SAINIK SCHOOL IMPHAL

SUMMER VACATION HOMEWORK: 2021-22

CLASS XII

HOLIDAY HOME WORK: FROM NCERT TEXT BOOK.

1. Chapter 01 : Question no. 11 to 18 Page no. 18.
2. Chapter 02 : Question no 01 to 12 Page no 40.
3. Project: Study of Canopy of Architecture of trees.
4. Project: To study of Dispersal of seeds by various agencies.

HOLODAY HOMEWORK

Subject: Chemistry Class-XII

1. Elucidate different forms of defects in crystals and its consequences on the density and electrical conductivity.
2. Prologue on preparation of different types of semiconductors and their role in our day today life.
3. Explain electrical properties of crystals. Write a report on what are the importance of these crystals in our day today life.
4. How would you explain Raoult's as special case of Heny's law with a suitable example.
5. Explain how calculation of molar mass of molecules of compounds can be done by measuring different colligative properties. In what way can errors in the calculation of molar mass be corrected with the help of vant-Hoff factor.
6. Explain how salinity of sea water can be removed to produce water for drinking purposes with the help of reversed osmosis?

Homework for Summer Vacation:

Subject: English Class: XII

1. Prepare a book review in an appropriate format, on the novel “A Farewell to Arms” by Earnest Hemingway.

   Following points are to be followed in the Book Review:

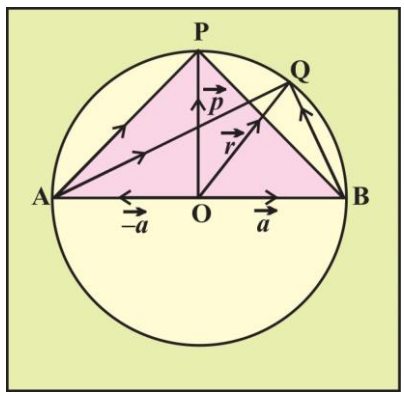
   a. Read the whole novel (not to finish in a single sitting)
   b. Write something about the Novelist and his achievements.
   c. Basic plot or summary (include brief quotes from the text)
   d. Discuss anything you liked and disliked about the book.
   e. Round up your views or evaluation.
   f. Mention some similar books.
   g. Give the book a star rating (1 being the lowest and 5 being the highest)
   h. Your recommendations.

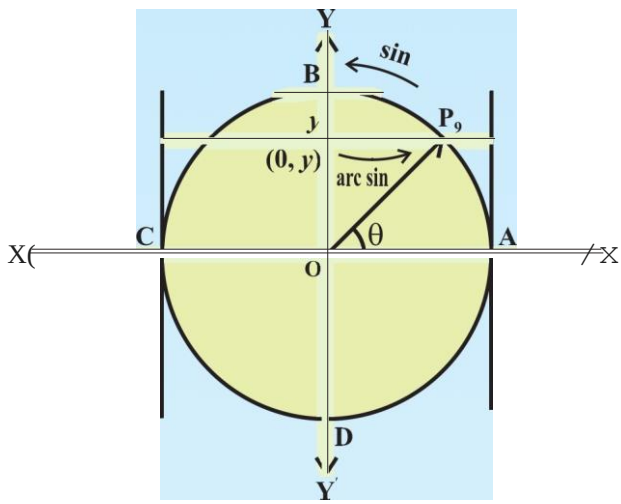
   (Books review is to be submitted as a separate assignment)

2. Two factual/case based passage with questions. (to be done in your homework copy)

   Cadets are advised to ensure the completion of above homework/assignment during the summer vacation and its submission at he same time of reporting back to school after the vacation.

Activities for
Class XII





Activity 1

OBJECTIVE

To verify that the relation R in the set L of all lines in a plane, defined by R = {(/, m) : /1 m) is symmetric but neither reflexive nor transitive.

MATERIAL REQUIRED

A piece of plywood, some pieces of wires (8), nails, white paper, glue etc.

THOD OF CONSTRUCTION

Take a piece of plywood and paste a white paper on it. Fix the wires randomly on the plywood with the help of nails such that some of them are parallel, some are perpendicular to each other and some are inclined as shown in Fig.1.

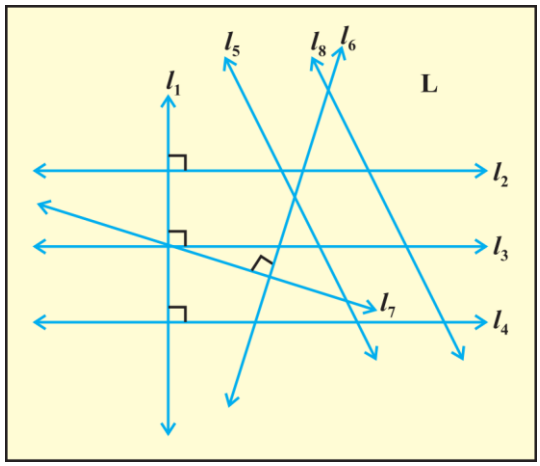


Fig. 1

DEMONSTRATION

1 Let the wires represent the lines /„ /$_2$, •••# g•

2 / is perpendicular to each of the lines /$_2$, /3, /$_4$. [see Fig. 1]

3 $/_6$ is perpendicular to $/_7$.

4 $/_2$ is parallel to $/_3$, $/_3$ is parallel to $/_4$ and lb is parallel to Jg•

5 • ('i' 'z)' ('i' '3)' ('1' '4)' ('6' '7) * R

OBSERVATION

1. In Fig. 1, no line is perpendicular to itself, so the relation R = ((/, m) : / 1 m)_____reflexive (is/is not).

2. In Fig. 1, /,1/ $_2$. Is $/_2$ 1 /, ? _____ (Yes/No)

(l_1, $\in l_2$) R $\Rightarrow$ (l_2, l_1) _____ R) /∈(∉

Similarly, $/_3$ 1 /, Is /, 1 $/_3$? _____ (Yes/No)

($/_3$' /,) e R m (/„ $/_3$)_____R)(∉ /∈

Also, $/_6$ 1 $/_7$. Is $/_7$ 1 $/_6$. _____ (Yes/No)

('$_6$' '7) H R (*$_7$' '6) _____ R) /∈(∉

The relation R .... symmetric (is/is not)

3. In Fig. 1, $/_2$ 1 /, and /,1 $/_3$. Is $/_2$ 1 $/_3$.....(Yes/No)

i.e., (* *!!)* z R and (/, , $/_3$) e R m (*$_2$ '3) _____ R (f /e)

The relation R .... transitive (is/is not).

PLICATION

This activity can be used to check whether a given relation is an equivalence relation or

ll Ot -

NOTE

1. In this case, the relation is not an equivalence relation.
2. The activity can be repeated by taking some more wire in different positions.

Activity 2

OBJECTIVE

To verify that the relation R in the set L of all lines in a plane, defined by R = {(/, m) : /ll m} is an equivalence relation.

MATERIAL REQUIRED

A piece of plywood, some pieces of wire (8), plywood, nails, white paper, glue.

THOD OF CONSTRUCTION

Take a piece of plywood of convenient size and paste a white paper on it. Fix the wires randomly on the plywood with the help of nails such that some of them are parallel, some are perpendicular to each other and some are inclined as shown in Fig. 2.

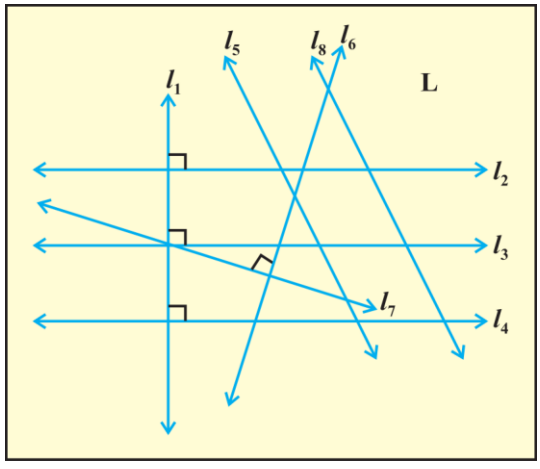


Fig. 2

DEMONSTRATION

1 Let the wires represent the lines /„ /$_2$, •••# g•

2 / is perpendicular to each of the lines /$_2$, /3, /$_4$ (see Fig. 2).

3 $/_6$ is perpendicular to $/_7$.

4 $/_2$ is parallel to /3, /3 is parallel to $/_4$ and $/_5$ is parallel to $/_8$.

5. (/ 2 3) 3, ' 4)' '5' '8)' e R

OBSERVATION

1. In Fig. 2, every line is parallel to itself. So the relation R = ((/, m) : / 11 m} ... reflexive relation (is/is not)

2. In Fig. 2, observe that $/_2$ | /3 . Is /3 ... $/_2$? (Y/ !l)

SO, 2' '3) R ('3' 'z) R ( )

Similarly, $/_3$ 1! lb. Is lb .../3? (,It/ 11)

SO, (/' lb) e R (lb, $/_3$) ... R

and (/5' /8) e R (/8, /5) ... R

)(∉/∈

The relation R ... symmetric relation (is/is not)

)(∉/∈

3. In Fig. 2, observe that $/_2$ 11 /3 and /3 11 $/_4$. Is $/_2$ ... $/_4$. (1! / !l)

So, (/2, /3) e R and (/3, lb) e R (/2, lb) ... R (e /r)

Similarly, /3 11 lb and lb 11 $/_2$. Is /3 ... $/_2$. (f/ !l)

So, (/3, lb) RQ (4' 'z) R ('3' 'z) R ( )

Thus, the relation R ... transitive relation (is/is not)

Hence, the relation R is reflexive, symmetric and transitive. So, R is an equivalence relation.

PLICATION

Norc

This activity is useful in understanding the concept of an equivalence relation.

This activity can be repeated by taking some more wires in different positions.

Activity 3

OBpC

To demonstrate a function which is not one-one but is onto.

TERIAL QUIRED

Cardboard, nails, strings, adhesive and plastic strips.

THOD OF CONSTRUCTION

1. Paste a plastic strip on the left hand side of the cardboard and fix three nails on it as shown in the Fig.3.1. Name the nails on the strip as 1, 2 and 3.
2. Paste another strip on the right hand side of the cardboard and fix two nails in the plastic strip as shown in Fig.3.2. Name the nails on the strip as a and *b.*
3. Join nails on the left strip to the nails on the right strip as shown in Fig. 3.3.

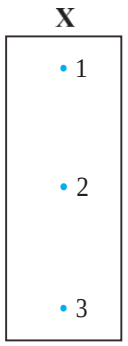


Fig. 3.1

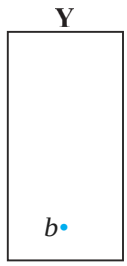


Fig. 3.2

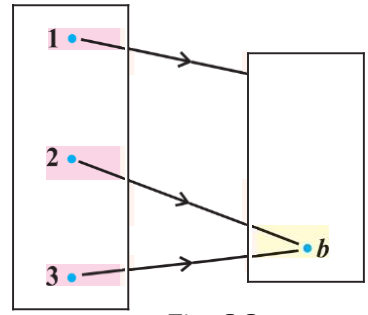


Fig. 3.3

DEMONSTRATION

1. Take the set X = (1, 2, 3)
2. Take the set Y = (a, *b)*
3. Join (correspondence) elements of X to the elements of Y as shown in Fig. 3.3

OBSERVATION

1. The image of the element 1 of X in Y is _____

   The image of the element 2 of X in Y is _____

The image of the element 3 of X in Y is _____

So, Fig. 3.3 represents a _____

2. Every element in X has a_____image in Y. So, the function is _____(one-one/not one-one).

3. The pre-image of each element of Y in X_____(exists/does not exist). So, the function is_____(onto/not onto).

A PLICATION

Norc

This activity can be used to demonstrate the concept of one-one and onto function.

Demonstrate the same activity by changing the number of the elements of the sets X and Y.

Activity 4

OBpC

To demonstrate a function which is one-one but not onto.

TERIAL QlMRED

Cardboard, nails, strings, adhesive and plastic strips.

THOD OF CONSTRUCTION

1. Paste a plastic strip on the left hand side of the cardboard and fix two nails in it as shown in the Fig. 4.1. Name the nails as a and *b*.
2. Paste another strip on the right hand side of the cardboard and fix three nails on it as shown in the Fig. 4.2. Name the nails on the right strip as 1, 2 and 3.
3. Join nails on the left strip to the nails on the right strip as shown in the Fig. 4.3.

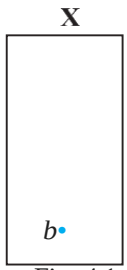


Fig. 4.1

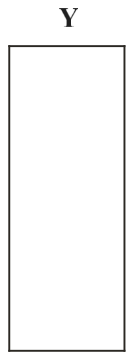


Fig. 4.2

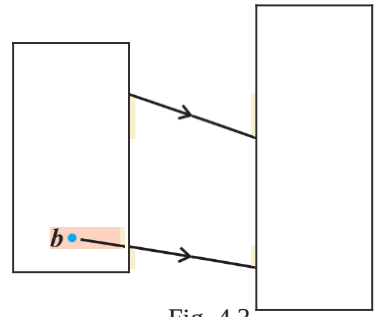


Fig. 4.3

DEMONSTRATION

1. Take the set X = (a, *b)*
2. Take the set Y = (1, 2, 3).
3. Join elements of X to the elements of Y as shown in Fig. 4.3.

OBSERVATION

1. The image of the element *a* of X in Y is _____

   The image of the element *b* of X in Y is _____

   So, the Fig. 4.3 represents a _____

2. Every element in X has a_____image in Y. So, the function is _____(one-one/not one-one).

3. The pre-image of the element 1 of Y in X_____(exists/does not exist). So, the function is_____(onto/not onto).

   Thus, Fig. 4.3 represents a function which is_____but not onto.

PLICATION

This activity can be used to demonstrate the concept of one-one but not onto function.

6.	$\lvert\Delta x_6\rvert =$	$\lvert\Delta y_6\rvert =$
7.	$\lvert\Delta x_7\rvert =$	$\lvert\Delta y_7\rvert =$
8.	$\lvert\Delta x_8\rvert =$	$\lvert\Delta y_8\rvert =$
9.	$\lvert\Delta x_9\rvert =$	$\lvert\Delta y_9\rvert =$
10.		

2. So, Ay becomes_____when becomes smaller.

3. Thus $\lim_{Ar \to r0} Ay = 0$ for a continuous function.

PLICATION

This activity is helpful in explaining the concept of derivative (left hand or right hand) at any point on the curve corresponding to a function.

SAINIK SCHOOL IMPHAL
NDA ASSIGNMENT
PHYSICS PORTION

51. In an experiment to verify ohm's law, a conductor of resistance R is taken. During the experiment, temperature of the conductor is increases with the flow of current. Resistance of the conductor

(a) remains the same (b) decreases
(c) increases (d) first increases and then decreases.

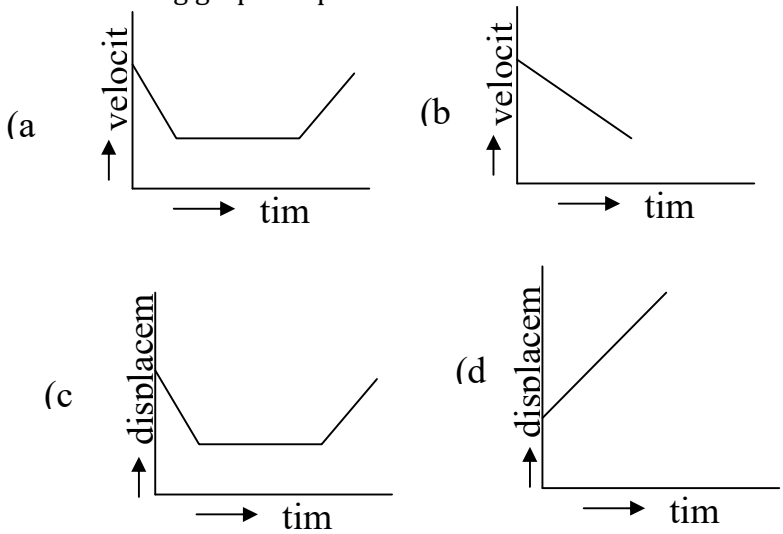
52. The force experienced by a unit positive test charge placed at a point is called(a) (a) Magnetic field at that point (b) Gravitational field at that point
(c) Electrical field at that point (d) Nuclear field at that point

53. Energy released during nuclear fission and fusion reactions is due to
(a) chemical reaction (b) the conversion of electrical energy
(c) the conversion of gravitational energy. (d) the conversion of mass into energy.

54. A body is thrown vertically upwards and then falls back on the ground. Its potential energy is maximum
(a) on the ground (b) at the maximum height
(c) during the return journey (d) both on the ground and at the maximum height

55. When a force of 1N acts on a mass of 1 kg that is able to move freely, the object moves with a
(a) speed of 1 ms^{-1} (b) speed of 1 km/s
(c) acceleration of 1 ms^{-2} (d) acceleration of 10 ms^{-2}.

56. Which one of the following graphs represents uniform motion?



57. While doing an experiment to find the relationship between the weight of a rectangular wooden block lying on a horizontal table and the minimum force required to just move it using a spring balance, it is observed that:
(a) more inertia more force (b) less inertia less force
(c) less inertia more force (d) inertia and force are not related to each other.

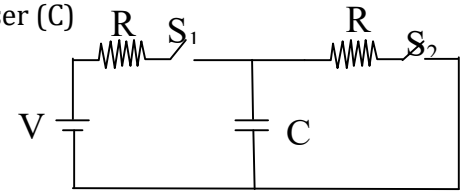
58. At the time of short circuit, the current in the circuit
(a) reduces substantially (b) does not change
(c) increases heavily (d) vary with time.

59. A student finds the writing on the black board as blurred and unclear while sitting on the last desk of a class room. However, he sees clearly when sitting on the front desk. The student suffers from a vision defect known as,
(a) Hypermetropia (b) Myopia (c) Presbyopia (d) Astignatism

60. An electric iron of resistance 20 Ω takes a current of 5 A. The heat developed in joules in 30 s is
(a) 5 kJ (b) 10 kJ (c) 15 kJ (d) 20 KJ

61. Consider the following statements:
A body weighs less at the equator than at the poles because
1. earth rotates about its axis.
2. the ice cap at the poles increases gravitational pull.
3. equatorial diameter is greater than the polar diameter.
4. of some unknown facts.
Which of the statements given above is/are correct?
(a) 1 and 2 (b) 3 only (c) 1 and 3 (d) 4 only

62. In the circuit shown, when does the condenser (C) get fully charged to V volts?
(a) Both S_2 and S_2 are closed
(b) Both S_1 and S_2 are opened
(c) $S_1$is closed but S_2 is opened
(d) S_1 is opened but S_2 is closed



63. A girl standing in front of a magic mirror finds that the image of her head bigger, the middle portion of her body of the same size and that of the legs smaller. The order of combinations for the magic mirror from top is:
(a) convex, plane and concave (b) Plane, convex and concave
(c) Concave, Plane and convex (d) convex, concave and plane.

64. A vessel contains oil density ρ_1 over a liquid of density ρ_2; a homogeneous sphere of volume V floats with half of its volume immersed in the liquid and the other half in oil. The weight of the sphere is

(a) $V(\rho_2 - \rho_1)/2$ (b) $V(\rho_2 + \rho_1)g/2$ (c) $V(\rho_2 + \rho_1)g$ (d) $V(\rho_2 + \rho_1)/2$

65. When a heavy body sinks in a liquid the weight of the body is:
(a) more than the volume of the body (b) less than the volume of the body
(c) less than the buoyant force (d) More than the buoyant force.

66. A stationery charge produces
(a) a magnetic field only (b) an electric field only
(c) electric field and magnetic field both. (d) none of the above.

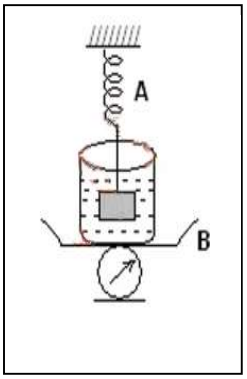
67. The effective resistance of three equal resistances, each of resistance r, connected in parallel, is

(a) 3/r (b) r/3 (c) 3r (d) r^3

68. A hollow sphere of radius 50 cm is charged such that the potential on its surface is 500 V. What is the potential at the centre of sphere?
(a) 0 (b) 10 V (c) 200 V (d) 500 V

69. The density of cast iron having specific gravity 7.20 is
(a) 7.20 kg/m^3 (b) 720 kg/m^3 (c) 72 kg/m^3 (d) 7200 kg/m^3

70. The spring balance A reads 2 kg with a block m suspended from it. A balance B reads 5 kg when a beaker with liquid is put on the pan of the balance. The two balances are now so arranged that the hanging mass is inside the liquid in the beaker as shown in the figure.
In this situation
(a) the balance A will read more than 2 kg
(b) the balance B will read more than 5 kg
(c) the balance A will read less than 2 kg and B will read more than 5 kg
(d) the balance A and B will read 2 kg and 5 kg respectively



71. When water is heated from O°C to 20°C, how does its volume change?
(a) It shall increase (b) It shall decrease
(c) It shall first increase and then decrease (d) It shall first decrease and then increase

72. Consider the following statements?
1. The gravitational force exerted by the sun on the moon is greater than the gravitational force exerted by the earth on the moon.
2. A heavy body falls at a faster rate than a light body in vacuum.
Which of the statements given above is/are correct?
(a) 1 only (b) 2 only (c) Both 1 and 2 (d) neither 1 nor 2

73. What would be the power of the engine which supplies 18 kJ of energy per minute?
(a) 200 W (b) 250 W (c) 300 W (d) 1080 W

74 In vacuum, the speed of light
(a) depends on its wavelength
(b) depends on its frequency
(c) depends on its intensity
(d) neither depends on its wavelength, frequency nor intensity

75. Net charge in a current-carrying conductor is
(a) always positive (b) always negative
(c) zero (d) either positive or negative

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HOLIDAY HOMEWORK: VACATION TASK (2021-22)

1. BASIC PROPERTIES OF CHARGE

Q1. Name any two basic properties of electric charge. (1)

Q2. Is it possible for particle to carry a charge of + 2.4×10-19 C? Justify your answer. (1)

2. COULOMB'S FORCE

Q3. Two point charges q_1 and q_2 are placed close to each other what is the nature of force between them when (i) $q_1q_2 < 0$ (ii) $q_1q_2 > 0$ (1)

Q4. How does the coulomb force between two point charges depend upon the dielectric constant of the intervening medium? (1)

Q5. Force of attraction between to point charges placed at distance 'd' apart in a medium is 'F'. What should be the distance apart in the same medium so that the force of attraction between them becomes 9 F? (2)

Q6. A charge q is placed at the centre of the line joining the two equal charges Q. Show that the system of three charges will be in equilibrium, if q = - Q/4. (2)

Q7. Plot a graph showing the variation of coulomb force (F) versus $\left(\frac{1}{r^2}\right)$ where r is the distance between the two charges of each pair of charges: (1 μC, 2 μC) and (2 μC, – 3 μC). Interpret the graphs obtained. (2)

Q8. Two similar and equally charged identical metal spheres A and B repel each other with a force of 2×10^{-5} N. A third identical uncharged sphere C is touched with A and then placed at the midpoint between A and B. Calculate the net electric force on C. (2)

Q9. Two similar charges 'Q' and '4Q' are separated by a distance 'r' in vacuum. Find the point on the line joining the charges where should a third charge 'q' be placed so that this system of charges is in equilibrium? Find the magnitude and nature of the third charge. (3)

Q Exercise 1.2; 1.4;1.12;1.13

Q Example 1.5, 1.6 and 1.7

ELECTRIC FIELD

Q10. The electric field E due to a point charge at any point near it is defined as $E = \lim_{q_0 \to 0} \frac{F}{q_0}$ where q_0 is the test charge and F is the force acting on it. What is the physical significance of limit in this expression? Draw the electric filed lines of a point charge Q when (i) Q > 0 and (ii) Q < 0 . (2)

Q11. In an electric field an electron is kept freely. If the electron is replaced by a proton, what will be the relation between the forces experienced by them? (1)

Q12. Two point charges of $+5\times10^{-19}$ C and $+20\times10^{-19}$ C are separated by a distance of 2 m. Find the point on the line joining them at which electric field intensity is zero. (2)

Example 1.9

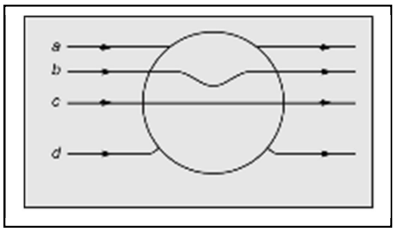
Exercise 1.8

ELECTRIC FIELD LINE

Q13. Properties of electric field lines. (3)

Q14. Diagrams for electric filed lines for system of charges. (3)

Q15. A metallic sphere is placed in a uniform electric field as shown in the figure.



Which path is followed by electric field lines and why? (1)

Q. Exercise 1.26

ELECTRIC DIPOLE

Q16. Define electric dipole moment. Write its S.I. unit. Is it a scalar or a vector quantity? (1)

Q17. Derive the expression for the electric field of a dipole at a point on the equatorial plane/line [or axial] of the dipole. Draw a graph of E versus r for $r >> a$. (3)

Q18. Show mathematically that the electric field intensity due to a short dipole at a distance'd' along its axis is twice the intensity at the same distance along the equatorial axis. (2)

Q. Examle 1.10; exercise 1.9

DIPOLE PLACED IN A UNIFORM ELECRTIC FIELD

Q19. An electric dipole is held in a uniform electric field.
(i) Using suitable diagram, show that it does not undergo any translatory motion, and
(ii) derive an expression for the torque acting on it and specify its direction. (3)

ELECTRIC FIELD AND GAUSS' THEOREM;

Q20. What is electric flux? Write its S. I. Units. (1)

Q21. State Gauss' theorem.
(i) Using Gauss's theorem, deduce an expression for the electric field at a point due to a uniformly charged infinite plane sheet. (3)
(ii) Use this law to derive an expression for the electric field due to an infinitely long straight wire of linear charge density λ Cm^{-1}. (2)

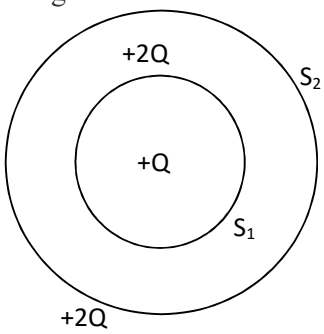
(ii) Use this law to derive an expression for the electric field due to two charged sheets
[likely charged / unlikely charged] (2)

Q.22.Using Gauss's law obtain the expression for the electric field due to a uniform charged thin spherical shell of radius R at a point outside the shell. Draw a graph showing the

(i) Show mathematically that for any point outside the shell is same as if the entire charge of the shell is concentrated at the centre. (2)

(ii) Why do you expect the electric field inside the shell to be zero according to this theorem? (1)

Q.23 S_1 and S_2 are two hollow concentric spheres enclosing charges Q and 2Q respectively as shown in the fig.



(i) What is the ratio of electric flux through S_1 and S_2?

(ii) How will the electric flux through the sphere S_1 change, if a medium of dielectric constant 5 is introduced in the space inside S_1 in placed of air? (2)

Q. Example 1.11 and 1.12

Q. Exercise 1.15, 1.17; 1.18