S.H.I.P.S.

[A Premier Institution

Home Assignment

2024-25

Grade-XI-Science

Name: ____

Section: _________ Roll. No. ___________________

Note:

1. **Assignment Marks will be added in the Terminal Assessment.**
2. **Parents are required to let their child do his/her assignments on his/her own.**
3. **Use loose sheets if required to perform the task.**
4. **Best Assignment of the year will be recognised.**

'Summer Vacation weaves a magic wand over the little world of our kids, everything softer and more beautiful.'

So, Hello Summer!!

The seven Golden Commandments for an exemplary Summer Vacation [to be followed by Parents Ward Duo].

a) What about Dining Together? A family that dines together, stays happy forever.
Feasting together with your ward atleast twice a day will strengthen bonds between you and your ward. They will share with you their innermost desires, once you start this process.

b) Teaching them Dignity of Labour: Asking your ward to engage in household chores like cleaning their dishes after meals, assisting maids and house servants, or gardeners or assisting you in cooking and serving food.

c) Visit to Orphanages: Instead of visiting malls, which promotes pseudo culture, allow your kids to visit orphanages so that they connect with the lesser fortunate, learn about their plight. Only by seeing the downtrodden, first hand, can they develop 'Empathy'.

d) Kinship with Mother Nature:- In order to develop affinity and accordance with nature, let the kids work in their kitchen garden, let them plant a sapling or a seed in medium sized pot on the first day of summer break. Ask them to nurture it throughout the holiday and to carry to school with their name tags on 11 July, 2018. This sapling will be nurtured by your ward in the school for the next few years. This way they will learn the value of 'caring' and also appreciate all that you do for them.

e) Shun the Indoor Era: Let them gel with rustic, invigorating natural environment. Let them steer clear of indoor culture which has made them slothful. Let them get dirty, let them bask in natural sunshine, prohibit air conditioners for them.
As Emerson said, "Live in the sunshine, swim the sea, drink the wild air."
Let your kids be adventurous, wild. Let them be REAL KIDS FOR A CHANGE.

f) Sow in them seeds of Philanthropy and Good Humanitarianism: Allow them to donate their old, unused stuff to the needy. Teach them to be generous. Let them donate with their own hands, their discarded clothes, stationery, bags, books, bottles, tiffin boxes etc.

So Dear Parents,

LET HOLIDAY MODE BE ACTIVATED

Holidays are a perfect time to reflect on our blessings and seek out ways to make life better for those around us.

May Your Days be Merry and Bright

Hope You Enjoy a Blissful Bonding with Your Ward.

LET THE MEMORIES OF HOLIDAYS LAST FOREVER

S.H.I.P.S.
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ENGLISH

SUMMER HOLIDAYS HOMEWORK

CLASS XI JUNE , 2024 – 2025

English Language and Literature (Code No. 184) CBSE

1. Writing Skills : NOTE MAKING

2. Grammar : Modals

3. PROJECT ON KHUSHWANT SINGH (20 MARKS)

NOTE MAKING

A. Read the following passage.

1. How does television affect our lives? It can be very helpful to people who carefully choose the shows that they watch. Television can increase our knowledge of the outside world; there are high quality programmes that help us understand many fields of study, science, medicine, the different arts and so on. Moreover, television benefits very old people, who can't leave the house, as well as patients in hospitals. It also offers non-native speakers the advantage of daily informal language practice. They can increase their vocabulary and practice listening.

2. On the other hand, there are several serious disadvantages of television. Of course, it provides us with a pleasant way to relax and spend our free time, but in some countries people watch television for an average of six hours or more a day. Many children stare at the TV screen for more hours a day than they spend on anything else, including studying and sleeping. It's clear that TV has a powerful influence on their lives and that its influence is often negative.

3. Recent studies show that after only thirty seconds of television viewing, a person's brain 'relaxes' the same way that it does just before the person falls asleep. Another effect of television on the human brain is that it seems to cause poor concentration. Children who view a lot of television can often concentrate on a subject for only fifteen to twenty minutes. They can pay attention only for the amount of time between commercials.

4. Another disadvantage is that television often causes people to become dissatisfied with their own lives. Real life does not seem so exciting to these people. To many people, television becomes more real than reality and

their own lives seem boring. Also many people get upset or depressed when they can't solve problems in real life as quickly as television actors seem to.

5. Before a child is fourteen years old, he or she views eleven thousand murders on the TV. He or she begins to believe that there is nothing strange about fights, killings and other kinds of violence. Many studies show that people become more violent after viewing certain programmes. They may even do the things that they see in a violent show.

(a) One the basis of your reading of the above passage, make notes on it using headings and subheadings. Use recognizable abbreviations (minimum four) and a format you consider suitable. Supply a suitable title to it. (5)
(b) Make a summary of the above passage in about 80 words.

EXERCISE 1

Fill in the blanks with 'can' or 'could':

1. **……………………. you prepare a cup of tea for me, please?**
2. **She ……………………. not help to laugh at the joker.**
3. **We ……………………. execute your plan at once.**
4. **He said that he ……………………. walk twenty kms at a stretch.**
5. **A lame person ……………………. not walk.**
6. **……………………. you lift this box for me?**
7. **She ……………………. read without glasses till last year.**
8. **You ……………………. not see the principal now.**
9. **He worked hard but ……………………. not pass the examination.**
10. **She …………………….   play the piano when she was only eleven.**

EXERCISE 2

Fill in the blanks with May' or "Might':

1. **The news ……………………. not be true.**
2. **With a little more effort we ……………………. win this time.**
3. **The examinations ……………………. be postponed.**
4. **We ……………………. have gone if they had invited us to dinner.**
5. **With a little push, he ……………………. have got the job.**
6. **……………………. your future be bright!**
7. **You ……………………. not attend the meeting this evening.**
8. **He said that it ……………………. not rain.**
9. **She asked if she ……………………. see the director.**
10. **The sky is overcast. It …………………….rain at any time.**

EXERCISE 3

Use shall or will in the blanks in the following sentences:

1. **He ………………. leave this office at once. It is final.**
2. **I ………………. file a case of defamation against the paper.**
3. **We ………………. not allow this type of misrule to continue.**

4. **All traitors ………………. die.**
5. **How long ………………. you stay at Manali?**
6. **……………….you attend her farewell party?**
7. **……………….we be invited to her mango party?**
8. **She ………………. just sit and brood over her past life.**
9. **We ………………. not visit the Trade Fair tomorrow.**
10. **………………. we refresh ourselves with some coffee now?**

PROJECT ON SIR. KHUSHWANT SINGH

PUNJABI

ਸੁਝਾਏ ਗਏ ਪ੍ਰੋਜੈਕਟ (SUGGESTED PROJECTS)

1. ਸੱਭਿਆਚਾਰਕ ਗਤੀਵਿਧੀਆਂ (ਲੋਕ-ਨਾਚ, ਲੋਕ-ਗੀਤ, ਲੋਕ-ਬੋਲੀਆਂ)
2. ਪੁਸਤਕ ਸਮੀਖਿਆ
3. ਸਲੋਗਨ ਲੇਖਣ
4. ਪੇਂਡੂ ਅਤੇ ਸ਼ਹਿਰੀ ਜੀਵਨ
5. ਸਮਾਜਿਕ ਕੁਰੀਤੀਆਂ (ਦਾਜ, ਭਰੂਣ-ਹੱਤਿਆ, ਨਸ਼ੇ)
6. ਮਾਂ-ਬੋਲੀ (ਮਹਤੱਤਾ ਤੇ ਪ੍ਰਚਾਰ-ਪ੍ਰਸਾਰ)
7. ਪੰਜਾਬੀ ਪਹਿਰਾਵਾ
8. ਪੰਜਾਬੀ ਰਹਿਣ-ਸਹਿਣ
9. ਪੰਜਾਬੀ ਹਾਰ-ਸ਼ਿੰਗਾਰ
10. ਵਿਰਾਸਤੀ ਖੇਡਾਂ
11. ਕਰੋਨਾ-ਕਾਲ ਸਮੇਂ ਮੇਲੇ ਤੇ ਤਿਉਹਾਰ
12. ਕਰੋਨਾ-ਕਾਲ ਸਮੇਂ ਵਿਆਹ ਤੇ ਹੋਰ ਸਮਾਗਮ

PHYSICAL EDUCATION

Q1.What examples of fair play in sports?
Q2. What is the concept of Olympism?
Q3. What is The Aimof KHELO INDIA program ?
Q4.Describe the Olympic educational value and significance.
Q5. What do you understand the meaning of Physical education.
Q6. Write in brief any five schemes which are working for the development of physical education and sports.
Q7. Define career options in physical education.
Q8. Explain in details about changing trends in technological advancement
Q.9Write In details about changing trends in wearable Gears.
Q10..What do you understand by technological advancement?
Q11.Write about Fit India.
Q12..Describe one of the Olympic core value?
Q.13. what are the difference between ancient and modern Olympics?
Q.14. Describe in detail about Modern Olympics.
15.What roles can be pursued in Sports administration in India?

PRACTICAL -1

Age group 5-8 years

BMI test

AGE GROUP 9-18 YEARS
Partial curl ups for abdominal strength
Push-ups for Boys and modify push-ups for girls to check upper body strength
Sit and reach test for lower body flexibility
50 m. race to check speed
600 m. run/walk for cardio vascular endurance

PROJECT FILE

YOGA as prevention for life style diseases
OBESITY
ASTHMA
HYPERTENTION
DIABETES
BACK PAIN

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BACK PAIN

~~Q.16~~

CHAPTER - 1

SETS AND FUNCTIONS

KEY POINTS

- Definition of Set : Set is well defined collection of objects.
- Objects in Set are called elements of Set.
- Elements are said to be 'belong to' set.

  Example: A = {a, b, c, d} is a Set and a, b, c, d are element of Set A

  Here a, b, c, d belongs to A or a, b, c, d $\in$ A

- Representation of Sets:

  (a) Roster or Tabular form

  e.g.: Set Natural Numbers less than 5 = {1, 2, 3, 4}

  (b) Set-builder form

  e.g.: Set of Natural Numbers less than 5 = $\{x : x \in N, x < 5\}$

- **Types of sets:**

  (a) Empty /Null/Void Set: Set which does not contain any element. It is denotd by ϕ or { }

  (b) Finite set : Set having finite number of elements

  (c) Infinite set: Set having infinite number of elements

  (d) Singleton set : Set having only one element

- Cardinal number of finite set: Number of distinct elements of set. It is denoted by n(A).
- Equivalent sets: Two or more finite sets having same number of elements or same cardinal number.

- Subset: A set A is said to be subset of a set B iff $a \in A \Rightarrow a \in B$.

  $\forall a \in A$

  We write it as $A \subseteq B$.

  Note: ϕ and A itself are always subsets of set A.
- Super set: If $A \subseteq B$ then B is superset of A.
- Proper subset : If $A \subseteq B$, but $A \neq B$ then A is proper subset of B.

  We write it as $A \subset B$.
- Number of subsets of a set A= $2^{n(A)}$
- Number of proper subsets of a Set A = $2^{n(A)} - 1$
- **Equal sets:** Two or more sets having exactly same elements.

  $A = B \Leftrightarrow A \subseteq B$ and $B \subseteq A$.

- **Power set:** The collection of all subsets of a set A.It is denoted by P(A)

  $P(A) = \{X: X \subseteq A\}$

  $n[P(A)] = 2^{n(A)}$

- **Types of Intervals**

  (a) Open Interval $(a, b) = \{ x \in R : a < x < b \}$

  (b) Closed Interval $[a, b] = \{ x \in R : a \leq x \leq b \}$

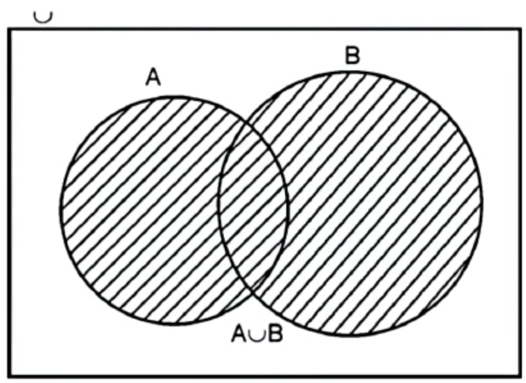
  (c) Semi open or Semi closed Interval,

  $(a,b] = \{ x \in R : a < x \leq b\}$

  $[a,b) = \{ x \in R : a \leq x < b\}$
- Venn diagram and operations on sets

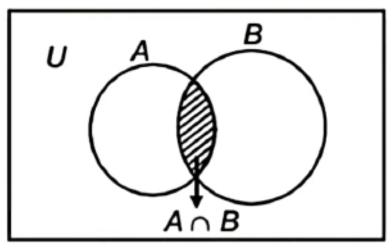
  (a) Union of two sets A and B :

  $A \cup B = \{ x : x \in A \text{ or } x \in B \}$

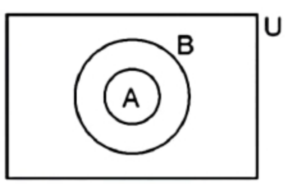


(b) Intersection of two sets A and B :

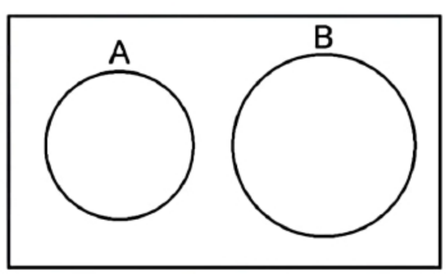
$A \cap B = \{ x : x \in A \text{ and } x \in B\}$



- Subset and superset: $A \subset B$

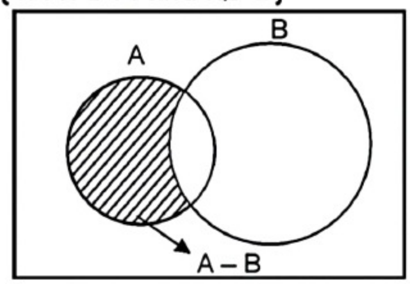


- Disjoint sets: Two sets A and B are said to be disjoint if $A \cap B = \phi$



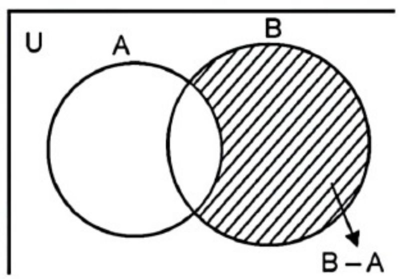
(c) Difference of sets A and B is,

$A - B = \{x : x \in A \text{ and } x \notin B\}$



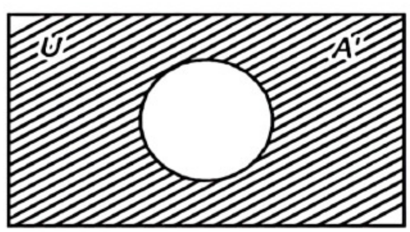
(d) Difference of sets B and A is,

$B - A = \{x : x \in B \text{ and } x \notin A\}$



(e) Complement of a set A, denoted by A′ or A^c

$A' = A^c = U - A = \{x : x \in U \text{ and } x \notin A\}$



- Properties of complement of sets :

1. Complement laws

   (i) $A \cup A' = U$ (ii) $A \cap A' = \phi$ (iii) $(A')' = A$

2. De Morgan's Laws

   (i) $(A \cup B)' = A' \cap B'$ (ii) $(A \cap B)' = A' \cup B'$

   Note **:** This law can be extended to any number of sets.

3. $\phi' = \bigcup$ and $\bigcup' = \phi$

4. If $A \subset B$ then $B' \subset A'$

- Laws of Algebra of sets

(i) $A \cup \phi = A$

(ii) $A \cap \phi = \phi$

- $A - B = A \cap B' = A - (A \cap B)$
- Commutative Laws :–

(i) $A \cup B = B \cup A$ (ii) $A \cap B = B \cap A$

- Associative Laws :–

(i) $(A \cup B) \cup C = A \cup (B \cup C)$

(ii) $(A \cap B) \cap C = A \cap (B \cap C)$

- Distributive Laws :–

(i) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

(ii) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

- If $A \subset B$, then $A \cap B = A$ and $A \cup B = B$
- $n(A \cup B) + (A \cap B) = n(A) + n(B)$
- If A and B are disjoint, then $n(A \cup B) = n(A) + n(B)$
- $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(A \cap C) + n(A \cap B \cap C)$

SETS

Introduction

A set is collection of well-defined distinguised objects. The sets are usually denoted by capital letters A, B, C etc., and the members or elements of the set are denoted by lower case letters a, b, c etc., if x is a member of the set A, we write $x \in A$ (read as 'x' belongs to A) and if x is not a member of set A, we write $x \in A$(read as 'x' doesn't belongs to A). if x and y both belong to A, we write $x, y \in A$.

Some examples of sets are: A: odd number less then 10

N: the set of all rational numbers

B: the vowels in the English alphabates

Q: the set of all rational numbers.

Cardinal Number

The number of elements in a finite set is represented by n (A), known as cardinal number.

Eg.: A = {a, b, c, d, e} Then, n(A) = 5

Subset

Let A and B be two sels. if every element of A is an element of B,then A is called a subset of B and written as $A \subset B$ or $B \supset$ (read as 'A' is contained in 'B' or 'B contains A'). is called superset of A.

Note:

1. Every set is a subset and superset of itself.
2. If A is not a subset of B, we write $A \not\subset B$.
3. The empty set is the subset of every set.
4. If A is a set with n(A) = m, then no. of element A are 2^n and the number of proper subsets of A are $2^n - 1$

Eg. Let A = {3,4}, then subsets of A are ϕ, {3}, {4}, {3, 4}. Here, n(A) = 2 and number of subsets of A = $2^2 = 4$.

Rerpresentation of sets

Set Builder Form Or Rule Method

In this form, we write a variable (say x) representing any member of the set followed by property satisfied by each member of the set.

e.g.: The set A of all prime number less than 10 in set builder from is written as

A = {x | x is a prime number less than 10}

the symbol "|" stands for the word "such that", sometimes, we use symbol ":" in place of symbol "|"

Roster Or Tambular Form

In this form, we first list all the members of the set within braces (curly brackets) and seprate these by commas.

E.g. The set of all natural number less than 10 in this form is written as: A = {1,3,5,7,9}

In roaster from, every element of sets is listed only once.

The order in which the elements are listed is immaterial.

E.g. Each of the following sets denotes the same set {1, 2, 3}, {3, 2, 1},{1, 3, 2}

Types Of Sets

Empty Set Or Null Set

A set which has no element is called null set. It is denoted by symbol ϕ or { }.

E.g: Set of all real number whose squre is –1.

In set-builder formL: {x:x is a real number whose squre is –1}

in roaster from: {} or ϕ

Finite And Infinite Set

A set which has finite number of element is called a finite set. Otherwise, it is called an infinite set.

E.g.: The set of all days in a week is a finite set where as the set of all integers, denoted by

{......–2, –1, 0, 1, 2,......} or {x | x is an integer} is an infinite set.

An empty set ϕ which has no element is a finite set A is called empty or void or null set.

Equal Set

Two sets A and B are set to be equal, written as A = B, if every element of A is in B and every element of B is in A.

e.g.: (i) A = {1, 2, 3, 4} and B {3, 1, 4, 2} then A= B

(ii) A = {x: x –5 =0} and B = {x: x is an intergral positive root Then A = B.

Singleton Set

A set having one element is called singleton set.

e.g.: (i) {0} is a singleton set, whose only member is 0.

(ii) A = {x: 1<x <3, x is a natural number} is a singleton set which has only one member which is 2.

Equivalent Set

Two finite sets A and B are said to be equivalent, if = n(A) = n(B), Clearly, equal set are equivalent but equivalent set need not to be equal.

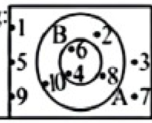
e.x. The sets A = {4, 5, 3, 2} and B = {1, 6, 8, 9} are equiva lent, but are not equal.

SETS

Venn Diagram

A Vann diagram is an illustration of the relationships between and among sets, groups of objects that share something common these diagrams consist of rectangle and closed curves usually circles

Eg:



In the given venn diagram $U = \{1,2,3,.....10\}$ universe set of which $A = \{2,4,6,8,10\}$ and $B = \{4,6\}$ are subsets and also $B \subset A$

Algebra of sets / Operations On Sets

1. For any set A, we have
   (a) $A \cup A = A$, (b) $A \cap A = A$, (c) $A \cup \phi = A$, (d) $A \cap \phi = \phi$, (e) $A \cup U = U$, (f) $A \cap \underline{U} = A$, (g) $A - \phi = A$, (h) $A - A = \phi$,
2. For any two sets A and B we have
   (a) $A \cup B = B \cup A$, (b) $A \cap B = B \cap A$, (c) $A - B \subseteq A$, (d) $B - A \subseteq B = U$
3. For any two sets A and B we have
   (a) $A \cup (B \cup C) = (A \cup B) \cup C$, (b) $A \cap (B \cap C) = (A \cap B) \cap C$
   (c) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$, (d) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
   (e) $A - (B \cup C) = (A - B) \cap (A - C)$, (f) $A - (B \cap C) = (A - B) \cup (A - C)$

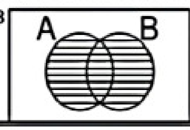
Union

The union of two sets A and B, written as $A \cup B$ (read as A union B) is the set of all elements which are either in A or in B in both.

Thus, $A \cup B = \{x : x \in A \text{ or } x \in B\}$

clearly, $x \in A \cup B \Rightarrow x \in A$ or $x \in B$ and $x \in A \cup B \Rightarrow x \in A$ and $x \in B$

$A \cup B$



eg: If $A = \{a, b, c, d\}$ and $B = \{c, d, e, f\}$ then $A \cup B = \{a, b, c, d, e, f\}$

Intersection

The intersection of two sets A and B, written as $A \cap B$ (read as 'A' intersection 'B') is the set consisting of all the common elements of A and B.

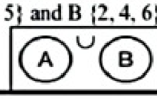
Thus, $A \cap B \Rightarrow \{x : x \in A \text{ And } x \in B\}$

Clearly, $x \in A \cap B \Rightarrow \{x \in A \text{ And } x \in B\}$ and $x \in A \cap B \Rightarrow \{x \in A \text{ or } x \in B\}$.

Eg: If $A = \{a,b,c,d\}$ and $B = \{c,d,e,f\}$ Then $A \cap B = \{c,d\}$

Disjoint Sets

Two sets A and B are said to be disjoint, if $A \cap B = \phi$ i.e, A and B have no common element. e.g: it $A = \{1, 3, 5\}$ and $B \{2, 4, 6\}$ Then, $A \cap B = \phi$, so A and B are disjoint.



Universal Set

The set containing all objects of element and of which all other sets are subsets is known as universal sets and denoted by U.

E.g: For the set of all intergers, the universal set can be the set of rational numbers or the set R of real numbers

Power Set

The set of all subset of a given set A is called power set of A and denoted by P(A).

Eg: If $A = (1,2,3,)$, then $P(A)\} \{\phi\}, \{1\}, \{2\}, \{3\}, \{1,2\}, \{1,3\}, \{2,3\}, \{1,2,3\}$

Clearly, if A has n elements, then its power set P (A) contains exactly 2^n elements.

Difference Of Sets

If A and B are two sets, then their difference A-B is defined as:

$A - B = \{x : x \in A \text{ and } x \in B\}$

Similarly, $B - A = \{x : x \in B \text{ and } x \in A\}$

Eg. If $A = (1,2,3,4,5,)$ and $B = \{1,3,5,7,9)$ then

$A - B = \{2,4\}$ and $B - A = \{7,9\}$

Symmeteric Defference

The symmetric diference of two sets A and B, denoted by $A \Delta B$, in defined as $(A \Delta B) = (A-B) \cup (B-A)$

Eg. If $A = \{1,2,3,4,5\}$ and $B = \{1,3,5,7,9\}$ then

$(A \Delta B) = (A-B) \cup (B-A)$
$= \{2, 4,\} \cup \{7,9\}$
$= \{2,4,7,9\}$

Compliment Of Set

If U is a universal set and A is a subset of U, then complement of A is the set which contains those elements of U, which are not present in A and is denoted by A' or A^c. Thus, $A^c = \{x : x \in U \text{ and } x \notin A\}$

e.g.: If U $\{1, 2, 3, 4,...\}$ and A $\{2, 4, 6, 8,...\}$ then AC $\{1,3,5,7,...\}$

Properties of complement

Complement law:
(1) $A \cup A' = U$ (ii) $A \cap A' = \phi$,
- De morgan's Law:
(i) $(A \cup B)' = A' \cap B'$ (ii) $(A \cap B)' = A' \cup B'$
- Double Complement law:
$(A')' = A$
- Law of empty set and universal set
$\phi' = U$ and $L = \phi$

Subsets Of A Sets Of Real Number 'R'

- The set of natural numbers $N = \{1, 2, 3, 4, 5, ---\}$
- The set of integers $Z = (...-3, -2, -1, 0, 1, 2, 3, ---\}$
- The set of irrational numbers, $T = \{x : x \in R \text{ and } r \in Q\}$
- The set of rational number $Q = \{x : x = p, q \in Z \text{ and } q \neq 0\}$ P
- Relation among these subsets are $N \subset Z \subset Q, Q \subset R, T \subset R, N \not\subset T$

Interval Notation

Let a and b be real numbers with a < b

Set of Real Numbers	Interval Notation	Region on the real number line
• $\{x \mid a < x < b\}$	(a, b)	
• $\{x \mid a \le x < b\}$	[a, b)	
• $\{x \mid a < x \le b\}$	(a, b]	
• $\{x \mid a \le x \le b\}$	[a, b]	
• $\{x \mid x < b\}$	$(-\infty, b)$	
• $\{x \mid x \le b\}$	$[-\infty, b]$	
• $\{x \mid x > a\}$	(a, ∞)	
• $\{x \mid x \ge a\}$		
• R	$(-\infty, \infty)$	

VERY SHORT ANSWER TYPE QUESTIONS

Which of the following are sets? Justify your answer.

1. Write set $\left\{\frac{1}{2},\frac{2}{3},\frac{3}{4},...\frac{19}{20}\right\}$ in set builder form.

2. Write the set $\{x : x \in Z^+, x^2 < 4\}$ is Roster form.

   Let A = {1,3,5,7,9}. Insert the appropriate symbol $\in$ or $\notin$ in blank spaces: – (Question- 3,4)

3. (i) 2 _____ A (ii) {3} _____ A (iii) {3, 5} _____ A

4. Write the set $A = \{ x : x \text{ is an integer}, -1 \leq x < 4\}$ in roster form

5. Write the set B = {3,9,27,81} in set-builder form.

   Which of the following are empty sets? Justify. (Question- 6,7)

6. $A = \{ x : x \in N \text{ and } 3 < x < 4\}$

7. $B = \{ x : x \in N \text{ and } x^2 = x\}$

   Which of the following sets are finite or infinite? Justify. (Question-8, 9)

8. The set of all the points on the circumference of a circle.

9. $B = \{ x : x \in N$ and x is an even prime number}

10. Are sets $A = \{ -2,2\}$, $B = \{ x : x \in Z, x^2 - 4 = 0\}$ equal? Why?

11. Write (–5,9] in set-builder form

12. Write $\{x : x \in R, -3 \leq x < 7\}$ as interval.

13. If A = { 1,3,5}, how many elements has P(A)?

14. Write all the possible subsets of A = {5,6}.

    If A = Set of letters of the word 'DELHI' and B= the set of letters the words 'DOLL' find (Question- 15, 16, 17)

15. $A \cup B$

16. $A \cap B$

17. $A - B$

18. Describe the following sets in Roster form

    (i) The set of all letters in the word 'ARITHMETIC'.

    (ii) The set of all vowels in the word 'EQUATION'.

19. Write the set $A = \{x : x \in Z, x^2 < 25\}$ in roster form.

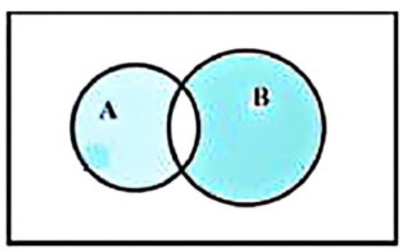
20. Write the set B = {x : x is a two digit number, such that the sum of its digits is 7}

SHORT ANSWER TYPE QUESTIONS

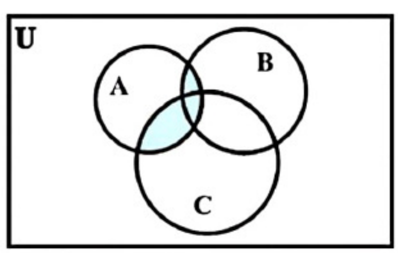
21. Are sets $A = \{1,2,3,4\}$, $B = \{x : x \in N \text{ and } 5 \leq x \leq 7\}$ disjoint? Justify?

What is represented by the shaded regions in each of the following Venn-diagrams? (Question 22, 23)

22.



23.



24. If A = { 1, 3, 5, 7, 11, 13, 15, 17}

B = { 2, 4, 6, 8 ... 18}, U = {1, 2, 3, ... 20}

Where U is universal set then find $A' \cup [(A \cup B) \cap B']$

25. Two sets A and B are such that

$n(A \cup B) = 21$, $n(A) = 10$, $n(B) = 15$, find $n(A \cap B)$ and $n(A - B)$

26. Let A = {1, 2, 4, 5} B = {2, 3, 5, 6} C = {4, 5, 6, 7} Verify the following identity

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

27. If U = { x : x ∈ N and x ≤ 10}

A = { x : x is prime and x ≤ 10}

B = { x : x is a factor of 24}

Verify the following result

(i) $A - B = A \cap B'$ (ii) $(A \cup B)' = A' \cap B'$ (iii) $(A \cap B)' = A' \cup B'$

28. For any sets A and B show that

(i) $(A \cap B) \cup (A - B) = A$ (ii) $A \cup (B - A) = A \cup B$

29. On the Real axis, if A=[0,3]and B=[2,6], then find the following

(i) A' (ii) $A \cup B$ (iii) $A \cap B$ (iv) $A - B$

30. In a survey of 450 people, it was found that 110 play cricket, 160 play tennis and 70 play both cricket as well as tennis. How many play neither cricket nor tennis?

31. In a group of students, 225 students know French, 100 know Spanish and 45 know both. Each student knows either French or Spanish. How many students are there in the group?

32. Two sets A and B are such that $n(A \cup B) = 21$, $n(A' \cap B') = 9$, $n(A \cap B) = 7$ find $n(A \cap B)'$.

LONG ANSWER TYPE QUESTIONS

33. In a group of 84 persons, each plays at least one game out of three viz. tennis, badminton and cricket. 28 of them play cricket, 40 play tennis and 48 play badminton. If 6 play both cricket and badminton and 4 play tennis and badminton and no one plays all the three games, find the number of persons who play cricket but not tennis.

34. Using properties of sets and their complements prove that

(i) $(A \cup B) \cap (A \cup B') = A$

(ii) $A - (A \cap B) = A - B$

(iii) $(A \cup B) - C = (A - C) \cup (B - C)$

(iv) $A - (B \cup C) = (A - B) \cap (A - C)$

(v) $A \cap (B - C) = (A \cap B) - (A \cap C)$.

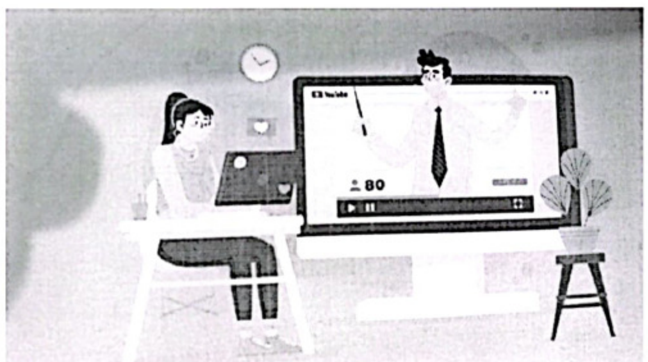
35. Two finite sets have m and n elements. The total number of subsets of first set is 56 more than the total number of subsets of the second set. Find the value of m and n.

36. A survey shows that 63% people watch news channel A whereas 76% people watch news channel B. If x% of people watch both news channels, then prove that $39 \le x \le 63$.

37. From 50 students taking examination in Mathematics, Physics and chemistry, each of the students has passed in at least one of the subject, 37 passes Mathematics, 24 Physics and 43Chemistry. At most 19 passed Mathematics and Physics, almost 29 Mathematics and chemistry and at most 20 Physics and chemistry. What is the largest possible number that could have passes in all the three subjects?

CASE STUDY TYPE QUESTIONS

38. In a survey of of 600 students of class XI, 150 are using YouTube videos and 225 are consulting books (other than text book) as a learning resource. 100 were using both YouTube videos and books as a learning resource.



i. How many students are using either books or YouTube videos as thelearning resource?

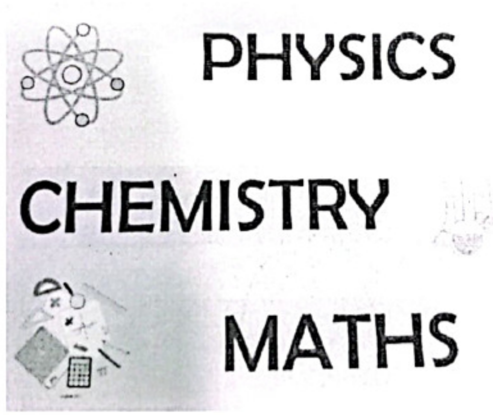
ii. How many students are neither using YouTube videos nor books asthe learning resource?

iii. How many students are using YouTube videos only as the learning resource?

iv. How many students are using books only as the learning resource?

v. What can be the maximum number of students who will use YouTube video or books as learning resources?

39. In a class 18 students took Physics, 23 students took Chemistry and 24 students took Mathematics.Of these 13 took both Chemistry and Mathematics, 12 took both physics and chemistry and 11 took both Physics and mathematics. If 6 students were offered all the three subjects, find:



i. The total number of students are

(a) 47 (b) 37 (c) 35 (d) 49

ii. How many took Mathematics but not Chemistry?

(a) 11 (b) 1 (c) 6 (d) 12

iii. How many took exactly one of the three subjects?

(a)12 (b) 11 (c) 13 (d) 1

iv. How many took exactly two of these subjects?

(a) 11 (b) 13 (c) 12 (d) 18

v. Number of students who took Physics or Mathematics but not Chemistry:

(a)12 (b) 13 (c) 11 (d) 18

40. In a town of 10,000 families, it was found that 40% families go to shop A for their home needs groceries, 20% families go to the shop B and 10% families go to shop C. 5% families go to shops A and B, 3% go to B and C and 4% families go to A and C. 2% families go to all the three shops A, Band C. Find:

i. The number of families which go to shop A only;

(a) 4000 (b) 3300 (c) 3700 (d) 4200

ii. The number of families which don't visit/purchase from any of A, B and C.

(a) 4000 (b) 7000 (c) 3300 (d) 6000

iii. The number of families which don't visit/purchase from any of A, B and C.

(a) 300 (b) 200 (c) 100 (d) 600

iv. The number of families that purchase from exactly one shop.

(a) 4700 (b) 4000 (c) 5200 (d) 3800

v. The number of families that buy from at least one of the shops A, B or C.

(a) 4000 (b) 6000 (c) 7000 (d) 1000

Multiple Choice Questions

41. In set builder method the null set is represented by

(a) $\{ \ \}$ (b) ϕ (c) $\{ x : x \neq x\}$ (d) $\{ x : x = x\}$.

42. If A and B are two given sets, then $A \cap (A \cap B)'$ is equal to

(a) A (b) B′ (c) ϕ (d) A – B.

43. If A and B are two sets such that $A \subset B$ then $A \cap B'$ is

(a) A (b) B′ (c) ϕ (d) $A \cap B$.

44. If $n(A \cup B) = 18$, $n(A - B) = 5$, $n(B - A) = 3$ then $n(A \cap B)$ is

(a) 18 (b) 10 (c) 15 (d) 12

45. For any two sets A and B, $A \cap (A \cup B)'$ is equal to

(a) A (b) B (c) ϕ (d) $A \cap B$

46. If n(A) = 5 and n(B) = 7, then maximum number of elements in $A \cup B$ is

(a) 7 (b) 5 (c) 12 (d) None of these

47. $n[P\{P(\phi)\}] =$

(a) 2 (b) 4 (c) 8 (d) 0

48. If A = {1, 2, 3, 4, 5}, then the number of proper subsets of A is

(a) 120 (b) 30 (c) 31 (d) 32

49. For any two sets A and B, $(A - B) \cap (B - A) =$

(a) $(A - B) \cup A$ (b) $(B - A) \cup B$

(c) $(A \cup B) - (A \cap B)$ (d) $(A \cup B) \cap (A \cap B)$

50. If X = $\{8^n - 7n - 1 : n \in N)$ and $y = \{49n - 49 : n \in N\}$, then

(a) $X \subset Y$ (b) $Y \subset X$

(d) X = Y (d) $X \cap Y = \phi$

51. Let n(U) = 700, n(A) = 200, n(B) = 300 and $n(A \cap B) = 100$, then $n(A^c \cap B^c) =$

(a) 400 (b) 600

(d) 300 (d) 200

52. If a set A has n elements, then the total number of subsets of A is

(a) n (b) n^2

(d) 2^n (d) 2n

53. The number of non-empty subsets of the set {1, 2, 3, 4} is

(a) 15 (b) 14

(d) 16 (d) 17

54. If A and B are two sets, then $A \cup B = A \cap B$ iff

(a) $A \subseteq B$ (b) $B \subseteq A$

(d) A = B (d) None of these

55. Let A and B be two sets. Then

(a) $A \cup B \subseteq A \cap B$ (b) $A \cap B \subseteq A \cup B$

(d) $A \cap B = A \cup B$ (d) None of these

56. If Q = $\left\{x : x = \frac{1}{y}, \text{where } y \in N\right\}$, then

(a) $0 \in Q$ (b) $1 \in Q$

(d) $2 \in Q$ (d) $\frac{2}{3} \in Q$

Directions: Each of these questions contains two statements, Assertion and Reason. Each of these questions also has four alternative choices, only one of which is the correct answer. You have to select one of the codes. (a), (b), (c) and (d) given below:

(a) Assertion is correct, reason is correct: reason is a correct explanation for assertion.
(b) Assertion is correct, reason is correct: reason is not a correct explanation for assertion.
(c) Assertion is correct, reason is incorrect.
(d) Assertion is incorrect, reason is correct.

57. **Assertion:** The number of non-empty subsets of the set {a, b, c, d} are 15.

Reason: Number of non-empty subsets of a set having n elements are $2^n - 1$.

58. Suppose A, B and C are three arbitrary sets and U is a universal set.

Assertion: If B = U – A, then n(B) = n(U) – n(A).

Reason: If C = A – B, then n(C) = n(A) – n(B).

59. **Assertion:** Let A = {1, {2, 3}}, then

P(A) = {{1}, {2, 3}, ϕ, {1, {2, 3}}}

Reason: Power set is set of all subsets of A.

60. **Assertion:**The subsets of the set {1, {2}} are { }, {1}, {{2}} and {1, {2}}.

Reason: The total number of proper subsets of a set containing n elements is $2^n - 1$.

ANSWERS

1. $\left\{x : x = \dfrac{n}{n+1}, n \in N, n \le 19\right\}$

2. {1}

3. (i) $\notin$ (ii) $\notin$ (iii) $\notin$

4. A = {–1, 0, 1, 2, 3}

5. B = { x : x = 3^n, n $\in$ N and 1 $\leq$ n $\leq$ 4}

6. Empty set because no natural number is lying between 3 and 4

7. Non-empty set because B = {1}

8. Infinite set because circle is a collection of infinite points whose distances from the centre is constant called radius.

9. Finite set because B = {2}

10. Yes, because $x^2 - 4 = 0 \Rightarrow$ □x = 2 or – 2 both are integers

11. {x : x $\in$ R, –5 < x $\leq$ 9}

12. [–3,7)

13. 2^3= 8

14. ϕ, {5}, {6}, {5,6}

15. A $\cup$ B = {D, E, L, H, I, O}

16. A $\cap$ B = {D, L}

17. A – B = {E, H, I}

18. (i) {A, R, I, T, H, M, E, C} (ii) {E, U, A, I, O}

19. { –4, –3, –2, –1, 0, 1, 2, 3, 4}

20. {16, 25, 34, 43, 52, 61, 70}

21. Yes, because A $\cap$ B = ϕ

22. (A – B) $\cup$(B – A) or A Δ B

23. A $\cap$(B $\cup$ C) [Hint: Find n(U)]

24. $\cup$ = {1, 2, 3, ... 20}

25. $n(A \cap B) = 4$, $n(A - B) = 6$

29. (i) $(-\infty, 0) \cup (3, \infty)$(ii) $[0, 6]$ (iii) $[2, 3]$ (iv) $[0, 2)$

30. **Hint:** U = set of people surveyed
A = set of people who play cricket
B = set of people who play tennis

Number of people who play neither cricket nor tennis

$= n[(A \cup B)'] = n(U) - n(A \cup B)$

$= 450 - 200 = 250$

31. There are 280 students in the group.

32. 23 [Hint: Find n(U)]

33. 6

35. n = 3 m = 6

36. [Hint: Take $n(\cup) = 100$]

37. 14

38. i. 275 ii. 325 iii. 50 iv. 125

39. i. (c) ii. (a) iii. (b) iv. (d) v. (a)

40. i. (b) ii. (a) iii. (d) iv. (c) v. (b)

41.(c)	42.(b)	43.(c)
44.(b)	45.(c)	46.(c)
47.(a)	48.(c)	49.(c)
50.(a)	51.(c)	52.(c)
53.(a)	54.(c)	55.(b)
56.(b)	57.(a)	58.(c)
59.(d)	60.(b)	

CHAPTER – 2

RELATIONS AND FUNCTIONS

CONCEPT MAP

- **Ordered Pair:** An ordered pair consists of two objects or elements in a given fixed order.

  Remarks: An ordered pair is not a set consisting of two elements. The ordering of two elements in an ordered pair is important and the two elements need not be distinct.

- **Equality of Ordered Pair:** Two ordered pairs (x_1, y_1) & (x_2, y_2) are equal if $x_1 = x_2$ and $y_1 = y_2$.

  i.e. $(x_1, y_1) = (x_2, y_2) \Leftrightarrow x_1 = x_2$ and $y_1 = y_2$

- **Cartesian product of two sets:** Cartesian product of two non-empty sets A and B is given by A × B and $A \times B = \{(x, y) : x \in A$ and $y \in B\}$.

- **Cartesian product of three sets:** Let A, B and C be three sets, then A × B × C is the set of all ordered triplet having first element from set A, 2nd element from set B and 3rd element from set C.

  i.e., $A \times B \times C = \{(x, y, z) : x \in A, y \in B \text{ and } z \in C\}$.

- **Number of elements in the Cartesian product of two sets:** If $n(A) = p$ and $n(B) = q$, then $n(A \times B) = pq$.

- **Relation:** Let A and B be two non-empty sets. Then a relation from set A to set B is a subset of A × B.

- **No. of relations:** If n(A) = p, n(B) = q then no. of relations from set A to set B is given by 2^{pq}.
- **Domain of a relation:** Domain of R = {a : (a,b) $\in$ R}
- **Range of a relation:** Range of R = { b : (a,b) $\in$ R}
- Co-domain of R from set A to set B = set B.
- Range $\subseteq$ Co-domain
- **Relation on a set:** Let A be non-empty set. Then a relation from A to A itself. i.e., a subset of A × A, is called a relation on a set.
- **Inverse of a relation:** Let A, B be two sets and Let R be a relations from set A to set B.

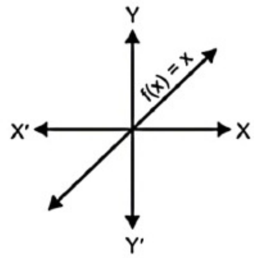
  Then the inverse of R denoted R^{-1} is a relation from set B to A and is defined by R^{-1} = {(b, a) : (a, b) $\in$ R}
- **Function:** Let A and B be two non-empty sets. A relation from set A to set B is called a function (or a mapping or a map) if each element of set A has a unique image in set B.

  Remark: If (a, b) $\in$ f then 'b' is called the image of 'a' under f and 'a' is called pre-image of 'b'.
- **Domain and rangeof a function:** If a function 'f' is expressed as the set of ordered pairs, the domain of 'f' is the set of all the first components of members of f and range of 'f' is the set of second components of member of 'f'.

  i.e., D_f = {a : (a, b) $\in$ f} and R_f = {b : (a, b) $\in$ f}
- **No. of functions:** Let A and B be two non-empty finite sets such that n(A) = p and n(B) = q then number of functions from A to B = q^p.
- **Real valued function:** A function f : A $\rightarrow$ B is called a real valued function if B is a subset of R (real numbers).

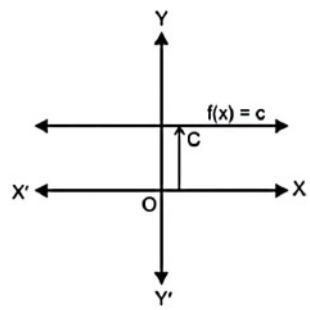
- **Identity function:** $f : R \to R$ given by $f(x) = x \ \forall \ x \in R$ (real number)

  Here, $D_f = R$ and $R_f = R$



- **Constant function:** $f : R \to R$ given by $f(x) = c$ for all $x \in R$ where c is any constant

  Here, $D_f = R$ and $R_f = \{c\}$

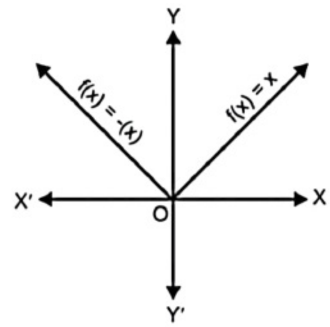


- **Modulus function:** $f : R \to R$ given by $f(x) = |x| \ \forall \ x \in R$

  Here, $D_f = R$ and $R_f = [0, \infty)$

  Remarks : $\sqrt{x^2} = |x|$

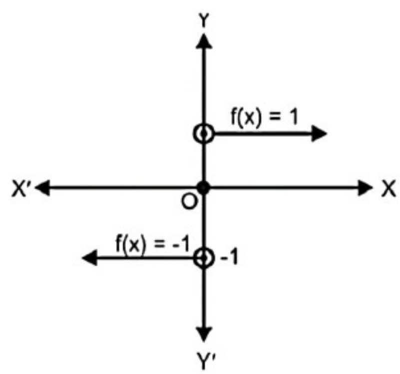
  or $f(x) = |x| = \begin{bmatrix} x : x \geq 0 \\ -x : x < 0 \end{bmatrix}$



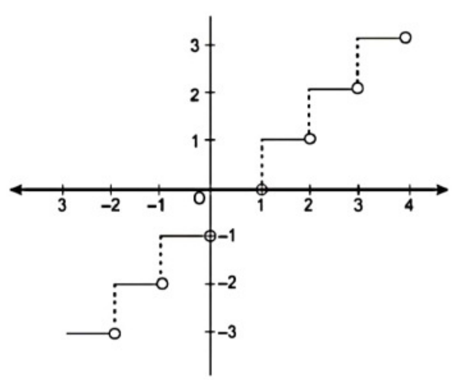
- **Signum function:** f : R → R defined by $f(x)=\begin{cases}\frac{|x|}{x}, & x \neq 0\\ 0, & x=0\end{cases}$

Or

$$f(x)=\begin{cases}1, & \text{if } x>0\\ 0, & \text{if } x=0\\ -1, & \text{if } x<0\end{cases}$$

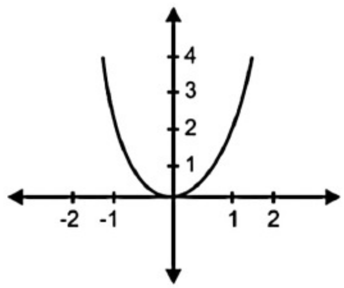


- **Greatest Integer function:** f : R → R defined by f(x) = [x], $x \in R$ assumes the value of the greatest integer, less than or equal to x. Here, $D_f = R$ and $R_f = Z$



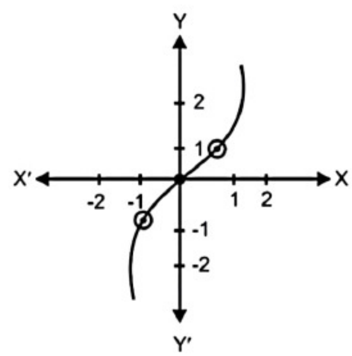
- Graph for $f : R \to R$, defined by $f(x) = x^2$

  Here, $D_f = R$ and $R_f = [0, \infty)$

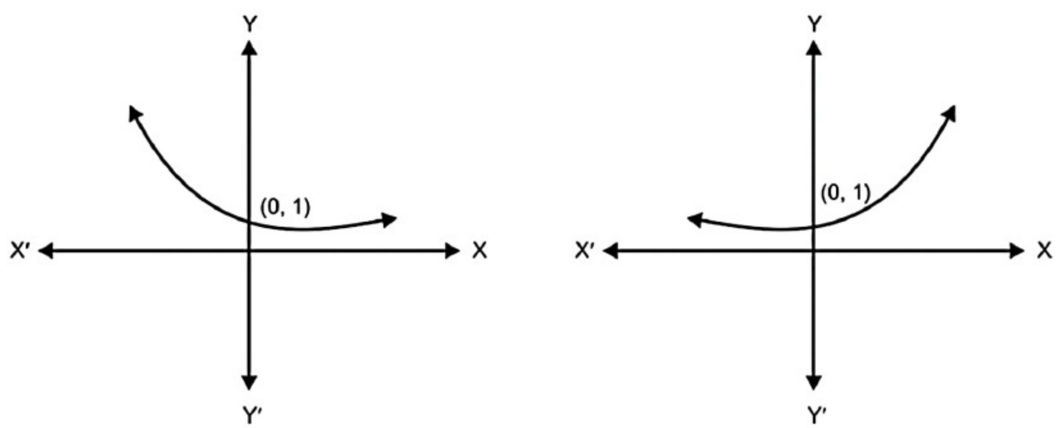


- Graph for $f : R \to R$, defined by $f(x) = x^3$

  Here $D_f = R$ and $R_f = R$



- **Exponential function:** $f : R \to R$, defined by $f(x) = a^x$, $a > 0$, $a \neq 1$



When $0 < a < 1$

$$f(x) = a^x \begin{cases} > 1 & \text{for } x < 0 \\ = 1 & \text{for } x = 0 \\ < 1 & \text{for } x > 0 \end{cases}$$

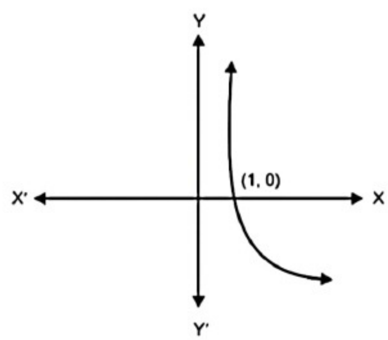
When $a > 1$

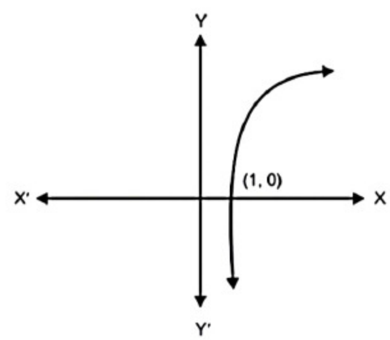
$$f(x) = a^x \begin{cases} < 1 & \text{for } x < 0 \\ = 1 & \text{for } x = 0 \\ > 1 & \text{for } x > 0 \end{cases}$$

- Natural exponential function, $f(x) = e^x$

$$e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + \ldots \infty, \quad 2 < e < 3$$

- Logarithmic functions, $f : (0, \infty) \to R$; $f(x) \log_a x$, $a > 0$, $a \neq 1$





When, $0 < a < 1$
$D_f = (0, \infty)$
$R_f = R$

When, $a > 1$
$D_f = (0, \infty)$
$R_f = R$

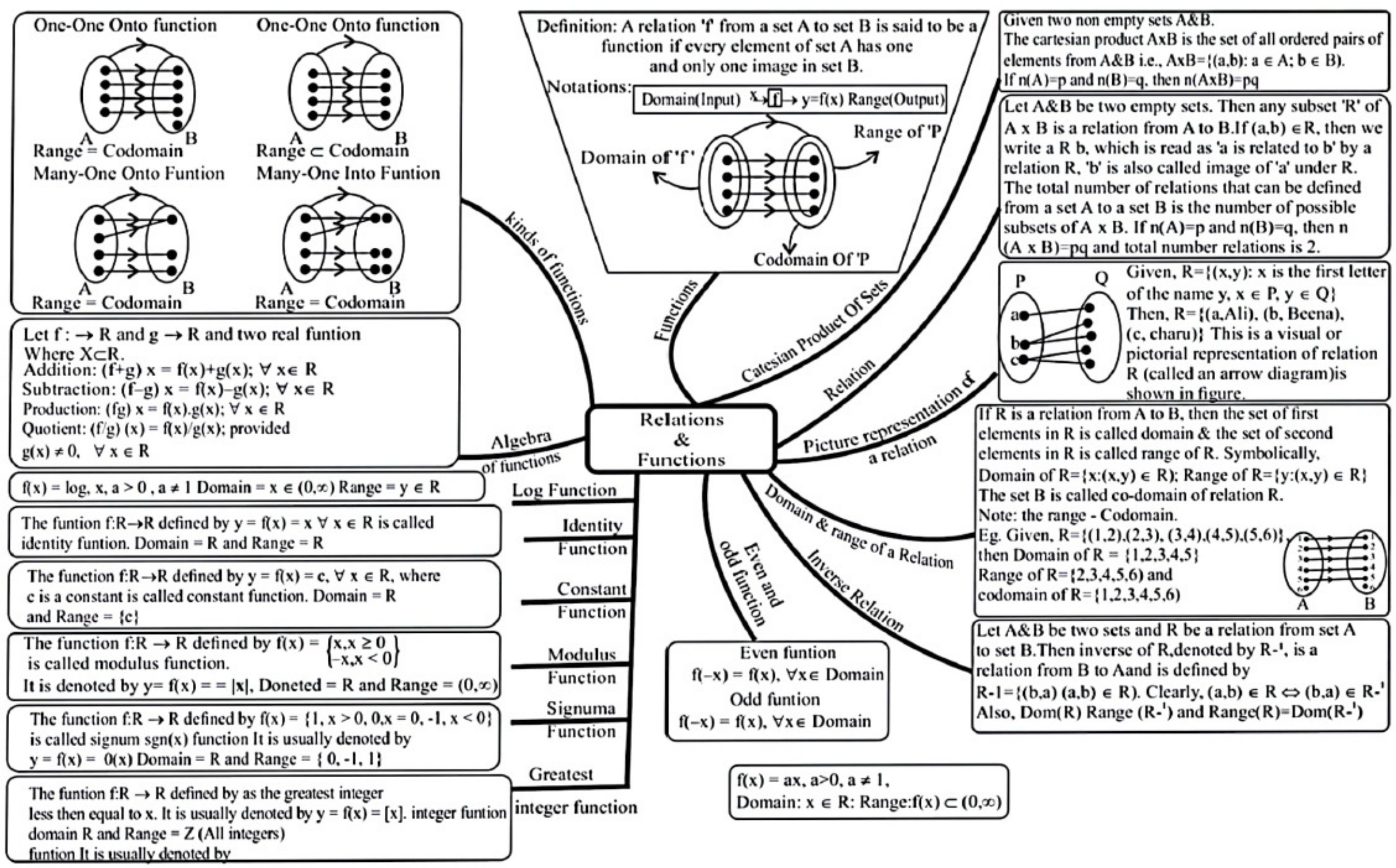
- **Natural logarithm function:** $f(x) = \log_e x$ or $\ln(x)$.

- Let $f : X \to R$ and $g : X \to R$ be any two real functions where $x \subset R$ then

$(f \pm g)(x) = f(x) \pm g(x) \ \forall \ x \in X$

$(fg)(x) = f(x)\, g(x) \ \forall \ x \in X$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} \quad \forall \ x \in X \text{ provided } g(x) \neq 0$$


Relations & Functions
Functions
Definition: A relation 'f' from a set A to set B is said to be a function if every element of set A has one and only one image in set B.
Notations: Domain(Input) x → f → y=f(x) Range(Output)
Domain of 'f'
Range of 'f'
Codomain Of 'f'
Catesian Product Of Sets
Given two non empty sets A&B.
The cartesian product AxB is the set of all ordered pairs of elements from A&B i.e., AxB={(a,b): a ∈ A; b ∈ B}.
If n(A)=p and n(B)=q, then n(AxB)=pq
Relation
Let A&B be two empty sets. Then any subset 'R' of A x B is a relation from A to B.If (a,b) ∈R, then we write a R b, which is read as 'a is related to b' by a relation R, 'b' is also called image of 'a' under R.
The total number of relations that can be defined from a set A to a set B is the number of possible subsets of A x B. If n(A)=p and n(B)=q, then n(A x B)=pq and total number relations is 2.
Picture representation of a relation
P
Q
a
b
c
Given, R={(x,y): x is the first letter of the name y, x ∈ P, y ∈ Q}
Then, R={(a,Ali), (b, Beena), (c, charu)} This is a visual or pictorial representation of relation R (called an arrow diagram)is shown in figure.
Domain & range of a Relation
If R is a relation from A to B, then the set of first elements in R is called domain & the set of second elements in R is called range of R. Symbolically,
Domain of R={x:(x,y) ∈ R}; Range of R={y:(x,y) ∈ R}
The set B is called co-domain of relation R.
Note: the range - Codomain.
Eg. Given, R={(1,2),(2,3), (3,4),(4,5),(5,6)},
then Domain of R = {1,2,3,4,5}
Range of R={2,3,4,5,6} and
codomain of R={1,2,3,4,5,6}
A
B
Inverse Relation
Let A&B be two sets and R be a relation from set A to set B.Then inverse of R,denoted by R-¹, is a relation from B to Aand is defined by
R-1={(b,a) (a,b) ∈ R). Clearly, (a,b) ∈ R ⇔ (b,a) ∈ R-¹
Also, Dom(R) Range (R-¹) and Range(R)=Dom(R-¹)
Even and odd function
Even funtion
f(−x) = f(x), ∀x∈ Domain
Odd funtion
f(−x) = f(x), ∀x∈ Domain
f(x) = ax, a>0, a ≠ 1,
Domain: x ∈ R: Range:f(x) ⊂ (0,∞)
kinds of functions
One-One Onto function
A
B
Range = Codomain
One-One Onto function
A
B
Range ⊂ Codomain
Many-One Onto Funtion
A
B
Range = Codomain
Many-One Into Funtion
A
B
Range = Codomain
Algebra of functions
Let f : → R and g → R and two real funtion
Where X⊂R.
Addition: (f+g) x = f(x)+g(x); ∀ x∈ R
Subtraction: (f−g) x = f(x)−g(x); ∀ x∈ R
Production: (fg) x = f(x).g(x); ∀ x ∈ R
Quotient: (f/g) (x) = f(x)/g(x); provided
g(x) ≠ 0, ∀ x ∈ R
Log Function
f(x) = log, x, a > 0 , a ≠ 1 Domain = x ∈ (0,∞) Range = y ∈ R
Identity Function
The funtion f:R→R defined by y = f(x) = x ∀ x ∈ R is called identity funtion. Domain = R and Range = R
Constant Function
The function f:R→R defined by y = f(x) = c, ∀ x ∈ R, where c is a constant is called constant function. Domain = R and Range = {c}
Modulus Function
The function f:R → R defined by f(x) = {x,x ≥ 0; −x,x < 0}
is called modulus function.
It is denoted by y= f(x) = = |x|, Doneted = R and Range = (0,∞)
Signuma Function
The function f:R → R defined by f(x) = {1, x > 0, 0,x = 0, -1, x < 0}
is called signum sgn(x) function It is usually denoted by
y = f(x) = 0(x) Domain = R and Range = { 0, -1, 1}
Greatest integer function
The funtion f:R → R defined by as the greatest integer less then equal to x. It is usually denoted by y = f(x) = [x]. integer funtion domain R and Range = Z (All integers)
funtion It is usually denoted by

Very Short Answer Type Question

1. Find a and b if (a – 1, b + 5) = (2, 3)

   If A = {1,3,5}, B = {2,3}, find : (Question- 2, 3)

2. A × B

3. B × A

   Let A = {1,2}, B = {2,3,4}, C = {4,5}, find (Question- 4, 5)

4. $A \times (B \cap C)$

5. $A \times (B \cup C)$

6. If P = {1,3}, Q = {2,3,5}, find the number of relations from P to Q

7. If $R = \{(x,y): x,y \in Z, x^2 + y^2 = 64\}$, then,

   Write R in roster form

   Which of the following relations are functions? Give reason. (Questions 18 to 20)

8. R = { (1,1), (2,2), (3,3), (4,4), (4,5)}

9. R = { (2,1), (2,2), (2,3), (2,4)}

10. R = { (1,2), (2,5), (3,8), (4,10), (5,12), (6,12)}

SHORT ANSWER TYPE QUESTIONS

11. If A and B are finite sets such that n(A) = 5 and n(B) = 7, then find the number of functions from A to B.

12. If $f(x) = x^2 - 3x + 1$ find $x \in R$ such that $f(2x) = f(x)$

Let f and g be two real valued functions, defined by, $f(x) = x$, $g(x) = |x|$.Find: (Question 13 to 16)

13. $f + g$

14. $f - g$

15. fg

16. $\frac{f}{g}$

17. If $f(x) = x^3$, find the value of, $\frac{f(5)-f(1)}{5-1}$

18. Find the domain of the real function, $f(x)=\sqrt{x^2-4}$

19. Find the domain of the function, $f(x)=\frac{x^2+2x+3}{x^2-5x+6}$

Find the range of the following functions. (Question- 20, 21)

20. $f(x)=\frac{1}{4-x^2}$

21. $f(x) = x^2 + 2$

22. Find the domain of the relation,
$R = \{(x, y): x, y \in Z, xy = 4\}$

Find the range of the following relations: (Question-23, 24)

23. $R = \{(a,b) : a, b \in N \text{ and } 2a + b = 10\}$

24. $R=\left\{\left(x,\frac{1}{x}\right): x\in Z, 0<x<6\right\}$

25. Let A = {1,2,3,4}, B = {1,4,9,16,25} and R be a relation defined from A to B as,

R = {(x, y): $x \in A$, $y \in B$ and $y = x^2$}

(a) Depict this relation using arrow diagram.
(b) Find domain of R.
(c) Find range of R.
(d) Write co-domain of R.

26. If A = {2,4,6,9} B = {4,6,18,27,54} and a relation R from A to B is defined by R = {(a,b): $a \in A$, $b \in B$, a is a factor of b and a < b}, then write R in Roster form. Also find its domain and range.

27. Find the domain and range of,

$f(x) = |2x - 3| - 3$

28. Draw the graph of the Constant functionf : $R \to R$; $f(x) = 2 \ \forall \ x \in R$. Also find its domain and range.

29. Draw the graph of the function $|x - 2|$

Find the domain and range of the following real functions (Question 30-35)

30. $f(x) = \sqrt{x^2 + 4}$

31. $f(x) = \dfrac{x+1}{x-2}$

32. $f(x) = \dfrac{|x+1|}{x+1}$

33. $f(x) = \dfrac{x^2 - 9}{x-3}$

34. $f(x) = 1 - |x - 3|$

35. $f(x) = \frac{1}{\sqrt{9 - x^2}}$

36. Determine a quadratic function f defined by $f(x) = ax^2 + bx + c$. If $f(0) = 6$; $f(2) = 11$, $f(-3) = 6$

37. Draw the graph of the function $f(x) = \begin{cases} 1+2x & x < 0 \\ 3+5x & x \geq 0 \end{cases}$ also find its range.

38. Draw the graph of following function

$$f(x) = \begin{cases} \frac{|x|}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$$

Also find its range.

Find the domain of the following function.

39. $f(x) = \frac{1}{\sqrt{x + |x|}}$

40. $f(x) = \frac{1}{\sqrt{x - |x|}}$

41. $f(x) = \frac{1}{\sqrt{[x]^2 - [x] - 6}}$

42. $f(x) = \sqrt{4 - x} + \frac{1}{\sqrt{x^2 - 1}}$

43. Find the domain for which the following functions:
$f(x) = 2x^2 - 1$ and $g(x) = 1 - 3x$ are equal.

44. If $f(x) = x - \frac{1}{x}$ prove that $[f(x)]^3 = f(x^3) + 3f\left(\frac{1}{x}\right)$.

45. If [x] denotes the greatest integer function. Find the solution set of equation, $[x]^2 + 5[x] + 6 = 0$.

46. If $f(x) = \frac{ax - b}{bx - a} = y$. Find the value of f(y).

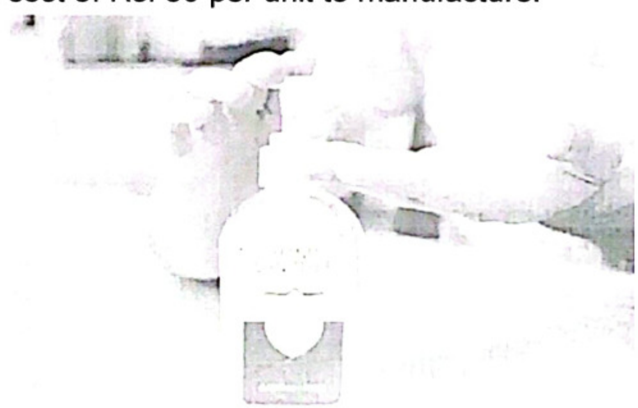
Long Answer Type Questions

47. Draw the graph of following function and find range(R_f) of
$f(x) = |x-2| + |2+x| \quad \forall \quad -3 \le x \le 3$.

48. Find domain and range $f(x) = \frac{1}{2\sin 3x}$

CASE STUDY TYPE QUESTIONS

49. To make himself self-dependent and to earn his living, a person decided to setup a small scale business of manufacturing hand sanitizers. He estimated a fixed cost of Rs. 15000 per month and a cost of Rs. 30 per unit to manufacture.



i. If x units of hand sanitizers are manufactured per month. What is the cost function?

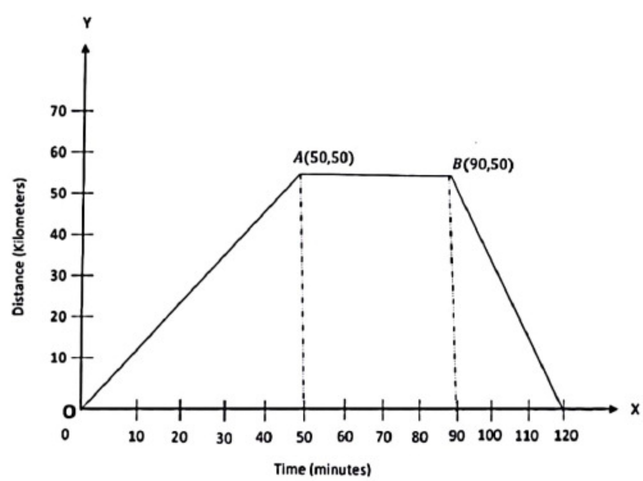
ii. If each unit is sold for Rs. 45. What is the selling (revenue) function?

iii. What is the profit function?

iv. For Break even (No Profit, no loss situation) in a month, how manyunits should be manufactured and sold?

50. This is a graph showing how far the distances have been travelled by Sunita (in her car) in a given time.

She drove, stopped, does her work and returned back.



i. The line OA of the graph represents the function:

(a) $x=10y$ (b) $y=10x$

(c) $y=x$ (d) $y=\frac{x}{2}$

ii. At what distance from the starting point Sunita stopped to do her work?

(a) 30m (b) 40m

(c) 50m (d) 60m

iii. How much time Sunita took to complete her work?

(a) 30 min (b) 40 min

(c) 50 min (d) 60 min

iv. Line AB represents the constant function:

(a) $y = 50$ (b) $x = 50$

(c) $y = 10$ (d) $x = 9$

v. How much time Sunita took to reach at a distance of 40 km. from the initial point?

(a) 30 min (b) 40 min

(c) 50 min (d) 1 hour

Multiple Choice Questions

51. If A = {1, 2, 4}, B = {2, 4, 5}, C = {2, 5} then (A – B) × (B – C)

(a) {(1, 2), (1, 5), (2, 5)} (b) {1, 4}

(c) {1, 4} (d) None of these.

52. If R is a relation on set A = {1, 2, 3, 4, 5, 6, 7, 8} given by xRy ⇔ y = 3x, then R = ?

(a) {(3, 1), (6, 2), (8, 2), (9, 3)} (b) {(3, 1), (6, 2), (9, 3)}

(c) {(3, 1), (2, 6), (3, 9)} (d) None of these.

53. Let A = {1, 2, 3}, B = {4, 6, 9} if relation R from A to B defined by x is greater then y. the range of R is -

(a) {1, 4, 6, 9} (b) {4, 6, 9}

(c) {1} (d) None of these.

54. If R be a relation from a set A to a set B then -

(a) $R = A \cup B$ (b) $R = A \cap B$

(c) $R \subseteq A \times B$ (d) $R \subseteq B \times A$.

55. If $2f(x)-3f\left(\frac{1}{x}\right)=x^2$ $(x \neq 0)$, then f(2) is equal to -

(a) $\frac{-7}{4}$ (b) $\frac{5}{2}$

(c) –1 (d) None of these.

56. Range of the function f(x) = cos[x] for $\frac{-\pi}{2} < x < \frac{\pi}{2}$ is -

(a) {–1, 1, 0} (b) {cos1, cos2, 1}

(c) {cos1, –cos1, 1} (d) {–1, 1}.

57. If $f(x) = \log\left(\frac{1+x}{1-x}\right)$ and $g(x) = \frac{3x+x^3}{1+3x^2}$ then f{g(x)} is equal to -

(a) f(3x) (b) $\{f(x)\}^3$

(c) 3f(x) (d) –(f(x).

58. If f(x) = cos(logx) then value of $f(x).f(y) - \frac{1}{2}\left\{f\left(\frac{x}{y}\right)+f(xy)\right\}$ is -

(a) 1 (b) –1

(c) 0 (d) ±1.

59. Doman of $f(x) = \sqrt{4x-x^2}$ is -

(a) R – [0, 4] (b) R – (0, 4)

(c) (0, 4) (d) [0, 4].

60. If $[x]^2 - 5[x] + 6 = 0$, where [.] denote the greatest integer function then -

(a) $x \in [3, 4]$ (b) $x \in (2, 3]$

(c) $x \in [2, 3]$ (d) $x \in [2, 4)$.

CHAPTER - 4

COMPLEX NUMBERS AND QUADRATIC EQUATIONS

KEY POINTS

- The imaginary number $\sqrt{-1} = i$, is called iota
- For any integer k, $i^{4k} = 1$, $i^{4k+1} = i$, $i^{4k+2} = -1$, $i^{4k+3} = -i$
- $i^2 = -1$; $i^4 = i^0 = 1$
- $\sqrt{a} \times \sqrt{b} \neq \sqrt{ab}$ if both a and b are negative real numbers
- $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$, if atleast one number is positive.
- A number of the form z = a + ib, where a, b $\in$ R is called a complex number.

  a is called the real part of z, denoted by Re(z) and b is called the imaginary part of z, denoted by Im(z)
- $a + ib = c + id \Leftrightarrow a = c$, and $b = d$
- $z_1 = a + ib$, $z_2 = c + id$.

  In general, we cannot compare and say that $z_1 > z_2$ or $z_1 < z_2$ but if b, d = 0 and a > c then $z_1 > z_2$

  i.e. we can compare two complex numbers only if they are purely real.
- $0 + i\,0$ is additive identity of a complex number.
- $-z = -a - ib$ is called the Additive Inverse or negative of $z = a + ib$

- 1 + i 0 is multiplicative identity of complex number.

- $z^{-1} = \frac{1}{z} = \frac{a - ib}{a^2 + b^2} = \frac{\overline{z}}{|z|^2}$ is called the multiplicative Inverse of

  z = a + ib (a ≠ 0, b ≠ 0)

- $\overline{z} = a - ib$ is called conjugate of $z = a + ib$

- The coordinate plane that represents the complex numbers is called the complex plane or the Argand plane

- $|z_1 + z_2| \leq |z_1| + |z_2|$; $|z_1 - z_2| \geq |z_1| - |z_2|$

- $|z_1 z_2| = |z_1|.\ |z_2|$; $\left|\frac{z_1}{z_2}\right| = \frac{|Z_1|}{|Z_2|}$

- $|z^n| = |z|^n$; $|z| = |\overline{z}| = |-z| = |-\overline{z}|$

- $(\overline{z_1 \pm z_2}) = \overline{z}_1 \pm \overline{z}_2$; $\overline{\left(\frac{z_1}{z_2}\right)} = \frac{\overline{z}_1}{\overline{z}_2}$

- $(\overline{z^n}) = (\overline{z})^n$

- $z\,.\,\overline{z} = |z|^2$

- For the quadratic equation $ax^2 + bx + c = 0$, a, b, c ∈ R, a ≠ 0, if $b^2 - 4ac < 0$ then it will have complex roots given by,

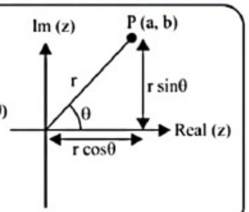
  $$x = \frac{-b \pm i\sqrt{4ac - b^2}}{2a}$$

W. R. Hamilton
(1805-1865)

Trigonometric Fuctions

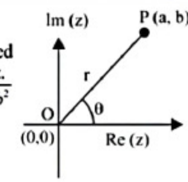
Polar Representation

Let $a = r\cos\theta$
$b = r\sin\theta$
where,
and $\theta = \arg(z)$
$\therefore z = a + ib = r(\cos\theta + i\sin\theta)$
The arument 'θ' of complex number $z_1 = a + ib$ is called principal argument of z if $-\pi < \theta \le \pi$.



Modulus & Argument of Complex Number

If $z = a + ib$ is a complex number
(i) Distance of z from origin is called as modulus of complex number z.
It is denoted by $r = |z| = \sqrt{a^2 + b^2}$
(*ii*) Angle θ made by OP with +ve direction of X-axis is called argument of z.



Powers of 'i'

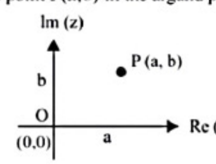
$i = \sqrt{-1},\ i^2 = -1$
In general, $i^{4l+r} = \begin{cases} 1; & r = 0 \\ i; & r = 1 \\ -1; & r = 2 \\ -i; & r = 3 \end{cases}$

Square root of Complex Number

Let $x + iy = \sqrt{a + ib}$, squaring both side, we get $(x + iy)^2 = a + ib$ i.e. $x^2 - y^2 = a, 2xy = b$ solving these equations, we get square root of z.

Argand Plane

A complex number $z = a + ib$ can be represented by a unique point $P(a, b)$ in the argand plane



$z = a + ib$ is represented by a poin $P(a, b)$

Multiplicative Inverse of complex number

For a non-zerocomplex number $z = a + ib (a \ne 0, b \ne 0)$, there exists a complex number $\frac{a}{a^2 + b^2} + \frac{-b}{a^2 + b^2} i$
denoted by $\frac{1}{z}$ or z^{-1}, called multiplicative inverse of Z
Such that: $(a + ib)\left(\frac{a}{a^2 + b^2} + i\frac{-b}{a^2 + b^2} = 1 + 0i = 1\right)$

Solution of Quadratic Equation

General form of quadratic equation in x is $ax^2 + bx + c = 0$, where $a, b, c \in R$ and $a \ne 0$
The solutions of given quadratic equation are given by $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
$\because b^2 - 4ac < 0$
Note:
- A polynomial equation has atleast one root.
- A polynomial equation of degree n has n roots.

Definition of complex numbers

A number of the form $a + ib$, where $a, b \in R$ and $i = \sqrt{-1}$ is called a comples number and denoted by '*i*'
$z = a + ib \rightarrow$ Imaginary part
↓
Real part
Conjugate of a complex number : For a given complex number $r = a + ib$, its conjugate is defined as $\bar{z} = a - ib$

Algebra of complex Numbers

Let: $z_1 = a + ib$ and $z_1 = c + id$ be two complex numbers, where $a, b, c, d \in R$ and $i = \sqrt{-1}$
1. Addition: $z_1 + z_2 = (a + ib) + (c + id) = (a + c) + i(b + d)$
2. Subtraction: $z_1 - z_2 = (a + ib) - (c + id) = (a - c) + (b - d)i$
3. Multiplication: $z_1 z_2 = (a + ib)(c + id)$
$= a(c + id) + ib(c + id)$
$= (ac - bd) + (ad + bc)i \quad (\because i^2 = -1)$
4. Division: $\frac{z_1}{z_1} = \frac{a + ib}{c + id} \cdot \frac{c - id}{c - id}$
$= \left(\frac{ac + bd}{c^2 + d^2}\right) + \left(\frac{bc - ad}{c^2 + d^2}\right)i$

Note : If $a + ib = c + id$
$\Rightarrow d = c \,\&\, d = d$

VERY SHORT ANSWER TYPE QUESTIONS

1. Write the value of $i + i^{10} + i^{20} + i^{30}$

2. Write the additive Inverse of $6i - i\sqrt{-49}$

3. Write the multiplicative Inverse of $1 + 4\sqrt{3}\ i$

4. Write the conjugate of $\frac{2-i}{(1-2i)^2}$

5. Write in the form of $a + ib$: $\frac{1}{-2+\sqrt{-3}}$

6. Multiply $2 - 3\ i$ by its conjugate.

7. What is the least integral value of K which makes the roots of the equation $x^2 + 5x + k = 0$ imaginary?

8. Find the real value of 'a' for which $3i^3 - 2ai^2 + (1-a)i$ is real.

9. Find the value of $\left(-\sqrt{-1}\right)^{4n-3}$, when n $\in$ N.

10. If a complex number lies in the third quadrant, then find the quadrant of it's conjugate.

11. Find the value of $\sqrt{-25} \times \sqrt{-9}$

12. Evaluate :

    (i) $\sqrt{-16} + 3\sqrt{-25} + \sqrt{-36} - \sqrt{-625}$

    (ii) $i\sqrt{-16} + i\sqrt{-25} + \sqrt{49} - i\sqrt{-49} + 14$

    (iii) $\left(i^{77} + i^{70} + i^{87} + i^{414}\right)^3$

    (iv) $\frac{(3+\sqrt{5}i)(3-\sqrt{5}i)}{(\sqrt{3}+\sqrt{2}i)-(\sqrt{3}-\sqrt{2}i)}$

13. Find x and y if (x + iy) (2 – 3i) = 4 + i.

14. If n is any positive integer, write value of $\frac{i^{4n+1} - i^{4n-1}}{2}$

15. If $z_1 = \sqrt{2}(\cos 30° + i \sin 30°)$, $z_2 = \sqrt{3}(\cos 60 + i \sin 30°)$

Find Re $(z_1 z_2)$

16. If $|z+4| \le 3$ then find the greatest and least values of $|z+1|$.

17. Find the real value of a for which $3i^3 - 2ai^2 + (1-a)i + 5$ is real.

SHORT ANSWER TYPE QUESTIONS

18. If x + iy = $\sqrt{\frac{1+i}{1-i}}$ prove that $x^2 + y^2 = 1$

19. Find real value of θ such that, $\frac{1+i\cos\theta}{1-2i\cos\theta}$ is a real number.

20. If $\left|\frac{z-5i}{z+5i}\right| = 1$ show that z is a real number.

21. Find real value of x and y if $\frac{(1+i)x-2i}{3+i} + \frac{(2-3i)y+i}{3-i} = i$.

22. If $(1+i)(1+2i)(1+3i)\ldots\ldots.(1+ni) = x+iy$.

Show, $2.5.10\ldots\ldots\ldots.(1+n^2) = x^2 + y^2$

23. If z = 2 – 3i show that $z^2 - 4z + 13 = 0$, hence find the value of $4z^3 - 3z^2 + 169$.

24. If $\left(\frac{1+i}{1-i}\right)^3 - \left(\frac{1-i}{1+i}\right)^3 = a+ib$, find a and b.

25. For complex numbers $z_1 = 6 + 3i$, $z_2 = 3 - i$ find $\frac{z_1}{z_2}$.

26. If $\left(\frac{2+2i}{2-2i}\right)^n = 1$, find the least positive integral value of n

27. If $(x+iy)^{\frac{1}{3}} = a+ib$ prove $\left(\frac{x}{a}+\frac{y}{b}\right) = 4\left(a^2-b^2\right)$.

28. Solve

(i) $x^2 - \left(3\sqrt{2}-2i\right)x - 6\sqrt{2}i = 0$ (ii) $ix^2 - 4x - 4i = 0$

29. Solve $|z + 1| = z + 2(1 + i)$

30. If $|z^2 - 1| = |z|^2 + 1$, then show that z lies on imaginary axis.

[Hint: Take $z = x + iy$]

31. Show that $\left|\frac{z-2}{z-3}\right| = 2$ represent a circle find its centre and radius.

32. Find all non-zero complex number z satisfying $\bar{z} = iz^2$.

33. If $iz^3 + z^2 - z + i = 0$ then show that $|z| = 1$.

34. If z_1, z_2 are complex numbers such that, $\frac{2z_1}{3z_2}$ is purely imaginary number then find $\left|\frac{z_1 - z_2}{z_1 + z_2}\right|$.

35. If z_1 and z_2 are complex numbers such that,

$\left|1-\bar{z}_1 z_2\right|^2 - \left|z_1 - z_{2^2}\right|^2 = k\left(1-|z_1|^2\right)\left(1-|z_2|^2\right)$. Find value of k.

LONG ANSWER TYPE QUESTIONS

36. Find number of solutions of $z^2 + |z|^2 = 0$.

37. If z_1, z_2 are complex numbers such that $\left|\frac{z_1 - 3z_2}{3 - z_1.\bar{z}_2}\right| = 1$ *and* $|z_2| \neq 1$ then find $|z_1|$.

38. Evaluate $x^4 - 4x^3 + 4x^2 + 8x + 44$, When $x = 3 + 2i$

39. If $z = x + iy$ and $w = \frac{1 - iz}{z - i}$ show that if $|w| = 1$ then z is purely real.

40. If $\left(\frac{1+i}{1+2^2 i}\right) \times \left(\frac{1+3^2 i}{1+4^2 i}\right) \times \ldots\ldots.. \times \left(\frac{1+(2n-1)^2 i}{1+(2n)^2 i}\right) = \frac{a+ib}{c+id}$ then show that $\frac{2}{17} \times \frac{82}{257} \times \ldots\ldots. \times \frac{1+(2n-1)^4}{1+(2n)^4} = \frac{a^2+b^2}{c^2+d^2}$.

41. Find the values of x and y for which complex numbers $-3 + ix^2y$ and $x^2 + y + 4i$ are conjugate to each other.

42. Show that the complex number z_1, z_2 and z_3 satisfying $\frac{z_1 - z_3}{z_2 - z_3} = \frac{1 - i\sqrt{3}}{2}$ are the vertices of a equilateral triangle.

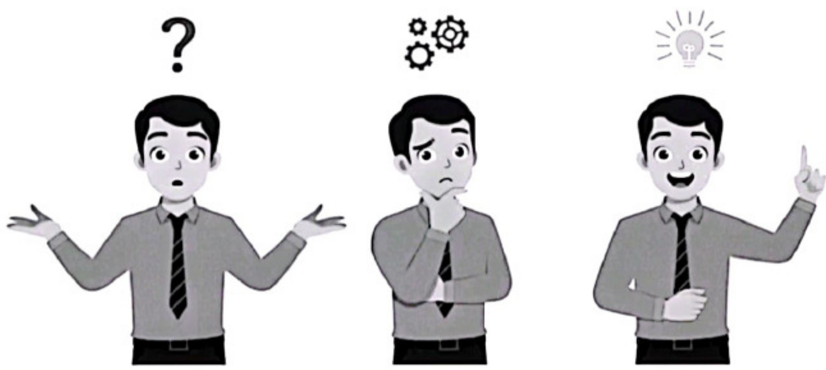
43. If $f(z) = \frac{7 - z}{1 - z^2}$ where $z = 1 + 2i$ then show that $|f(z)| = \frac{|z|}{2}$.

44. If z_1, z_2, z_3 are complex numbers such that

$|z_1| = |z_2| = |z_3| = \left|\frac{1}{z_1} + \frac{1}{z_2} + \frac{1}{z_3}\right| = 1$ then find the value of $|z_1 + z_2 + z_3|$

CASE STUDY TYPE QUESTIONS

45. While solving a typical equation a person finds that one of the root of the equation is a complex number $z = \frac{1+2i}{1-3i}$, help him to find



i. The standard form of z

(a) $-\frac{1}{2}+\frac{i}{2}$ (b) $\frac{1}{2}-\frac{i}{2}$ (c) $-\frac{1}{2}-\frac{i}{2}$ (d) $\frac{1}{2}+\frac{i}{2}$

ii. If $z = 2x + (4-y)i$, then

(a) $x = \frac{1}{4},\ y = \frac{7}{2}$ (b) $x = -\frac{1}{4},\ y = \frac{7}{2}$

(c) $x = \frac{1}{4},\ y = -\frac{7}{2}$ (d) $x = -\frac{1}{4},\ y = -\frac{7}{2}$

iii. Conjugate of Z is

(a) $\frac{1-2i}{1-3i}$ (b) $\frac{1+2i}{1+3i}$ (c) $\frac{1+2i}{1-3i}$ (d) $\frac{1-2i}{1+3i}$

iv. The modulus of z is

(a) 1/3 (b) 1/2 (c) $1/\sqrt{2}$ (d) $1/\sqrt{3}$

v. z lies in

(a) I quadrant (b) II quadrant

(c) III quadrant (d) IV quadrant

Multiple Choice Questions

46. $(\sqrt{-2})(\sqrt{3})$ is equal to

(a) $\sqrt{6}$ (b) $-\sqrt{6}$

(c) $i\sqrt{6}$ (d) None of these

47. If $\frac{(a^2+1)^2}{2a-i} = x+iy$, x^2+y^2 is equal to

(a) $\frac{(a^2+1)^4}{4a^2+1}$ (b) $\frac{(a+1)^2}{4a^2+1}$

(c) $\frac{(a^2-1)^2}{(4a^2-1)^2}$ (d) None of these

48. If z = $\frac{1}{1-\cos\theta - i\sin\theta}$, then Re(z) =

(a) 0 (b) ½

(c) cot θ/2 (d) ½ cot θ /2

49. If f(z) = $\frac{7-z}{1-z^2}$, where z = 1 + 2i, then |f(z)| is

(a) $\frac{|z|}{2}$ (b) |z|

(c) 2|z| (d) None of these

50. The value of $(1+i)^4+(1-i)^4$ is

(a) 8 (b) 4

(c) – 8 (d) – 4

BIOLOGY

MULTIPLE CHOICE QUESTIONS:-

1. Largest herbarium of India is at
(a) Lloyd Botanical Garden,
(b) National Botanical Garden,
(c) Indian Botanical Garden, Sibpur
(d) Forest Research Institute, Dehradun
2. A condition in which internal environment of the body remains constant is
(a) Hematoma
(b) Haemopoiesis
(c) Homeostasis
(d) Hemostasis
3. Which one is taxonomic aid for identification of plants and animals based on similarities and dissimilarities
(a) Flora
(b) Keys
(c) Monographs
(d) Catalogues
4. nigrum is one species of genus
(a) Mangifera
(b) Solanum
(c) Triticum
(d) Pisum

5. Black rot of crucifers is caused by a:
(a) Fungus
(b) Bacterium
(c) virus
(d) None of these.
6. Pusa Komal variety of cow pea is resistant to disease:
(a) Hill bunt
(b) White rust
(c) Leaf curl
(d) Bacterial blight
7. Due to which of the following organisms, yield of rice is increased?
(a) Sesbania
(b) Bacillus popilliae
(c) Anabaena
(d) Bacillus subtilis
8. Which of the following kingdoms includes unicellular eukaryotes?
(a) Monera
(b) Fungi
(c) Protista
(d) Plantae
9. How many organisms in the list given below are autotrophs?
Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Saccharomyces, Trypanosoma, Porphyra, Wolffia.
(a) Four
(b) Five
(c) Six
(d) Three

10.Yellow-green pigment is found in
(a) Xanthophyta
(b) Chlorophyta
(c) Phaeophyta
(d) Rhodophyta
11. Mannitol is the stored food in :
(a) Chara
(b)Porphyra
(c)Fucus
(d)Gracillaria
12. Which one of the following has haplontic life cycle ?
(a) Funaria
(b) Polytrichum
(c) Ustilago
(d) Wheat
13. Which one of the following plants is monoecious ?
(a) Marchantia
(b) Pinus
(c) Cycas
(d) Papaya
14. Which one is the wrong pairing for the disease and its causal organism?
(a) Late blight of potato-Alternaria solani
(b) Black rust of wheat-Puccinia graminis
(c) Loose smut of wheat-Ustilago nuda
(d) Root-knot of vegetables-Meloidogyne sp
15 . Which one of the following is a vascular cryptogam?
(a) Ginkgo
(b) Equisetum
(c) Marchantia
(c) Cedrus
16. Replum is present in the ovary of flower of :
(a) Sunflower
(b) Pea
(c) Lemon
(d) Mustard
17. Thorn of Bougainvillea and tendril of Cucurbita are examples of
(a) Vestigial organs
(b) Retrogressive evolution
(c) Analogous organs
(d) Homologous organs
18. Dry indehiscent single-seeded
fruit formed from bicarpellary syncarpous inferior ovary is :
(a) Berry
(b) Cremocarp
(c) Caryopsis
(d) Cypsella
19. The fleshy receptacle of syconous of fig encloses a number of:
(a) Berries
(b) Mericarps
(c) Achenes
(d) Samaras
20. Pneumatophores are present in

(a) Xerophytes
(b) Hygrophytes
(c) Mesophytes
(d) Halophytes

ASSERTION/ REASON

A. Both assertion and reason are true, and reason is the correct explanation of assertion.
B.Both assertion and reason are true, but reason is not the correct explanation of assertion.
c.Assertion is true but reason is false.
D. Both assertion and reason are false.

ASSERTION:-Leaves are pinnately arrange in poppy plant
REASON:-incisions are less than half way from margin to Madrib.
ASSERTION:- Parthenocarpy involves formation of seedless fruits
REASON:-apomixis occurs without fertilisation

ASSERTION:-Red algae contribute in producing coral reefs
REASON:-some red algae secret and deposit calcium carbonate over their cell wall.

ASSERTION:-cyanobacteria is the new name for myxophyceae or blue green algae.
REASON:-Brown algae is the new name for chlorophyceae.

ASSERTION:-Plant manufactures food only during the daytime.
REASON:- During day time metabolism is high.

ANSWER THE FOLLOWING QUESTIONS:-

1. Algae are known to reproduce asexually by a variety of spores under different environmental conditions. Name these spores and the conditions under which they are produced

2. Biological classification is a dynamic and ever evolving phenomena which keeps changing with our understanding of life forms.
justify the statement taking any two examples.

3. 'Zoological parks are centre for recreation and education'. comments.

4. Explain the structure of bacteriophage.

5. Gametophyte is a dominant phase in the life cycle of bryophyte. Explain.

6. Draw well labelled diagram of i)female and male Thallus of liverwort
ii) Gametophyte and sporophyte of in Funaria

7. Justify the following statement on the basis of external features:
a)Underground parts of a plant are not always roots.
b) Flower is a modified shoot.

8. Seeds of some plants germinate immediately after shedding from the plants while in other plants they require a period of rest before germination. The lateral phenomena is called dormancy. Give the reasons for seed dormancy and some methods to break it.

9. 'Sunflower is not a flower'. explain.

10. Classify the plant Kingdom

PROJECT

1. To prepare project of 35-40 pages on the topic already discussed It should include:

• Cover page
• Index
• Acknowledgement
• Introduction
• Details about the project
• Bibliography

PRESENTATION

• Short presentation on biological classification (At least with one kingdom)
• Instructions:

1. Topic must have introduction, needs of classification.
• 2. Information about all the type of classification.
• 3. Complete information about any one kingdom.
• 4. Relevant diagram must be attached with your presentation
Mode :Video
PRACTICAL FILE
NOTE :-
Complete your notes.
Complete your practical
File.
Learn full syllabus
CHEMISTRY

TOPIC : LAWS OF CHEMICAL COMBINATION

1. 10.0g of $CaCO_3$ on heating gave 4.4 g of CO_2 and 5.6 g of CaO. Show that these observations are in agreement with law of conservation of mass.
2. 1.375 g of cupric oxide was reduced by heating in a current of hydrogen and the weight of copper that remained was 1.098g. In another experiment, 1.179g of copper was converted into 1.476g of cupric oxide by oxidation process. Show that these results illustrate law of constant proportion.
(HINT : Find the % of Cu and O in both the cases . % of Cu will be same in both the cases , similarly % of O will be same in both the cases)
3. Hydrogen and oxygen are known to form two compounds. The hydrogen content in one of these is 5.93% while in other it is 11.2%. Show that this data illustrates law of multiple proportions.
4. Carbon and Oxygen are known to form two compounds. The carbon content in one of these is 42.9%, while in other; it is 27.3%. Show that this data is in agreement with law of multiple proportion.
5. Copper sulphate crystals contain 25.45% of copper and 36.07% of water. If the law of definite proportion is true ; then calculate the mass of copper required to obtain 40 g of crystalline copper sulphate.

TOPIC : MOLE CONCEPT

1. Calculate:-
(a) mass of 2.5 gram atom of Mg.
(b) gram atoms in 60 g of Nitrogen.
© gram molecules in 4.9 g of H_2SO_4.
(d) mass of 0.72 gram molecules of CO_2.
(e) no. of atoms in 0.25 mole of C.

2. What weight of Calcium contains the same no. of atoms as are present in 3.2 g of Chlorine?
3. How many atoms of oxygen and hydrogen are present in 0.15 mol of H_2O?

EMPIRICAL FORMULA

1. A substance on analysis gave the following percentage composition.
Na = 43.4% C = 11.3% O = 45.3%. Calculate its empirical formula.
2. What is the empirical formula of the compound which has the following percentage composition?
C = 80% H = 20% . If the mass is 30 g, calculate its molecular formula.

IMultiple Choice Questions

Question 1

Which of the following terms are unitless?

(a) Molality

(b) Molarity

(c) Mole fraction

(d) Mass percent

Question 2

16 g of oxygen has same number of molecules as in

(a) 16 g of CO

(b) 28 g of N2$N2$

(c) 14 g of N2$N2$

(d) 1.0 g of H2$H2$

Question 3

Number of significant Figures in the numer 1.065

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

Question 4

How many moles of atom are contained in 32.7 g of Zn

(a) .200
(b) .500
(c) 1.50
(d) .0118

Question 5

What will be the molality of the solution containing 18.25 g of HCl gas in 500 g of water?

(a) 0.1 m
(b) 1 M
(c) 0.5 m
(d) 1 m

Question 6

Calculate the number of Moles

of Cu(C2H3O2)2$Cu(C2H3O2)2$ present in 200 g

(a) 1.1 mol

(b) 1 mol

(c) .9 mol

(d) 1.2 mol

Question 7

The percentage of Carbon is Ca(HCO3)2$Ca(HCO3)2$ is

(a) 15%

(b) 1.8%

(c) 14.8%

(d) 15.2%

Question 8

Which of the following statements about a compound is incorrect?

(a) A molecule of a compound has atoms of different elements.

(b) A compound cannot be separated into its constituent elements by physical methods of separation.

(c) A compound retains the physical properties of its constituent elements.
(d) The ratio of atoms of different elements in a compound is fixed

Question 9

Calculate the standard molar volume of oxygen gas. The density of O2O2 gas at NTP is 1.429g/L.
(a) 22.39litres
(b) 21.2 Litres
(c) 24 Litres
(d) None of the above

Question 10

Calculate the number of oxygen atoms in 50 g of CaCO_3.
(a) 6.033×10236.033×1023 atoms
(b) 9.033×10239.033×1023 atoms
(c) 8.033×10238.033×1023 atoms
(d) 3.033×10233.033×1023 atoms

Question 11

What will be the molarity of a solution, which contains 5.85 g of NaCl(s) per 500 mL?

(a) 4 mol/L

(b) 20 mol/L

(c) 0.2 mol/L

(d) 2 mol/L

Question 12

the mass of 2.044×1023 carbon atoms.

(a) 12 g

(b) 36 g

(c) 24 g

(d) 48 g

Question 13

How many gram of solute is required to prepare 1.0 L of 1 M CaCl2.6H2O?

(a) 200 g

(b) 216 g

(c) 219 g

(d) None of the above

Question 14

Which of the following reactions is not

correct according to the law of conservation of mass.

(a) $2Mg(s)+O2(g) \rightarrow 2MgO(s) 2Mg(s)+O2(g) \rightarrow 2MgO(s)$

(b) $C3H8(g)+O2(g) \rightarrow CO2(g)+H2O(g) C3H8(g)+O2(g) \rightarrow CO2(g)+H2O(g)$

(c) $P4(s)+5O2(g) \rightarrow P4O10(s) P4(s)+5O2(g) \rightarrow P4O10(s)$

(d) $CH4(g)+2O2(g) \rightarrow CO2(g)+2H2O(g) CH4(g)+2O2(g) \rightarrow CO2(g)+2H2O(g)$

Question 15

How many mL of water must be added to 200 mL of .65 M HCL to dilute the solution to .20 M

(a) 450 mL

(b) 400 mL

(c) 350 mL

(d) 500 mL

Question 16

The number of Gram molecules of oxygen in 6.02×10246.02×1024 CO molecules is

(a) 10 gm-molecules

(b) 5 gm-molecules

(c) 1 gm -molecules

(d) .5 gm-molecules

Question 17

Which of the following has the largest number of atoms

(a)0.5 g-atoms of Cu

(b)0.635 g Cu

(c) 0.25moles of Cu atoms

(d)1g of Cu

Question 18

A measured temperature on Fahrenheit scale is 200 °F. What will this reading be on Celsius scale?

(a) 40 °C

(b) 94 °C

(c) 93.3 °C

(d) 30 °C

Question 19

1 Mole of CH4$CH4$ contains

(a) 6.02×10236.02×1023 atoms of H

(b) 4 gm-atoms of hydrogen

(c) 1.81×10231.81×1023 molecules of CH4$CH4$

(d) 3g of Carbon

Question 20

Which of the following pairs have the same number of atoms?

(a) 16 g of O2$O2$(g) and 4 g of H2$H2$(g)

(b) 16 g of O2$O2$ and 44 g of CO2$CO2$

(c) 28 g of N2$N2$ and 32 g of O2$O2$

(d) 12 g of C(s) and 23 g of Na(s)

PHYSICS

CASE BASED STUDY

nature of a physical quantity is described by its dimensions. All the physical quantities represented by derived units can be expressed in terms of some combination of seven fundamental or base quantities. We shall call these base quantities as the seven dimensions of the physical world, which are denoted with square brackets [ ]. Thus, length has the dimension [L], mass [M], time [T], electric current [A], thermodynamic temperature [K], luminous intensity [cd], and amount of substance [mol]. The dimensions of a physical quantity are the powers (or exponents) to which the base quantities are raised to represent that quantity. Note that using the square brackets [ ] round a quantity means that we are dealing with 'the dimensions of' the quantity. In mechanics, all the physical quantities can be written in terms of the dimensions [L], [M] and [T]. For example, the volume occupied by an object is expressed as the product of length, breadth and height, or three lengths. Hence the dimensions of volume are [L] × [L] × [L] = [L3].

(1) Dimensions of area is

(a) [L2] (b) [L3] (c) [M2] (d) None of these

(2) dimensions of volume are

(a) [L2] (b) [L] (c) [L3] (d) None of these

(3) What is uncertainty in physics? Explain with one example

(4) define dimensions of a physical quantity

(5) Give list for 7 base quantities with dimensions

Multiple Choice Questions (MCQ II)

6. **If P, Q, R are physical quantities, having different dimensions, which of the following combinations can never be a meaningful quantity?**

(a) (P – Q)/R (b) PQ – R c) PQ/R (d) (PR – Q2)/R

(e) (R + Q)/P

7. **Photon is quantum of radiation with energy E = hν where ν is frequency h is Planck's constant. The dimensions of h are the same as that of**

(a) Linear impulse (b) Angular impulse

(c) Linear momentum (d) Angular momentum

8. If **Planck's constant (h) and speed of light in vacuum (c) are taken as two fundamental quantities, which one of the following can, in addition, be taken to express length, mass and time in terms of the three chosen fundamental quantities?**

(a) Mass of electron (me) (b) Universal gravitational constant (G)

(c) Charge of electron (e) (d) Mass of proton (mp)

9.Which of the following ratios express pressure?

(a) Force/ Area (b) Energy/ Volume

(c) Energy/ Area (d) Force/ Volume

SHORT QUESTIONS ANSWERS

10. If the unit of force is 100 N, unit of length is 10 m and unit of time is 100 s, what is the unit of mass in this system of units?

11.Give an example of

(a) a physical quantity which has a unit but no dimensions.

(b) a physical quantity which has neither unit nor dimensions. (c) a constant which has a unit.

(d) a constant which has no unit.

12 The displacement of a progressive wave is represented by y = A sin(wt – k x), where x is distance and t is time. Write the dimensional formula of (i) ω and (ii) k

Long Answer Type Questions

13. A new system of units is proposed in which unit of mass is α kg, unit of length β m and unit of time γ s. How much will 5 J measure in this new system?

14. If velocity of light c, Planck's constant h and gravitational contant G are taken as fundamental quantities then express mass, length and time in terms of dimensions of these quantities.

Physics Motion in a Straight line

QI. A body covered a distance of L metre along a semi circular path. Calculate the ratio of its distance to displacement.

Q2. A table clock has its minute hand 5 cm long. Find the average velocity of the minute hand between 6:00 am to 6:30 am.

Q3. The magnitude of the average velocity of a particle is not always equal to its average speed. Why?

Q4. A car moves from A to B with a speed of 30 km h and from B to A with a speed of 20 km h 1 . What is the average speed of the car?

Q5. Two straight lines drawn on the same x-t curve make angles 30 0 and 600 with time axis. Which line represents greater velocity? What is the ratio of the two velocities?

Q6. A body covers one third of its journey with speed u, next one third with speed v and the last one third with speed w. Calculate the average speed of the body during the entire journey.

Q7. How can one determine (i) the distance (ii) the displacement covered by a uniformly accelerated body from its velocity-time graph?

Q8. Acceleration-time graph of a moving object is parallel to time axis. Draw the velocity-time graph and displacement-time graph corresponding to this type of motion.

Q9. Draw the following graphs for an object under free fall.

(a)Variation of acceleration with respect to time.

(b)Variation of velocity with respect to time.

(c)Variation of distance with respect to time.

QI0. A stone is dropped from the top of a cliff and is found to travel 44.1 m during the last second before it reaches the ground. What is the height of the cliff? g=9.8 m/s 2

QI I. What is the ratio of the distances travelled by a body, falling freely from the rest, in the first, second and third seconds of its fall?

Q12. A driver of a car moving at 30 m/s suddenly notices a child 80m straight ahead. If the driver's reaction time is 0.5 s and the deceleration is 8 m s- , can he avoid hitting the child?

Q13. A balloon is ascending at the rate of 4.9 m/s. A packet is dropped from the balloon when situated at a height of 245 m. how long does the packet take to reach the ground? What is its final velocity?

Q14. A body starting from rest has an acceleration of 20 m/s 2 . Calculate (i) distance travelled by body in 8 s (ii) its velocity after travelling 10 m and (iii) distance travelled by it in 5 t second.

Q15. A car starts from rest and accelerates uniformly for 10 s to a velocity of 8 m s- . It then runs with constant velocity and is finally brought to rest in 64 m with a constant retardation. The total distance covered by the car is 584 m. find the value of acceleration, retardation and total time taken.

Q16. If the displacement of particle is given by X = t2 + 5t + 3. Find (i) Velocity and acceleration of the panicle at t = 3s.

Case Study Based Ouestions

Following questions are case study-based questions. Each question has five sub parts of multiplechoice questions. Attempt any four sub parts from each question. Each sub part of question carries I mark.

In the absence of air resistance, all bodies falls with same same acceleration near the surface of the earth. This motion of a body falling towards the earth from a small height is called free fall. The acceleration with which a body falls is called acceleration due to gravity and it is denoted by g.

(i) **For a freely falling body, which of the following equation is incorrect.**

(a) h-ut =(1/2) gt2 (b) v2 — u2 =2gh

(c) h = (1/2) ut +gt2 (d) (v-u)/g = t

(ii) **The maximum height attained by a body thrown vertically upward with initial velocity u is**

(a) h=u2/2g (b) h=u/2g

(c) h=u2/g (d) h: 2u2/g

(iii) **The time of ascent of a body thrown vertically upward with initial velocity u is**

(a) t: u/2g (b) t: u/g

(c) t: u2/g (d) t: u/g2

(iv) **The total time of flight to come back to the point of projection of a body thrown vertically upward with initial velocity u is**

(a) t: 2u/3g (b) t: u/2g

(c) t: 2u/g (d) t: u 2/2g

ASSERTION AND REASON TYPE OUESTIONS

Directions: The question numbers I to 20 consist of two statements one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a)If both A and R are true and R is the correct explanation of A

(b)If both A and R are true but R is NOT the correct explanation of A

(c)If A is true but R is false

(d)If A is false and R is also false

I). **A :** It is not possible to have constant velocity and variable acceleration.

R : Accelerated body cannot have constant velocity.

2) **A** : The direction of velocity of an object can be reversed with constant acceleration.

R: A ball projected upward reverse its direction under the effect of gravity.

3). **A** : A body moving with decreasing speed may have increased acceleration.

R : The speed of body decreases when acceleration of body is opposite to velocity.

4) **A** : For a moving particle distance can never be negative or zero.

R : Distance is a scalar quantity and never decreases with time for moving object.

5) **A**:If speed of a particle is never zero then it may have zero average speed.

R : The average speed of a moving object in a closed path is zero.

6) **A**: The magnitude of average velocity in an interval can never be greater than average speed in that interval.

R : For a moving object distance travelled is greater than or equal to magnitude of displacement

7 **A**: The area under acceleration-time graph is equal to velocity of object.

R : For an object moving with constant acceleration position-time graph is a straight line.

MCQs

Q.1.A boy starts from a point A, travels to a point B at a distance of 3 km from A and return to

A. If he takes two hours to do so, his speed is

(a) 3 km/h (b) zero

(c) 2 km/h (d) 1.5 km/h

Q.2.A 180 meter long train is moving due north at a speed of 25 m/s. A small bird is flying due south, a little above the train, with a speed of 5 m/s. The time taken by the bird to cros the train is

(a) 10 s (b) 12 s

Q.3. A boy starts from a point A, travels to a point B at a distance of 1.5 km and returns to A If he takes one hour to do so, his average velocity is (a) 3 km/h (b) zero

(c) 1.5 km/h (d) 2 km/h

Q.4. A body starts from rest and travels with uniform acceleration on a straight line. If its velocity after making a displacement of 32 m is 8 m/s, its acceleration is

(a) I m/s2 (b) 2 m/s2

(c) 3 m/s2 (d) 4 m/s2

Q.5. Which one of the following is the unit of velocity?

(a) kilogram (b) meter

(c) m/s (d) second

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