluate:

$$\begin{vmatrix} 3 & 0 & 2 \\ 1 & -1 & 4 \\ 2 & 3 & 1 \end{vmatrix}$$

Q9. If

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 5 & 6 & 0 \end{bmatrix}$$

find the adjoint and hence the inverse of matrix A, if it exists.

ASSIGNMENT- DIFFERENTIATION

Differentiate the following functions with respect to x:

Q1. $y = x^3 + 2x^2 - x + 7$

Q2. $y = \sin x + \cos x$

Q3. $y = e^x + \ln x$

Q4. $y = \tan x - \cot x$

Q5. $y = \sqrt{x} + \frac{1}{x}$

Q6. Differentiate $y = (x^2 + 3x)(x - 1)^2$

Q7. Find $\frac{dy}{dx}$, if $y = \frac{\sin x}{x^2 + 1}$

Q8. If $y = \cos(\ln x)$, find $\frac{dy}{dx}$

Q9. Differentiate $y = e^{x^2 + 1}$

Q10. $y = \tan^{-1}(\sqrt{x})$, find $\frac{dy}{dx}$

Q11. If $x^2 + y^2 = 25$, find $\frac{dy}{dx}$

Q12. If $x = \sin t$, $y = \cos t$, find $\frac{dy}{dx}$

Q13. If $y = x^x$, show that

$$\frac{dy}{dx} = x^x (1 + \ln x)$$

Q14. Differentiate $y = \ln(\sin x)$ with respect to x

Q15. If $y = (\sin x)^{\cos x}$, find $\frac{dy}{dx}$

ASSIGNMENT- INVERSE TRIGONOMETRY FUNCTIONS

Q1. $\sin^{-1}(1) =$ _____

Q2. $\cos^{-1}(0) =$ _____

Q3. The principal value of $\tan^{-1}(\sqrt{3})$ is _____

Q4. Domain of $\sin^{-1}(x)$ is _____

Q5. $\cos^{-1}(-\frac{1}{2}) =$ _____ (in radians)

Q6. Find the value of $\tan\left(\sin^{-1}\left(\frac{3}{5}\right)\right)$

Q7. Evaluate:

$$\sin^{-1}\left(\frac{1}{2}\right) + \cos^{-1}\left(\frac{1}{2}\right)$$

Q8. Find the principal value of:

$$\cot^{-1}\left(\frac{1}{\sqrt{3}}\right)$$

Q9. Prove that:

$$\sin^{-1} x + \cos^{-1} x = \frac{\pi}{2}, \text{ for all } x \in [-1, 1]$$

Q10. Solve:

$$2\tan^{-1} x = \frac{\pi}{2}$$

Q11. Prove that:

$$\tan^{-1} x + \tan^{-1} y = \tan^{-1}\left(\frac{x+y}{1-xy}\right), \text{ if } xy < 1$$

Q12. Evaluate:

$$\sin^{-1}\left(\frac{2x}{1+x^2}\right) = 2\tan^{-1} x, \text{ where } x > 0$$

Q13. If $\theta = \cos^{-1} x$, find the value of $\sin\theta$ in terms of x

Q14. Prove that:

$$\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3 = \pi$$

ASSIGNMENT- MATRICES

Q1. If $A = \begin{bmatrix} 2 & 1 \\ 0 & 3 \end{bmatrix}$, then the order of matrix A is:

a) 1×2

b) 2×1

c) 2×2

d) 3×3

Q2. If A and B are matrices such that AB is defined, then the number of columns of A must be equal to:

a) Number of rows of B

b) Number of columns of B

c) Number of rows of A

d) Number of elements in B

Q3. Which of the following matrices is a **zero matrix**?

a) $\begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$

b) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

d) None of these

Q4. Find the transpose of the matrix

$$A = \begin{bmatrix} 3 & -2 \\ 5 & 4 \\ 1 & 0 \end{bmatrix}$$

Q5. Let

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 2 & 0 \\ 1 & 3 \end{bmatrix}$$

Find $A + B$ and $A - B$

Q6. Check whether the multiplication AB is possible if

$$A = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}$$

If yes, find the product.

Q7. Show that matrix multiplication is not commutative, i.e., $AB \neq BA$ in general. Use the following matrices to justify your answer:

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

Q8. If

$$A = \begin{bmatrix} 2 & -1 \\ 0 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 2 \\ 4 & 0 \end{bmatrix}$$

find AB and BA. Are they equal?

Q9. Verify the associativity of matrix multiplication for the matrices

$$A = \begin{bmatrix} 1 & 0 \\ 2 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, \quad C = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$$

Q10. Let $A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$. Show that $A^2 - 2A + I = 0$, where I is the identity matrix of order 2.

CLASS : XII COMPUTER SCIENCE
UNIT-3 : DATABASE MANAGEMNET SYSTEM
ASSIGNMENT-1

Q1. Write SQL commands for the queries based on a Table COMPANY and CUSTOMER.

COMPANY

CID	NAME	CITY	PRODUCTNAME
111	SONY	DELHI	TV
222	NOKIA	MUMBAI	MOBILE
333	ONIDA	DELHI	TV
444	SONY	MUMBAI	MOBILE
555	BLACKBERRY	MADRAS	MOBILE
666	DELL	DELHI	LAPTOP

CUSTOMER

CUSTID	NAME	PRICE	QTY	CID
101	ROHAN SHARMA	70,000	20	222
102	DEEPAK KUMAR	50,000	10	666
103	MOHAN KUMAR	30,000	5	111
104	SAHIL BANSAL	35,000	3	333
105	NEHA SONI	25,000	7	444
106	SONAL AGGARWAL	20,000	5	333
107	ARUN SINGH	50,000	15	666

1) **Identify the most appropriate Primary key for Tables Company and Customer.**
2) **To display those company name which are having prize less than 30000.**
3) **To increase the price by 1000 for those customer whose name starts with S?**
4) **What is the cardinality and degree of table customer?**
5) **Delete the records from table customer whose name has KUMAR.**
6) **Insert a new record in table Company where CID : 777, Name : APPLE City**
   KOCHI and PRODUCTNAME is LAPTOP
7) **Write the degree and cardinality of the above table company.**
8) **What would be the Cartesian product of both the tables after insert a new record?**

Q2. A SQL table ITEMS contains the following columns:
INO, INAME, QUANTITY, PRICE, DISCOUNT

Write the SQL command to remove the column DISCOUNT from the table.

Q3. Categorize the following SQL commands into DDL and DML:
CREATE, UPDATE, INSERT, DROP

Q4. Differentiate between Primary Key and Candidate Key.

Q5. A table has 7 columns and 20 rows. When Kritika is executing below given query:

SELECT COUNT (*) FROM TOYS;

It shows 20 and when she executed SELECT COUNT (TYPE) from TOYS it shows 15. What could be the reason?

UNT-1 : PYTHON BASICS ASSIGNMENT -2

Q1. Find and write the output of the following Python code:

```
def makenew(mystr):
   newstr = " "
   count = 0
   for i in mystr:
      if count%2 ==0:
         newstr = newstr+i.lower()
      else:
         if i.islower():
            newstr = newstr+i.upper()
         else:
            newstr = newstr+i
      count+=1
   newstr = newstr+mystr[:3]
   print ("The new string is :", newstr)
makenew("cbseEXAMs@2022")
```

Q2. What possible output(s) are expected to be displayed on screen at the time of Execution of the following code? Also specify the maximum and minimum value that Can be assigned to variable X.

```
import random
L=[10,7,21]
X=random.randint(1,2)
for i in range(X):
   Y=random.randint(1,X)
print(L[Y],"$",end=" ")
```

(i)10 $ 7 $ (ii) 21 $ 7 $ (iii) 21 $ 10 $ (iv) 7 $

Q3. Write the type of tokens from the following: (i) if (ii) roll_no

Q4. Name the Python Library modules which need to be imported to invoke the following functions: (i) sin() (ii) randint ()

Q5. Find and write the output of the following python code:

```
x = "abcdef"
i = "a"
while i in x:
   print(i, end = " ")
```

UNIT-1 : DATA FILE HANDLING (TEXT FILES)

ASSIGNMENT -3

Write the output of following statements –

	Considering the content stored in file "CORONA.TXT **O Corona O Corona** **Jaldi se tum Go na** **Social Distancing ka palan karona sabse** **1 meter ki duri rakhona** **Lockdown me ghar me ho to Online** **padhai karona**
1	Write the output of following statements – f = open("CORONA.TXT") sr1 = _____ # to read first line of file str2 = _____ # to read next line of file str3 = _____ # to read remaining lines of file
2	Write a function in python to read lines from file "CORONA.txt" and count how many times the word "Corona" exists in file. **Output should be: Number of time word Corona occurs : 4**
3	Write a function dispS() in Python to read from text file "CORONA.TXT" and display those lines which starts with "S"**The function should display:** **Social Distancing ka palan karona** **Sabse 1 meter ki duri rakhona**
4	Write a function in python to read lines from file "CORONA.txt" and display all those words, which has two characters in it. **Output should be : se Go na ka ki me me ho to se Go na**

UNIT-1 : DATA FILE HANDLING (TEXT FILES)
ASSIGNMENT -4

Ques 1 Differentiate between readline() and readlines().

Ans

readline()	readlines()

Ques 2 Why is it advised to close a file after we are done with the read and write operations? What will happen if we do not close it? Will some error message be flashed?

Ans

Ques 3 Write a function countdigits() in Python, which should read each character of a text file "marks.txt", count the number of digits and display the file content and the number of digits.

Example: If the "marks.txt" contents are as follows:
Harikaran:40,Atheeswaran:35,Dahrshini:30,Jahnavi:48

The output of the function should be:
Harikaran:40,Atheeswaran:35,Dahrshini:30,Jahnavi:48
('Total number of digits in the file:', 8)

Ans