

6

NEET / IIT/ JEE
FOUNDATION
COURSE

PREFACE

This book is specially for the students to get ready for competitive exams. The objective of this book is to make the students get ready for future.

At the same time it guides the students to face the challenges in maths and science in various fields. It places emphasis on developing thinking and reasoning skills among students, by connecting mathematics, Science and CPT curriculum with real life situations.

This book is compiled with six chapters each on mathematics and science. Each chapter is divided under different heads.

KEY FEATURES:

UNDERSTANDING:

Students will be able to understand the concept of different topics with related formulas, equations and concepts.

APPLICATIONS:

Apply effectively with the help of the guidelines given.

ANALYSIS:

Analysis the concepts using the given formula and equations.

OUTCOME:

Get ready for competitive exams in future.

**“Education is the kindling of a flame,
Not the Filling of the Vessel”**

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IIT/JEE – MATHS

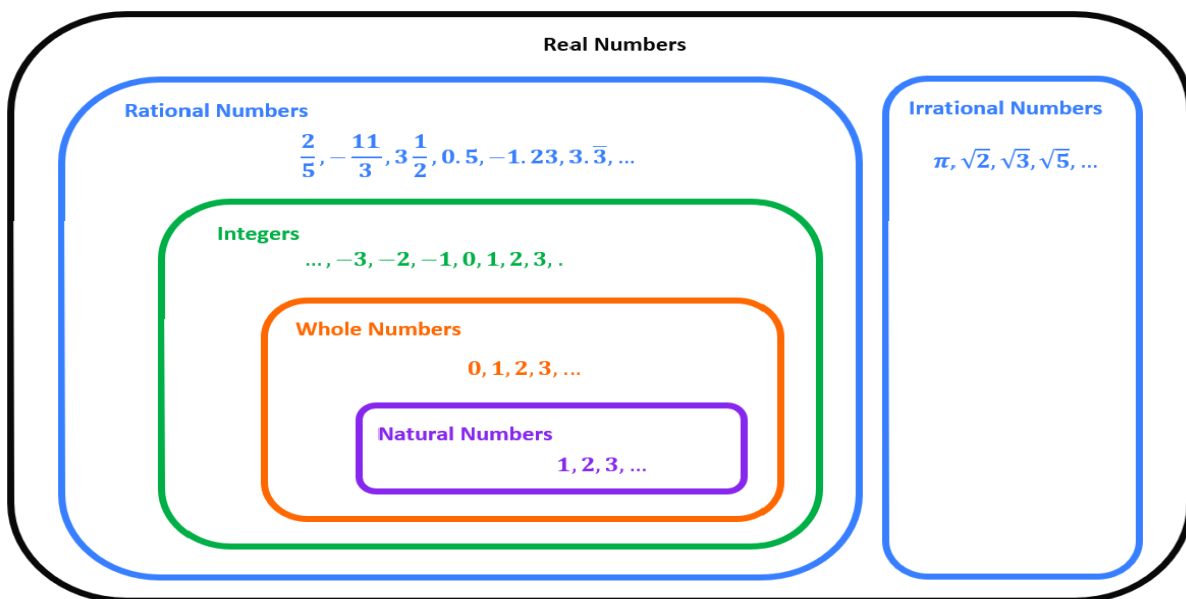


UNIT – 1 NUMBERS

All the numbers in mathematics are arranged in a set of real numbers

Indian Place Value System								
CRORES		LAKHS		THOUSANDS		ONES		
TC	C	TL	L	T-TH	TH	H	T	O
		2	3	1	9	6	1	7

International Place Value Chart								
MILLIONS			THOUSANDS			ONES		
HM	TM	M	HTh	TTh	Th	H	T	O
		2	3	1	9	6	1	7



- Even numbers** : The number is exactly divisible by 2.
- Odd number** : When a number is divisible by 2 it leaves a reminder.
- Prime number** : It has a factors 1 and the number itself.
- Composite Number** : It has more than two factors

Multiples : A multiple of a number is a number that is the product of a given number and some other natural number.

Factor : It is an exact divisor

Divisibility rules by

- 1) Number 2 : The one's place is an even number
- 2) Number 3 : The sum of digit is divisible by 3
- 3) Number 4 : The last 2 digit is divisible by 4 or 0
- 4) Number 5 : The one's place is either 0 or 5
- 5) Number 6 : It is divisible by both 2 and 3
- 6) Number 8 : The last 3 digit is either 0 or divisible by 8
- 7) Number 9 : The sum of the digit is divisible by 9
- 8) Number 10 : The one's place is 0

Rounding of number :

The number 237 is rounded to the nearest 10 is 240.

Whole number :

Whole numbers are the set of positive or natural numbers along with the zero.

$$W = \{ 0, 1, 2, 3, \dots \}$$

Properties of whole number

Commutative property $a + b = b + a$ and $ab = ba$

Distributive property $a(b + c) = ab + ac$

Associative property $a + (b + c) = (a + b) + c$

Commutative and associative property is not applicable for subtraction and division.

Square number :

A square number or perfect square is an integer that is the square of an integer. Ex. Square number of 3 is 9.

Exercise – 1.1

1. The greatest number which on rounding off to nearest thousands gives 5000 is _____.

- a) 5001 b) 5559 c) 5999 d) 5499

Ans : d) 5499

2. Sum of the greatest 8 digit number and the smallest 9 digit number is _____.

- a) 19999999 b) 199999999 c) 99999999 d) 10000999

Ans : b) 199999999

3. The whole number which does not have a predecessor is _____.

- a) 100 b) 0 c) 1 d) 9

Ans : b) 0

4. Successor of 301, 999 is _____.

- a) 30,200 b) 302,000 c) 302,1010 d) 301,100

Ans : b) 302,000

5. The least whole number is _____.

- a) 1 b) 10 c) 0 d) Does not exist

Ans : c) 0

6. The least natural number is _____.

- a) 0 b) 1 c) 9 d) Does not exist

Ans : b) 1

7. Successor of every even number is _____.

- a) Even b) Prime c) Odd d) None of these

Ans : c) Odd

8. The product of two odd number is _____.

- a) Even number b) An odd number
c) Cannot be determined d) None

Ans : b) An odd number

9. The sum of the prime numbers between 90 and 100 is _____.

- a) 188 b) 281 c) 376 d) 97

Ans : d) 97

10. Which digit in the number 568731 has a place value of thousands ?

- a) 8 b) 7 c) 6 d) 5

Ans : a) 8

11. Find the smallest number which when divided by 36 and 63 leaves 3 as the remainder.

- a) 365 b) 435 c) 255 d) 445

Ans : c) 255

12. The relation of which of the given series is such that the number are the squares of the prime numbers.

a) 4, 6, 9, 13

b) 4, 9, 25, 81

c) 4, 9, 25, 49, 121

d) None

Ans : c) 4, 9, 25, 49, 121

13. $56 (4 + 2) = (56 \times 4) + (56 \times 2)$ is an example of the _____ property of whole number.

a) Closure

b) Commutative

c) Associative

d) Distributive

Ans : d) Distributive

14. Which of the following is an example of commutative property?

a) $21 \times 1 = 21$

b) $5 \times (7 + 8) = 5 \times 7 + 5 \times 8$

c) $12 + 33 = 33 + 12$

d) None

Ans : c) $12 + 33 = 33 + 12$

15. In which of the following is the prime factorisation not complete?

a) $70 = 2 \times 5 \times 7$

b) $28 = 2 \times 2 \times 7$

c) $48 = 2 \times 2 \times 2 \times 2 \times 3$

d) $108 = 2 \times 2 \times 27$

Ans : d) $108 = 2 \times 2 \times 27$

16. Consider the following statements

i) The commutative property is true for multiplication

ii) The commutative property is true for addition

iii) The commutative property is true for subtraction

iv) Which statement is not correct ?

a) only (ii)

b) only (i)

c) only (iii)

d) None

Ans : b) only (i)

17. Consider the following statements

(i) Both addition and multiplication are associative for whole numbers

(ii) Zero is the identity for multiplication of whole numbers

which is not true? Choose the correct option.

a) only (i)

b) only (ii)

c) both

d) None

Ans : b) only (ii)

18. If the number $517*324$ is completely divisible by 3 then the smallest whole number in the place of * will be _____.

a) 0

b) 1

c) 2

d) None

Ans : c) 2

19. Use divisibility rules to determine which number is divisible by 6

a) 678

b) 789

c) 590

d) None

Ans : a) 678

20. The common factor of 56 and 44 are

- a) 1, 2, 4 b) 1, 2, 11 c) 1, 8 d) 2

Ans : a) 1, 2, 4

21. List the prime factorization of 24

- a) $2 \times 2 \times 2 \times 3$ b) $3 \times 2 \times 4$
c) 3×8 d) None

Ans : a) $2 \times 2 \times 2 \times 3$

22. What is the seventh multiple of 9 ?

- a) 45 b) 54 c) 63 d) 72

Ans : c) 63

23. How many factors do prime number have ?

- a) 0 b) 1 c) 2 d) 3

Ans : c) 2

24. If $6 \times 5 = 30$ then 6 and 5 are

- a) Addends b) Divisor c) Factors d) None

Ans : c) Factor

25. Which number is neither prime nor composite ?

- a) 3 b) 5 c) 1 d) 2

Ans : c) 1

26. Which list contains all prime number

- a) 1, 7, 13, 29 b) 2, 13, 17, 41
c) 5, 11, 29, 31 d) 6, 18, 21, 50

Ans : c) 5, 11, 29, 31

27. A number which is a factor of every number is

- a) 0 b) 1 c) 2 d) 5

Ans : b) 1

28. Find the least numbers which is divisible by each of the numbers 4, 8 and 12

- a) 12 b) 8 c) 144 d) 4

Ans : c) 144

29. Identify the problem with negative numbers as its Answer:

- a) $-9 + (-5) + 6$ b) $18 + (-12) - 6$
c) $- + 42 + 10$ d) $10 + (-4) + 8$

Ans : a) $-9 + (-5) + 6$

30. Simplify : $(10) + (+7) =$ _____

- a) + 3 b) - 3 c) - 17 d) + 17

Ans : d) +17

31. Simplify : $11 \times (-1) =$ _____
a) -1 b) 0 c) $+1$ d) -11

Ans : d) -11

32. Which of following does not represent an integer ?
a) $0 \div (-7)$ b) $20 \div (-4)$ c) $(-9) \div 3$ d) $(12) \div 5$

Ans : d) $(12) \div 5$

33. The set of integers is not closed under
a) Addition b) Subtraction c) Multiplication d) Division

Ans : d) Division

34. In an expression, we can add or subtract only...
a) Like terms b) Unlike terms
c) All terms d) None of the above

Ans : a) Like terms

35. The generalization of the number pattern 3, 6, 9, 12,is
a) n b) $2n$ c) $3n$ d) $4n$

Ans : c) $3n$

36. The place value of 3 in 85.073 is _____
a) tenths b) hundredths c) thousands d) thousandths

Ans : d) thousandths

37. The unit digit of the numeric expression $10^{71} + 10^{72} + 10^{73}$ is
a) 0 b) 3 c) 1 d) 2

Ans : a) 0

38. Between which two whole numbers 1.7 lie ?
a) 2 and 3 b) 3 and 4 c) 1 and 2 d) 1 and 7

Ans : c) 1 and 2

39. Find the greatest number that will divide 43, 91 and 183 so as to leave the same remainder in each case.

a) 4 b) 7 c) 9 d) 13

Ans : a) 4

40. The H.C.F. of two numbers is 23 and the other two factors or their L.C.M are 13 and 14. The larger of the two numbers is :

a) 276 b) 299 c) 322 d) 345

Ans : c) 322

41. Let N be the greatest number that will divide 1305, 4665 and 6905 leaving the same remainder in each case. Then sum of the digits in N is :

a) 4 b) 5 c) 6 d) 8

Ans : a) 4

42. The greatest number of four digits which is divisible by 15, 25, 40 and 75 is :

- a) 9000 b) 9400 c) 9600 d) 9800

Ans : c) 9600

43. The product of two numbers is 2028 and their H.C.F. is 13. The number of such pairs is:

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

Ans : b) 2

44. The least multiple of 7, which leaves a remainder of 4, when divided by 6, 9, 15 and 18 is:

- a) 74 b) 94 c) 184 d) 364

Ans : d) 364

45. Find the lowest common multiple of 24, 36 and 40.

- a) 120 b) 240 c) 360 d) 480

Ans : c) 360

46. Which one of the following is not a prime number ?

- a) 31 b) 61 c) 71 d) 91

Ans : d) 91

47. Which least number must be added to 1056, so that the sum is completely divisible by 23 ?

- a) 2 b) 3 c) 18 d) 21

Ans : a) 2

48. How many of the following numbers are divisible by 132, 264, 396, 462, 792, 968, 2178, 5184, 6336 ?

- a) 4 b) 5 c) 6 d) 7

Ans : a) 4

49. The largest 4 digit number exactly divisible by 88 is :

- a) 9944 b) 9768 c) 9988 d) 8888

Ans : a) 9944

50. Which of the following is a prime number ?

- a) 33 b) 81 c) 93 d) 97

Ans : d) 97

WORKSPACE

NAME: _____

SUBJECT: _____

CLASS: _____

MARKS: _____

1	☐ A	☐ B	☐ C	☐ D
2	☐ A	☐ B	☐ C	☐ D
3	☐ A	☐ B	☐ C	☐ D
4	☐ A	☐ B	☐ C	☐ D
5	☐ A	☐ B	☐ C	☐ D
6	☐ A	☐ B	☐ C	☐ D
7	☐ A	☐ B	☐ C	☐ D
8	☐ A	☐ B	☐ C	☐ D
9	☐ A	☐ B	☐ C	☐ D
10	☐ A	☐ B	☐ C	☐ D
11	☐ A	☐ B	☐ C	☐ D
12	☐ A	☐ B	☐ C	☐ D
13	☐ A	☐ B	☐ C	☐ D
14	☐ A	☐ B	☐ C	☐ D
15	☐ A	☐ B	☐ C	☐ D
16	☐ A	☐ B	☐ C	☐ D
17	☐ A	☐ B	☐ C	☐ D
18	☐ A	☐ B	☐ C	☐ D
19	☐ A	☐ B	☐ C	☐ D
20	☐ A	☐ B	☐ C	☐ D

21	☐ A	☐ B	☐ C	☐ D
22	☐ A	☐ B	☐ C	☐ D
23	☐ A	☐ B	☐ C	☐ D
24	☐ A	☐ B	☐ C	☐ D
25	☐ A	☐ B	☐ C	☐ D
26	☐ A	☐ B	☐ C	☐ D
27	☐ A	☐ B	☐ C	☐ D
28	☐ A	☐ B	☐ C	☐ D
29	☐ A	☐ B	☐ C	☐ D
30	☐ A	☐ B	☐ C	☐ D
31	☐ A	☐ B	☐ C	☐ D
32	☐ A	☐ B	☐ C	☐ D
33	☐ A	☐ B	☐ C	☐ D
34	☐ A	☐ B	☐ C	☐ D
35	☐ A	☐ B	☐ C	☐ D
36	☐ A	☐ B	☐ C	☐ D
37	☐ A	☐ B	☐ C	☐ D
38	☐ A	☐ B	☐ C	☐ D
39	☐ A	☐ B	☐ C	☐ D
40	☐ A	☐ B	☐ C	☐ D

41	☐ A	☐ B	☐ C	☐ D
42	☐ A	☐ B	☐ C	☐ D
43	☐ A	☐ B	☐ C	☐ D
44	☐ A	☐ B	☐ C	☐ D
45	☐ A	☐ B	☐ C	☐ D
46	☐ A	☐ B	☐ C	☐ D
47	☐ A	☐ B	☐ C	☐ D
48	☐ A	☐ B	☐ C	☐ D
49	☐ A	☐ B	☐ C	☐ D
50	☐ A	☐ B	☐ C	☐ D
51	☐ A	☐ B	☐ C	☐ D
52	☐ A	☐ B	☐ C	☐ D
53	☐ A	☐ B	☐ C	☐ D
54	☐ A	☐ B	☐ C	☐ D
55	☐ A	☐ B	☐ C	☐ D
56	☐ A	☐ B	☐ C	☐ D
57	☐ A	☐ B	☐ C	☐ D
58	☐ A	☐ B	☐ C	☐ D
59	☐ A	☐ B	☐ C	☐ D
60	☐ A	☐ B	☐ C	☐ D

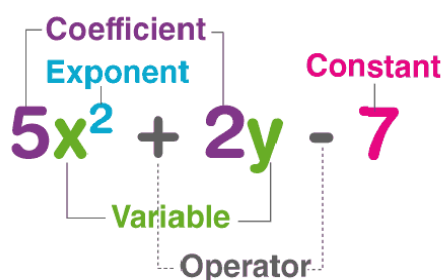
61	☐ A	☐ B	☐ C	☐ D
62	☐ A	☐ B	☐ C	☐ D
63	☐ A	☐ B	☐ C	☐ D
64	☐ A	☐ B	☐ C	☐ D
65	☐ A	☐ B	☐ C	☐ D
66	☐ A	☐ B	☐ C	☐ D
67	☐ A	☐ B	☐ C	☐ D
68	☐ A	☐ B	☐ C	☐ D
69	☐ A	☐ B	☐ C	☐ D
70	☐ A	☐ B	☐ C	☐ D
71	☐ A	☐ B	☐ C	☐ D
72	☐ A	☐ B	☐ C	☐ D
73	☐ A	☐ B	☐ C	☐ D
74	☐ A	☐ B	☐ C	☐ D
75	☐ A	☐ B	☐ C	☐ D
76	☐ A	☐ B	☐ C	☐ D
77	☐ A	☐ B	☐ C	☐ D
78	☐ A	☐ B	☐ C	☐ D
79	☐ A	☐ B	☐ C	☐ D
80	☐ A	☐ B	☐ C	☐ D

81	☐ A	☐ B	☐ C	☐ D
82	☐ A	☐ B	☐ C	☐ D
83	☐ A	☐ B	☐ C	☐ D
84	☐ A	☐ B	☐ C	☐ D
85	☐ A	☐ B	☐ C	☐ D
86	☐ A	☐ B	☐ C	☐ D
87	☐ A	☐ B	☐ C	☐ D
88	☐ A	☐ B	☐ C	☐ D
89	☐ A	☐ B	☐ C	☐ D
90	☐ A	☐ B	☐ C	☐ D
91	☐ A	☐ B	☐ C	☐ D
92	☐ A	☐ B	☐ C	☐ D
93	☐ A	☐ B	☐ C	☐ D
94	☐ A	☐ B	☐ C	☐ D
95	☐ A	☐ B	☐ C	☐ D
96	☐ A	☐ B	☐ C	☐ D
97	☐ A	☐ B	☐ C	☐ D
98	☐ A	☐ B	☐ C	☐ D
99	☐ A	☐ B	☐ C	☐ D
100	☐ A	☐ B	☐ C	☐ D

UNIT – 2

ALGEBRA

Algebra is the branch of mathematics that helps in the representation of problem or situations in the form of mathematical expression.



Statement

- (i) x subtracted from 6 is less than y
- (ii) y divided by 4 equals 3
- (iii) z increased by $3x$ is 26

Algebraic Form

$$6 - x < y$$

$$\frac{y}{4} = 3$$

$$z + 3x = 26$$

Conversely,

Algebraic Form

- (i) $x + y = 6$
- (ii) $b - 5 = x$
- (iii) $6x > 7$
- (iv) $\frac{6}{y} < 3$

Statement

x plus y is equal to 6
 or, sum of x and y is equal to 6
 b minus 5 is equal to x or, b decreased by 5
 is equal to x or, b exceeds 5 by x
 6 multiplied by x is greater than 7
 or, product of 6 and x is greater than 7
 6 divided by y is less than 3.

Term:

A Constant a variable or combination of constants and variables joined by multiplication or division operations.

Algebra factor:

A factor of a term containing a variable.

Co-efficient :

A factor of a term is the co – efficient of the product of the remaining factors in the term.

Like term:

Terms that have the same variable and the same power for each variable.

Unlike terms:

Terms that do not have the same variable or the same power for each variable.

Algebra expression:

A combination of terms joined by the addition or subtraction operation.

Algebra terms:

$3x, 4y$

Variable x, y in $3x, 4y$

Constant $3, 4$ in $3x, 4y$

Eg: $3x + 4, 4y^2$

Exercise: 2.1

1. The expression for p divided by 2 is _____
a) $p/2$ b) $2p$ c) $p + 2$ d) $p - 2$

Ans : a) $p/2$

2. The expression for 1 subtracted from p is _____
a) $-p - 1$ b) $p - 1$ c) $1 - p$ d) $1 + p$

Ans : b) $p - 1$

3. The expression for 1 added to $-p$ is _____
a) $-p + 1$ b) $-p - 1$ c) $p + 1$ d) $p - 1$

Ans : a) $-p + 1$

4. The expression for ' p multiplied by -2 ' is _____
a) $-2p$ b) $-p/2$ c) $p - 2$ d) $-p - 2$

Ans : a) $-2p$

5. The expression for added 2 times of x to 1 is _____
a) $2x+1$ b) $x+2$ c) $1-2x$ d) $2x-1$

Ans: a) $2x + 1$

6. The expression for x is divided by 2 and the result is added to 1 is

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

Ans : a) $1 + \frac{x}{2}$

7. If Amala's present age is x years what will be her age in years after 20 years from now ?

- a) $x + 20$ b) $x - 20$ c) None d) $20x$

Ans : a) $x + 20$

8. If Meenu's present age is x years what was her age in 10 years back?

- a) $x - 10$ b) $10 - x$ c) $-x - 10$ d) $10x$

Ans : a) $x - 10$

9. If the age of Harikisan is two time's the age of Manish then the age of Harikisan in years is

- a) $\frac{x}{2}$ b) $2x$ c) $x + 2$ d) $x - 2$

Ans: b) $2x$

10. Which of following is an equation in a variable ?

- a) $\frac{10}{2} = 5$ b) $2 \times 3 + 2 \times 1 = 5$ c) $2 \times 4 = 8$ d) $3p = 12$

Ans: d) $3p = 12$

11. Which of the following is an equation in a variable ?

- a) $2 < 10$ b) $3 > 12$ c) $x - 1 = 0$ d) $2 + 3 = 3 + 2$

Ans : c) $x - 1 = 0$

12. The rule which gives the number of matchstick required to make the matchstick pattern of "T" is _____

- a) $2n$ b) $3n$ c) $4n$ d) $5n$

Ans : a) $2n$

13. The rule which gives the number of matchsticks required to make the matchstick pattern of "U" is _____

- a) $2n$ b) $3n$ c) $4n$ d) $5n$

Ans : b) $3n$

14. Write an algebraic expression for the sum of a number x and 4 is doubled

- a) $2x + 4$ b) $2x + x + 4$ c) $\frac{2x}{4}$ d) $2x (x + 4)$

Ans: d) $2x (x + 4)$

15. Write an algebraic expression for one fourth of a number x is added to one third of the same number

- a) $\frac{1}{4}x + 3x$ b) $\frac{1}{4}x + \frac{1}{3}x$ c) $4x + \frac{1}{3}x$ d) $4x \times 3x$

Ans : b) $\frac{1}{4}x + \frac{1}{3}x$

16. Think of a number x multiply it by 3 and add 5 to the product and subtract subsequently find the resulting number

- a) $3x - 5 +$ b) $-3x - 5 + y$ c) $3x + 5 - y$ d) $3x + 5 + y$

Ans : c) $3x + 5 - y$

17. If the side of a equilateral triangle is x it's perimeter _____ units

- a) $2x$ b) $3x$ c) $4x$ d) None

Ans : b) $3x$

18. If $x = 3$ find the value of $\left(\frac{x}{3} - 1\right)$

- a) $\frac{1}{3}$ b) $\frac{3}{3}$ c) 0 d) 1

Ans : c) 0

19. If $x = 2$, $y = 3$ and $z = 5$ then the value of $x - y + z$ is _____

- a) 3 b) 10 c) 4 d) 1

Ans : c) 4

20. The side of a regular hexagon it's cm find its perimeter

- a) $5s$ cm b) $6s$ cm c) $7s$ cm d) None

Ans : b) $6s$ cm

21. 5 added to -5

- a) 5 b) -5 c) 1 d) 0

Ans : d) 0

22. 4 less than a number $x =$ _____

- a) $x + 4$ b) $\frac{x}{4}$ c) $4x$ d) $x - 4$

Ans : d) $x - 4$

23. If $x = 3$ then $3x - 5 =$ _____

- a) 15 b) 14 c) 4 d) 1

Ans : c) 4

24. If the side of a square is I then the perimeter is _____

- a) $2I$ b) $4I$ c) $3I$ d) I

Ans : b) $4I$

25. Six less than a number equals to two what is the number ?

- a) 2 b) 10 c) 4 d) 8

Ans : d) 8

26. The numerical co – efficient of $-7mn$ is

- a) 7 b) -7 c) p d) $-p$

Ans : b) -7

27. Choose the pair of like terms

- a) $7p$, $7x$ b) $7r$, $7x$ c) $-4x$, 4 d) $-4x$, $7x$

Ans : d) $-4x$, $7x$

28. The value of $7a - 4b$ when $a = 3$, $b = 2$ is

- a) 21 b) 13 c) 8 d) 32

Ans : b) 13

29. An algebraic expression which is equivalent to the verbal statement “ Three times the sum of x and y ” is

- a) $3(x + y)$ b) $3 + x + y$ c) $3x + y$ d) $3 + xy$

Ans : a) $3(x + y)$

30. The addition of $3mn$, $-5mn$, $8mn$ and $-4mn$ is

- a) mn b) $-mn$ c) $2mn$ d) $3mn$

Ans : c) $2mn$

31. When we subtract ‘ a ’ from ‘ $-a$ ’, we get _____

- a) 0 b) $2a$ c) $-2a$ d) $-a$

Ans : c) $-2a$

32. _____ can take various values.

- a) Variable b) Expression
c) Term d) None of the above

Ans : a) Variable

33. Which of the following is like term as $8xy$, $8xz$

- a) 8 b) $8x$ c) $8y$ d) xy

Ans : b) $8x$

34. Expand $(97xy)^3$

- a) $912673x^3y^2$ b) $912673xy^2$ c) $912673x^3y^3$ d) $912673x^2y^2$

Ans : c) $912673x^3y^3$

35. How many terms are there in the expression $2y + 5$?

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

Ans : b) 2

36. If $a = \frac{1}{2}$, $b = \frac{3}{4}$ then $a + b$ is _____

- a) $\frac{4}{6}$ b) $\frac{5}{4}$ c) $\frac{3}{8}$ d) 1

Ans : b) $\frac{5}{4}$

37. The common factors of the algebraic expressions ax^2y , bxy^2 and $cxyz$ is

- a) x^2y b) xy^2 c) xyz d) xy

Ans : d) xy

38. The solution of the in equation $3 \leq p \leq 6$ are (where p is a natural number)

- a) 4,5 and 6 b) 3,4 and 5 c) 4 and 5 d) 3,4,5 and 6

Ans : d) 3,4,5 and 6

39. The solution of the in equation $5x + 5 \leq 15$ are (where x is a natural number)

- a) 1 and 2 b) 0,1 and 2 c) 2,1,0,-1,-2 d) 1,2,3

Ans : a) 1 and 2

40. The cost of one pen is ₹8 it is available in a sealed pack of 10 pens. If Swetha has only ₹500, how many packs of pens can she buy at the maximum?

- a) 10 b) 5 c) 6 d) 8

Ans : c) 6

WORKSPACE

NAME: _____

SUBJECT: _____

CLASS: _____

MARKS: _____

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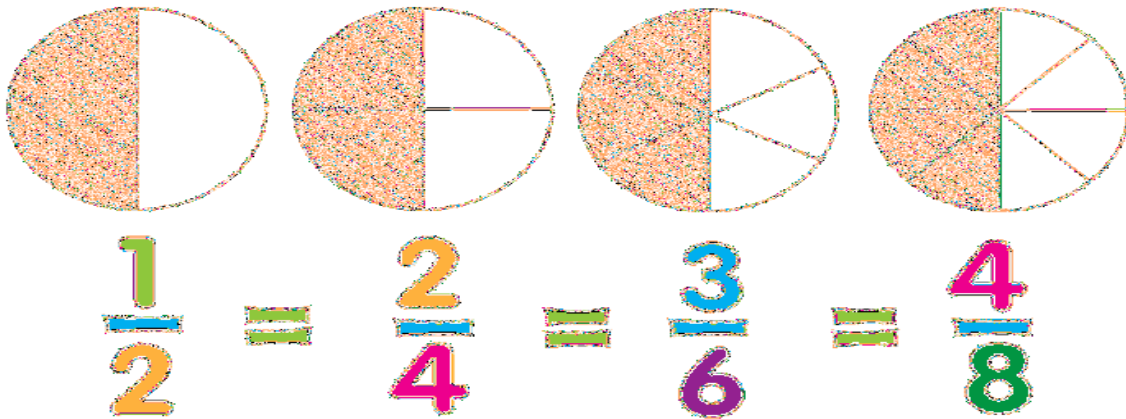
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UNIT – 3
FRACTIONS



Types of Fraction

1. Proper Fractions	$\frac{1}{2}$
2. Improper fractions	$\frac{3}{2}$
3. Mixed numbers	$2 \frac{3}{2}$

Fraction :

It is part of a whole or a collection.

Numerator:

Upper part of the fraction.

Denominator:

Lower part of the fraction.

Proper fraction :

The numerator of the fraction is less than its denominator-

Eg $\frac{2}{3}$

Improper fraction:

The numerator of the fraction is more than its denominator Eg $\frac{16}{3}$.

Mixed Fraction : The combination of a whole number and a proper fraction-

$2\frac{5}{6}$.

Like fractions : Fraction with the same denominator $\frac{6}{5}, \frac{4}{5}$

Unlike Fractions : Fraction with different denominator. $\frac{5}{3}, \frac{2}{8}$

Unit fractions : fractions with digit 1 as its numerators. $\frac{1}{3}, \frac{1}{8}$

Equivalent fraction : Fractions that have the same value. $\frac{2}{4} = \frac{1}{2}$

Reciprocal : The number obtained by interchanging the position of the numerator and denominator of the fraction $\frac{2}{3} = \frac{3}{2}$

Exercise – 3.1

1. Fractions with the same denominator is _____

- a) Proper fraction
- b) Improper fraction
- c) Like fraction
- d) Unlike fractions

Ans : c) Like fraction

2. Upper part of the fraction is _____

- a) Denominator
- b) Numerator
- c) Fraction
- d) Decimal

Ans : b) Numerator

3. Identify the mixed fraction.

- a) $\frac{2}{3}$
- b) $\frac{15}{3}$
- c) $8\frac{2}{3}$
- d) $\frac{8}{6}$

Ans : c) $8\frac{2}{3}$

4. The numerator of the fraction is less than its denominator is called _____.

- a) Improper fraction
- b) Proper fraction
- c) Mixes fraction
- d) Like fraction

Ans : a) Improper fraction

5. Fraction with the digit _____ as their numerators.

- a) 0
- b) 1
- c) $\frac{2}{3}$
- d) $\frac{6}{10}$

Ans : b) 1

12. Which of the following is a improper fraction ?

a) $\frac{2}{3}$

b) $\frac{1}{3}$

c) $\frac{5}{7}$

d) $\frac{11}{3}$

Ans : a) $\frac{2}{3}$

13. Which of the following is a proper fraction whose numerator is 1 and denominator is 3 ?

a) $\frac{1}{3}$

b) $\frac{1}{6}$

c) $\frac{1}{9}$

d) $\frac{1}{12}$

Ans : a) $\frac{1}{3}$

14. Which of the following pairs of fractions are like fractions ?

a) $\frac{1}{5}, \frac{4}{5}$

b) $\frac{2}{3}, \frac{3}{4}$

c) $\frac{4}{5}, \frac{5}{6}$

d) $\frac{5}{6}, \frac{6}{7}$

Ans : a) $\frac{1}{5}, \frac{4}{5}$

15. Which of the following pairs of fraction are unlike fractions ?

a) $\frac{2}{5}, \frac{3}{5}$

b) $\frac{1}{7}, \frac{6}{6}$

c) $\frac{2}{9}, \frac{5}{9}$

d) $\frac{4}{13}, \frac{12}{13}$

Ans : b) $\frac{1}{7}, \frac{6}{6}$

16. $\frac{1}{3} + \frac{2}{3} =$ _____.

a) 1

b) 2

c) 3

d) None of these

Ans : a) 1

17. What fraction of a year is 6 months ?

a) $\frac{3}{12}$

b) $\frac{4}{12}$

c) $\frac{6}{12}$

d) $\frac{8}{12}$

Ans : c) $\frac{6}{12}$

18. Which of the following price of fractions are not equivalent ?

a) $\frac{1}{2}, \frac{2}{3}$

b) $\frac{4}{5}, \frac{12}{15}$

c) $\frac{6}{7}, \frac{12}{14}$

d) $\frac{4}{9}, \frac{36}{81}$

Ans : a) $\frac{1}{2}, \frac{2}{3}$

19. $\frac{3}{5}$ is _____ type of fraction ?

a) Unit fraction

b) Like fraction

c) Proper fraction

d) Improper fraction

Ans : c) Proper fraction

20. Unlike fraction with the _____ denominators.

- a) same b) Different c) 1 d) None of these

Ans : b) Different

21. Which of the following is not an equivalent fraction of $\frac{8}{12}$?

- a) $\frac{2}{3}$ b) $\frac{16}{24}$ c) $\frac{32}{60}$ d) $\frac{24}{36}$

Ans : c) $\frac{32}{60}$

22. Which of the following rational numbers is the greatest ?

- a) $\frac{-17}{24}$ b) $\frac{-13}{16}$ c) $\frac{7}{-8}$ d) $\frac{-31}{32}$

Ans : a) $\frac{-17}{24}$

23. The sum of the digits of the denominator in the simplest form of the $\frac{112}{528}$ is

_____.

- a) 4 b) 5 c) 6 d) 7

Ans : c) 6

24. Which of the following fractions is greater than $\frac{3}{4}$ and less than $\frac{5}{6}$?

- a) $\frac{2}{9}$ b) $\frac{2}{3}$ c) $\frac{4}{5}$ d) $\frac{9}{10}$

Ans : c) $\frac{4}{5}$

25. The rational number for recurring decimal 0.125125 _____ is :

- a) $\frac{63}{487}$ b) $\frac{119}{993}$ c) $\frac{125}{999}$ d) $\frac{214}{374}$

Ans : c) $\frac{125}{999}$

26. The correct expression of 6.46 in the fractional form is :

- a) $\frac{646}{99}$ b) $\frac{64640}{1000}$ c) $\frac{640}{100}$ d) $\frac{640}{999}$

Ans : d) $\frac{640}{999}$

27. The fraction $101\frac{27}{100000}$ in decimal form

- a) .01027 b) .10127 c) 101.00027 d) 101. 000027

Ans : c) 101.00027

28. The difference between a positive proper fraction and its reciprocal is $\frac{9}{20}$.

The fraction is :

a) $\frac{3}{5}$

b) $\frac{3}{10}$

c) $\frac{4}{5}$

d) 43

Ans : c) $\frac{4}{5}$

Can you solve this puzzle :

CRACK THE CODE



CODE

A NUMERIC LOCK HAS A 3 DIGIT KEY

HINT

4 8 2 One number is correct and well placed	4 1 6 One number is correct but wrong placed	2 0 4 Two numbers are correct but wrong placed
7 3 8 Nothing is correct	7 8 0 One number is correct but wrong placed	

A) 062 B) 602 C) 042 D) 204

WORKSPACE

NAME:_____

SUBJECT:_____

CLASS:_____

MARKS:_____

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98	A	B	C	D
99	A	B	C	D
100	A	B	C	D

UNIT – 4

DECIMALS

Decimals :

Fraction in which denominators are either 10 or multiples of 10.

Decimal point :

A point that separates the whole number from the decimal number part.

Tenths :

The first digit after the decimal point whose value is $\frac{1}{10}$

Hundredths :

The second digit after the decimal point whose value is $\frac{1}{100}$

Thousandths :

The third digit after the decimal point value is $\frac{1}{1000}$

Number line :

A straight line where the numbers are placed in an order with equal spacing between them.

Like decimals:

Decimal number having an equal number of decimal places.

Unlike Decimals:

Two or more decimal numbers having an unequal number of decimal places.

EXERCISE – 4 . 1

1. What is the place value of 4 in the number 25.347 ?

- a) 4 tens b) 4 tenths c) 4 hundredths d) 4 hundred

Ans : c) 4 hundredths

2. How is the decimal number 9.6 read ?

- a) Nine six b) Ninety six c) Nine point six d) Nine six

Ans : c) Nine point six

3. What is the decimal from? $\frac{4}{10}$

- a) 4 b) 0.4 c) 40 d) 0.04

Ans : b) 0.4

4. What is the fractional from of 46.3 ?

a) $\frac{46}{10}$

b) $\frac{460}{10}$

c) $46\frac{3}{10}$

d) $\frac{463}{100}$

Ans : c) $46\frac{3}{10}$

5. Write $\frac{4}{20}$ as a decimal _____

a) 0.4

b) 0.20

c) 0.25

d) 0.40

Ans : b) 0.20

6. Which of the following is the place value of 3 in 4.375 ?

a) $\frac{3}{10}$

b) 30

c) 3

d) None of these

Ans : a) $\frac{3}{10}$

7. Find the decimal number for “one and four tenths”

a) 14.0

b) 1.4

c) 0.14

d) 140.0

Ans : b) 1.4

8. Find the decimal number for “sixty seven and twenty three one-hundredths”

a) 67.23

b) 6.723

c) 0.6723

d) 6723.0

Ans : a) 67.23

9. Find the decimal number for “ 12.78” rounded to the nearest tenths.

a) 12.8

b) 12.7

c) 12.79

d) 13.0

Ans : a) 12.8

10. Find the decimal number for 3.8439 rounded to the nearest hundredths place

a) 3.84

b) 3.844

c) 3.843

d) 3.85

Ans : a) 3.84

11. Which of the following decimal number is the least ? 1.305, 1.35, 1.053, 1.53

a) 1.305

b) 1.35

c) 1.053

d) 1.53

Ans : c) 1.053

12. Smallest number in the row 31.21, 31.12, 311.2, 3.112 is _____

a) 31.21

b) 31.12

c) 311.2

d) 3.112

Ans : d) 3.112

13. Highest number in the row 9.03, 9.33, 9.39, 9.09 is _____

- a) 9.03 b) 9.33 c) 9.39 d) 9.09

Ans : c) 9.39

14. Five and seven hundredths is equal to

- a) 5.7 b) 5.07 c) 0.57 d) 5.70

Ans : b) 5.07

15. Sixty three thousandths is equal to

- a) 0.63 b) 0.630 c) 0.603 d) 0.063

Ans : d) 0.063

16. Which of the following in the decimal form of “two ones and five tenths” ?

- a) 0.2 b) 0.25 c) 2.5 d) 25.0

Ans : c) 2.5

17. The place value of the digit 7 in the decimal number 5.0378 is

- a) $\frac{7}{1000}$ b) $\frac{7}{10}$ c) $\frac{3}{100}$ d) $\frac{5}{100}$

Ans : a) $\frac{7}{1000}$

18. The place value of the digit 1 in the decimal number 13.405 is

- a) 0 b) $\frac{1}{10}$ c) $\frac{1}{100}$ d) None of these

Ans : c) $\frac{1}{100}$

19. Which of the following decimal number is the greatest ?

- a) 0.291 b) 0.219 c) 0.038 d) 0.182

Ans : a) 0.291

20. Which of the following decimal number is the smallest ?

- a) 0.81 b) 0.801 c) 1.08 d) 0.108

Ans : d) 0.108

21. What decimal of an hour is a second ?

- a) .0025 b) .0256 c) .00027 d) .000126

Ans : c) .00027

22. If $2994 \div 14.5 = 172$, then $29.94 \div 1.45 = ?$

- a) 0.172 b) 1.72 c) 17.2 d) 172

Ans : c) 17.2

23. When 0.232323....is converted into a fraction, then the result is:

a) $\frac{1}{5}$

b) $\frac{2}{9}$

c) $\frac{23}{99}$

d) $\frac{23}{100}$

Ans : c) $\frac{23}{99}$

24. $3889 + 12.952 - ? = 3854.002$

a) 47.095

b) 47.752

c) 47.932

d) 47.95

Ans : d) 47.95

25. Sum of two decimals is 4.78. If one decimal is 3.21, then the other one is

a) 1.57

b) 1.75

c) 1.59

d) 1.58

Ans : a) 1.57

26. The difference of two decimals is 86.58 and one of the decimal is 42.31

Find the other one.

a) 128.89

b) 128.69

c) 128.36

d) 128.39

Ans : a) 128.89

27. 0.04×0.0162 is equal to:

a) 6.48×10^{-3}

b) 6.48×10^{-4}

c) 6.48×10^{-5}

d) 6.48×10^{-6}

Ans : b) 6.48×10^{-4}

28. $0.002 \times 0.5 = ?$

a) 0.0001

b) 0.001

c) 0.01

d) 0.1

Ans : b) 0.001

29. A frog jumps 5.3cm in one jump. The distance travelled by the frog in 10 jumps is _____.

a) 0.53cm

b) 530cm

c) 53.0cm

d) 53.5cm

Ans : c) 53.0cm

30. Which of the following is equal to 3.14×10^6 ?

a) 314

b) 3140

c) 3140000

d) None of these

Ans : c) 3140000

31. $34.95 + 240.016 + 23.98 = ?$

a) 298.0946

b) 298.111

c) 298.946

d) 299.09

Ans : c) 298.946

32. The least among the following is:

a) 0.2

b) $1 \div 0.2$

c) 0.2

d) $(0.2)^2$

Ans : d) $(0.2)^2$

33. How many digits will be there to the right of the decimal point in the product 95.75 and .02554 ?

- a) 5 b) 6 c) 7d) None of these

Ans : b) 6

34. 4.036 divided by 0.04 gives:

- a) 1.009 b) 10.09 c) 100.9 d) None of these

Ans : c) 100.

NAME:_____

SUBJECT:_____

CLASS:_____

MARKS:_____

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SCIENCE

CONTENTS

S.NO	TOPICS	Page.No
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UNIT – 1

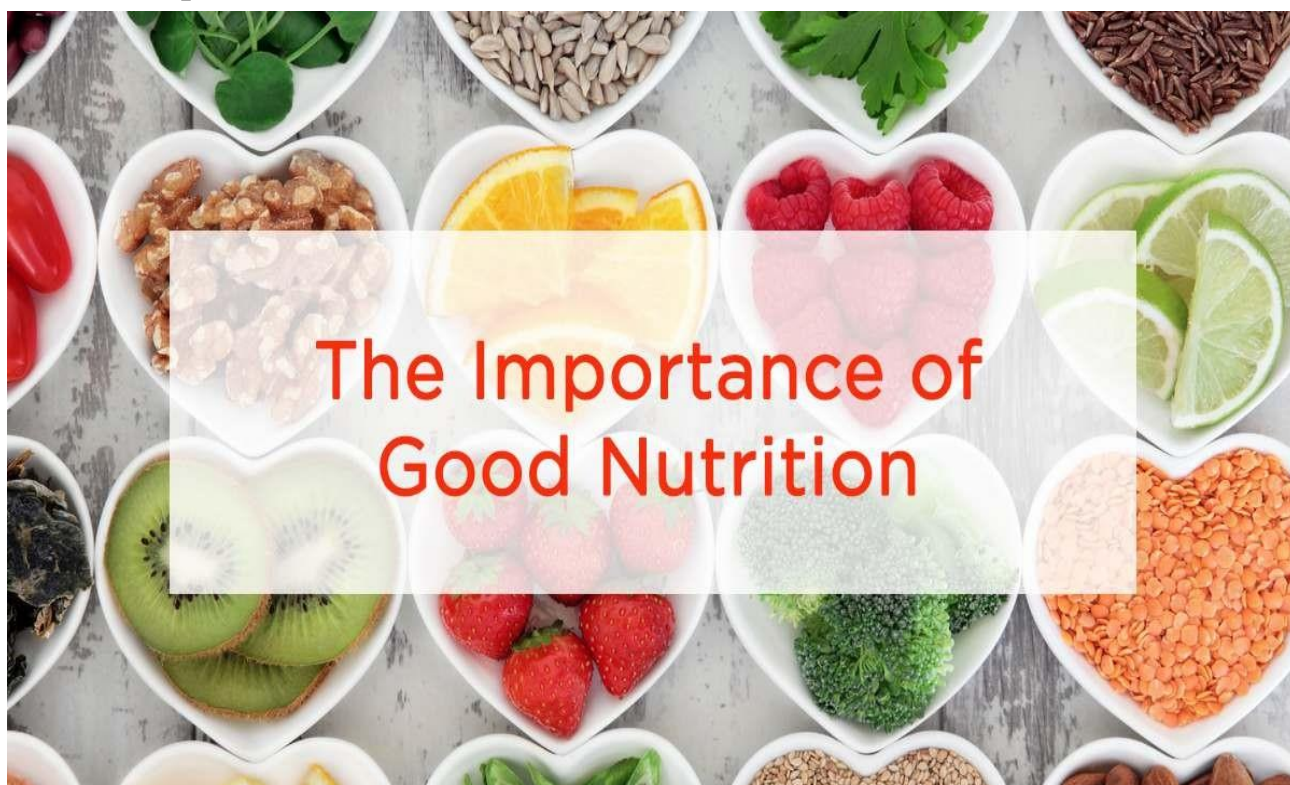
NUTRITION IN PLANTS

Introduction :

All living organisms require food. The food gives energy to the organisms for growth and maintenance of their body functions.

Carbohydrates, Proteins, Fats, Vitamins and minerals are the components of food. These components of food are necessary for our body and are called **nutrients**.

Nutrients is the process of taking food by an organism and its utilization by the body. Green plants prepare their own directory or indirectly dependent on plants for their food.



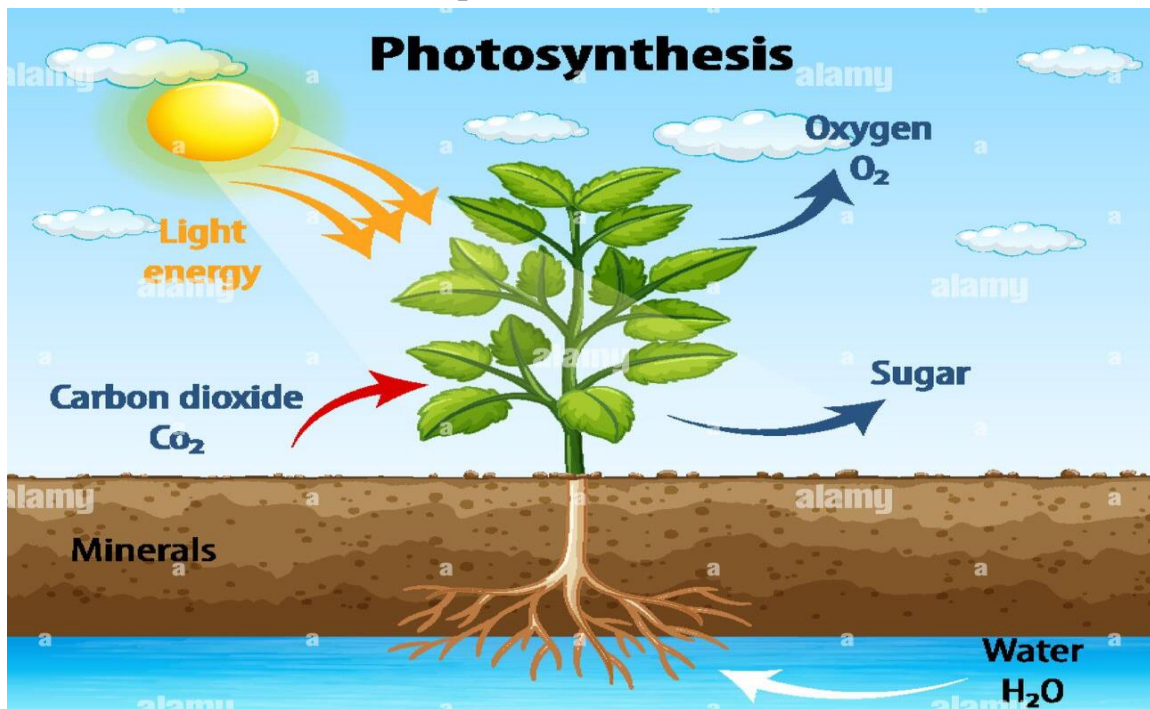
Modes of Nutrients:

On the basis of different mode of nutrition, Organisms are categorized in to two major types.

1. Autotrophs
2. Heterotrophs

1. Autotrophs:

Autotrophs **nutrients** are the mode of nutrients in which organisms make their own food from the simple substance.

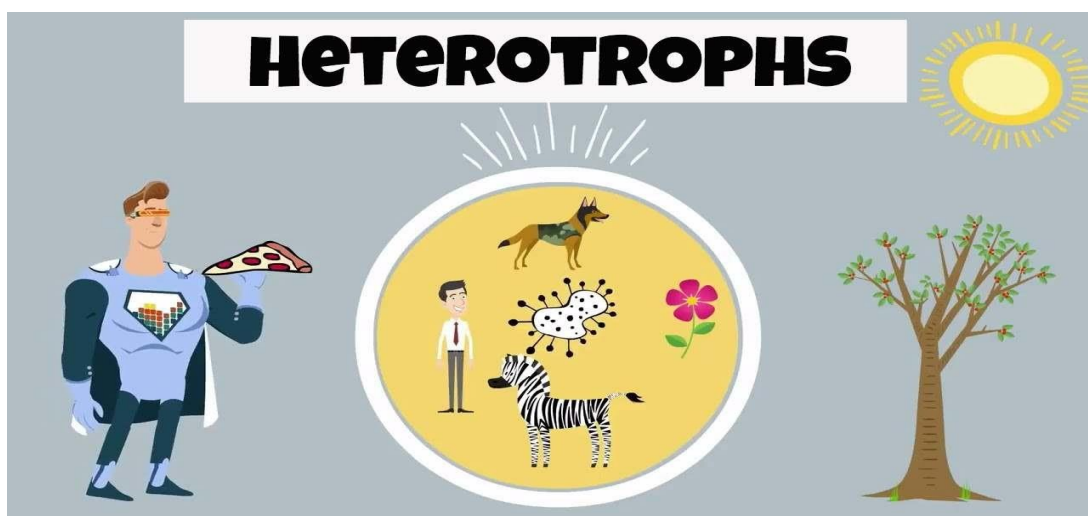


Eg; (CO_2 and H_2O)

By the process of photosynthesis. Therefore, plants are called autotrophs.

2. Heterotrophs:

Human and animals do not contain chlorophyll and are dependent on plants for their food in ready made form. Those organisms which cannot prepare their own food and take food from green plants or animals are called **heterotrophs** and the mode of nutrition is called **heterotrophic nutrition**.

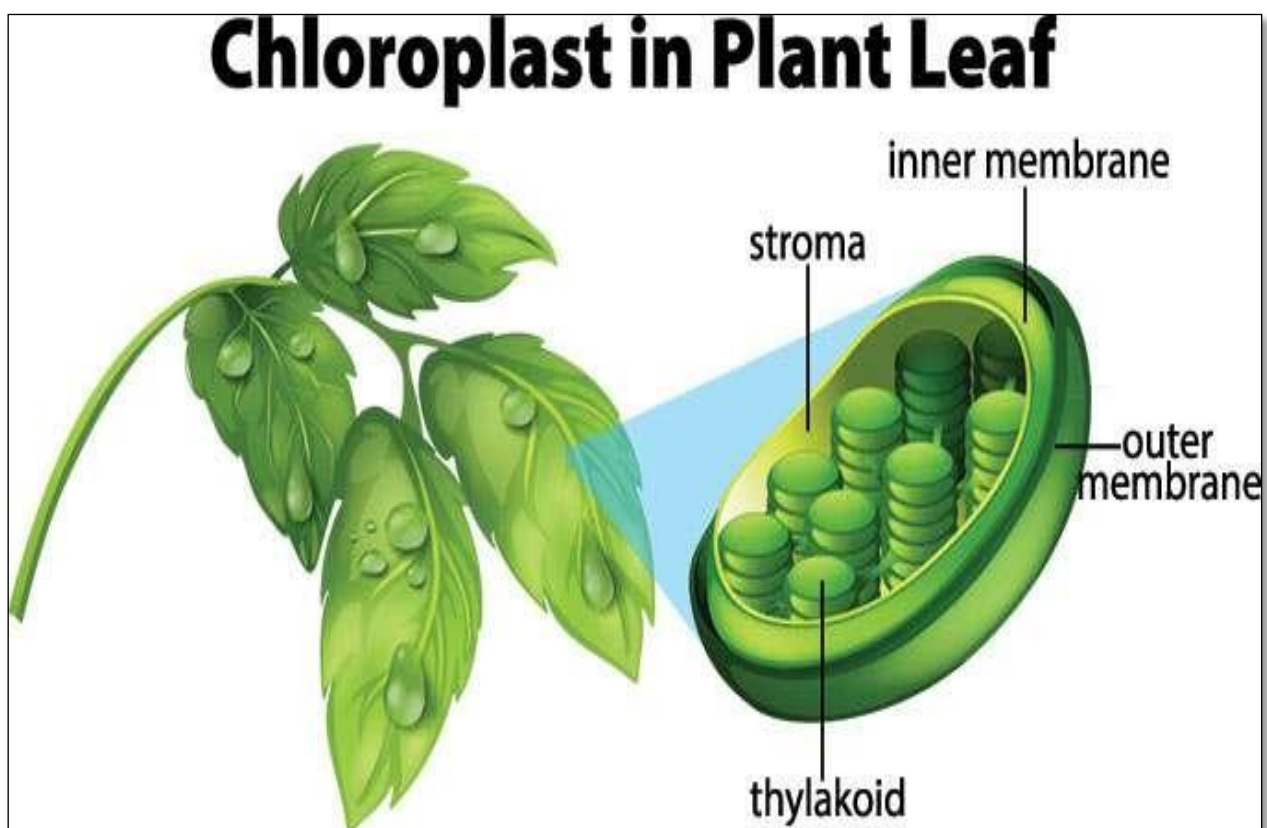


Photosynthesis :

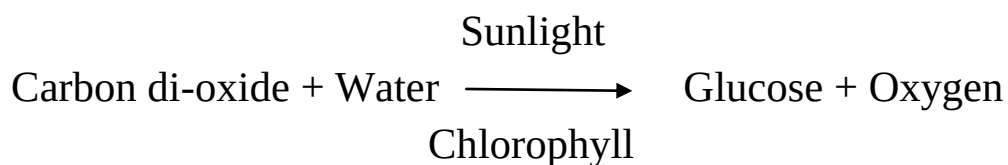
Food making process in plants : The process by which autotrophic green plants make their own food from simple inorganic substances (Carbon dioxide and water) in the presence of chlorophyll is known as photosynthesis.

Site of photosynthesis :

The process of photosynthesis takes place in green leaves, therefore leaves are referred to as the food factories of plants. The photosynthesis process can occur in other green parts of the plant like stem but is not enough for meeting all the needs of the plant.



Reactions involved in photosynthesis :



Other modes of nutrition in plants:

There are some plants which do not contain chlorophyll in them and thus, cannot prepare their own food. These plants obtain their food from other plants or animal, i.e. They are heterotrophic in nature.

Parasitic plants :

A parasitic plant is one that lives inside or outside the other organism and derive their food from them. The plant (non-green) which obtains their food from other organism is called a parasite and the living organisms from whose body, food is obtained is called **host**.



Eg; Amarbel or cuscuta. It takes through special type of roots called sucking roots which penetrate into host plant and suck food material from the host.

Insectivorous plants :



There are some plants which can trap insects and digest them green in nutrition. These plants are green in color but lack nitrogen elements. To overcome this problem, these plants eat insects. Hence they are called insectivorous plant or carnivorous plants. These have specialized leaves , the apex of which forms a lid that can open and close the mouth of pitcher which are used to entangle the insects.

Eg; Pitcher plant, Sundew, Venus flytrap and bladderwort.

Saprotrophic plants :

The mode of nutrition in which organisms take their nutrients from dead and decaying matter is called saprotrophic nutrition. Plants which use the saprotrophic nutrition are called saprotrophs.



Eg; Fungi like mushrooms are non-green plants that grow on the dead and decaying matter for their food.

Symbiotic plants :

Sometimes two plants of different species live together and help each other in obtaining food and shelter. This association is called symbiosis and such plants are called symbiotic plants.

The relationship in which two different organisms live together and share shelter and nutrients is called symbiotic relationship.



Eg; Lichens and Rhizobium.

CHOOSE THE CORRECT ANSWER:

1. Which of the following is a nutrient ?

- a) Protein b) Fat c) Vitamin **d) All of these**

2. Human beings can be categorized as _____.

- a) Heterotrophs** b) Autotrophs c) Parasites d) Saprophytes

3. The food making process in plants is called as _____.

- a) Glycolysis **b) Photosynthesis**
c) Photolysis d) Chemosynthesis

4. Which part of the plant is called its food factory?

- a) Fruits b) Seeds **c) Leaves** d) Flowers

5. The pores present on the surface of leaves through which gaseous exchange

Occurs are called _____.

- a) Stomata** b) Guard cells c) Food holes d) Gas holes

6. What is the ultimate source of energy for all living organisms?

- a) Water energy b) Wind energy
c) Solar energy d) Chemical energy

7. Green pigment present in the leaves is called _____.

- a) Hemoglobin b) Globulin
c) Albumin **d) Chlorophyll**

8. During photosynthesis plants _____.

- a) Take oxygen and release carbon dioxide
b) Take Carbon dioxide and release oxygen
c) Take Carbon dioxide but do not release oxygen
d) Take oxygen but do not release carbon dioxide

9. During photosynthesis.

- a) Solar energy is converted in to chemical energy
b) Solar energy is converted in to Mechanical energy
c) Chemical energy is converted into mechanical energy
d) Bio energy is converted in to chemical energy.

10. The raw materials for photosynthesis are.
a) CO_2 b) CO_2 , O_2 , H_2 c) N_2 water d) O_2 Water
11. The end products of photosynthesis are _____.
a) Carbohydrates, Oxygen b) Carbohydrates, Hydrogen
 c) Carbohydrates, Water vapours d) Carbohydrates, Oxygen and
12. Which one of the following is a parasite ?
 a) Lichen **b) Cuscuta** c) Pitcher d) Rhizobium
13. Which of following class of organisms belongs to saprophytes ?
a) Fungi b) Algae c) Lichens d) Bryophytes
14. Which of the following is an insectivorous plant ?
a) Pitcher plant b) Indian telegraph plant
 c) 4 'o' clock plant d) Cuscuta
15. Which of the following class of organisms belong to saprophytes ?
 a) Lichens b) Rhizobium and a legume
c) None of these d) Both (a) and (b)
16. All organisms take _____ and utilize it to get energy for the growth and the maintenance of their bodies.
a) Food b) Water c) Air d) Fat
17. Green plants synthesis their food themselves by the process of _____.
 a) Photolysis b) Glycolysis
c) Photosynthesis d) Chemosynthesis
18. _____ energy is stored by the leaves with the help of chlorophyll.
a) Solar b) Wind c) Fire d) Liquid
19. _____ drive nutrition from dead, decaying matter.
a) Saprophytes b) Autotrophs c) Parasite d) Lichens
20. Plants like Cuscuta take food from _____ plant.
 a) Parasite **b) Host** c) Saprophyte d) Vector
21. All animal are categorized as _____.
a) Heterotrophs b) Autotrophs
 c) Insectivorous d) Symbiotic plants
22. _____ is the site of reception of light energy in leaves.
a) Chlorophyll b) Chitin c) Cellulose d) Mitochondria

23. _____ is produced and _____ is utilized during Photosynthesis

a) O₂, CO₂

b) CO₂, O₂

c) N₂, O₂

d) O₂, N₂

24. An example of Autotrophs _____.

a) Fungi

b) Bacteria

c) Animals

d) Plants

25. Complete the formula $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + \underline{\hspace{2cm}}$

a) H₂O

b) CO₂

c) 6H₂O

d) CO₃

UNIT – II

WATER POLLUTION

INTRODUCTION :

When harmful substances contaminated the environment it is called pollution. Pollution refers to the very bad condition of environment in terms of quantity and quality.

WATER POLLUTION :

Water pollution can be defined as presence of solid, Liquid or gaseous contaminants in such concentration that may alter the quality of water.



Water pollution is defined as the addition to water of an excess material or heat that is harmful to the living organism or which impairs the beneficial use of water.

CAUSES OF WATER POLLUTION :

The principle sources of water pollution resulting from exploration and production operations are.

1. Domestic Waste
2. Sewage system
3. Solid Waste
4. Industrial Waste
5. Acid rain
6. Oil Industry
7. Aquatic plants



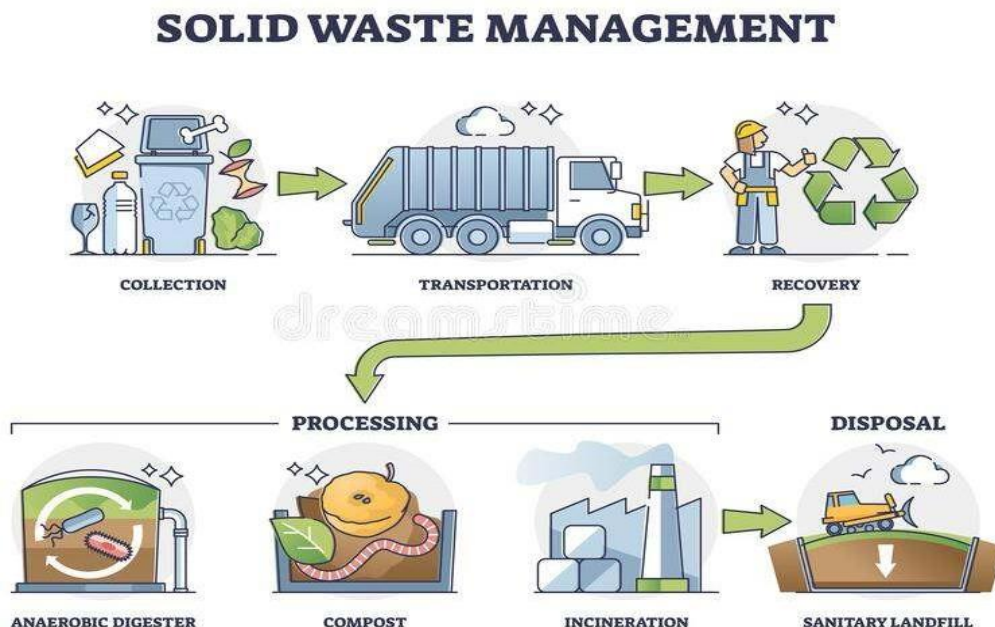
DOMESTIC WASTES :

Dumping of house hold waste into water.



Solid waste:

Solid waste causes blockage in flow of water. It causes water as well as air pollution polythene is the main solid waste.



Industrial Wastes:

Industrial Wastes containing paper waste, rubber, metallic, aluminum waste etc. is drawn directly into water which pollutes water.



Effects of water :

- Death of aquatic organisms
- Rivers and changed into dustbin
- Increase and changed into dustbin
- Increase ion BOD

Control measures:

- Stabilization of ecosystem
- Sewage treatment
- Ion exchange method

Softness of water

Water which produce form in a soap solution is called Soft water.

Hardness of water

Water which do not produce foam in a soap solution is called Hard water. Ion exchange and lime softening are used to remove fluorides from the water bodies.

CHOOSE THE CORRECT ANSWER:

1. In comparison to pure water, boiling point of impure water is _____ .

- | | |
|--------------|------------------------------------|
| a) Same | <u>b) Increases</u> |
| c) Decreases | d) First decreases then increases. |

2. Reason of water pollution is _____ .

- | | |
|----------------------|-----------------------------------|
| a) Pesticides | b) Human activity |
| c) Population growth | <u>d) All of the above</u> |

3. Which pollutant is the major source of marine pollution?

- | | |
|---|--------------|
| <u>a) Agricultural run – off</u> | b) Oil spill |
| c) Pollution of water | d) Saline |

4. Major cause of water – borne diseases in India is _____.
- a) Hardness of Water b) Scarcity of Water
c) Pollution of Water d) Saline water
5. Which one of the following diseases is caused by water pollution?
- a) Conjunctivitis b) Respiratory infections
c) Diarrhoea d) Bronchitis
6. Which one of the following is not a category of ground water block in Rajasthan?
- a) Less exploited** b) Safe
c) Semi critical d) Excess exploited
7. Which of the following is the major cause of poor health in Indians ?
- a) Air pollution **b) Water pollution**
c) Noise pollution d) Soil pollution
8. _____ water is bacteriologically & chemically pure.
- a) Portable water b) Whole some water
c) Distilled water d) Safe water
9. In large part of Eastern India, the ground water is contaminated by _____.
a) Arsenic b) Lead c) Mercury d) Nickel
10. Which of the following has resulted in deterioration in water quality?
- a) Not disposing the waste water properly**
b) Deforestation
c) Excess pollution
d) Wrong distribution of water source
11. Which of the following rivers is called the World's most polluted river?
- a) Ganga river** b) Chenab river
c) Cauvery river d) Yamuna river
12. Which of the following are the primary causes of water pollution?
- a) Plants b) Animals
c) Human activities d) None of these

24. Which of the following diseases can be caused by drinking polluted Water?

- a) Polio b) Diarrhoea c) Typhoid d) All of the above

UNIT – 3

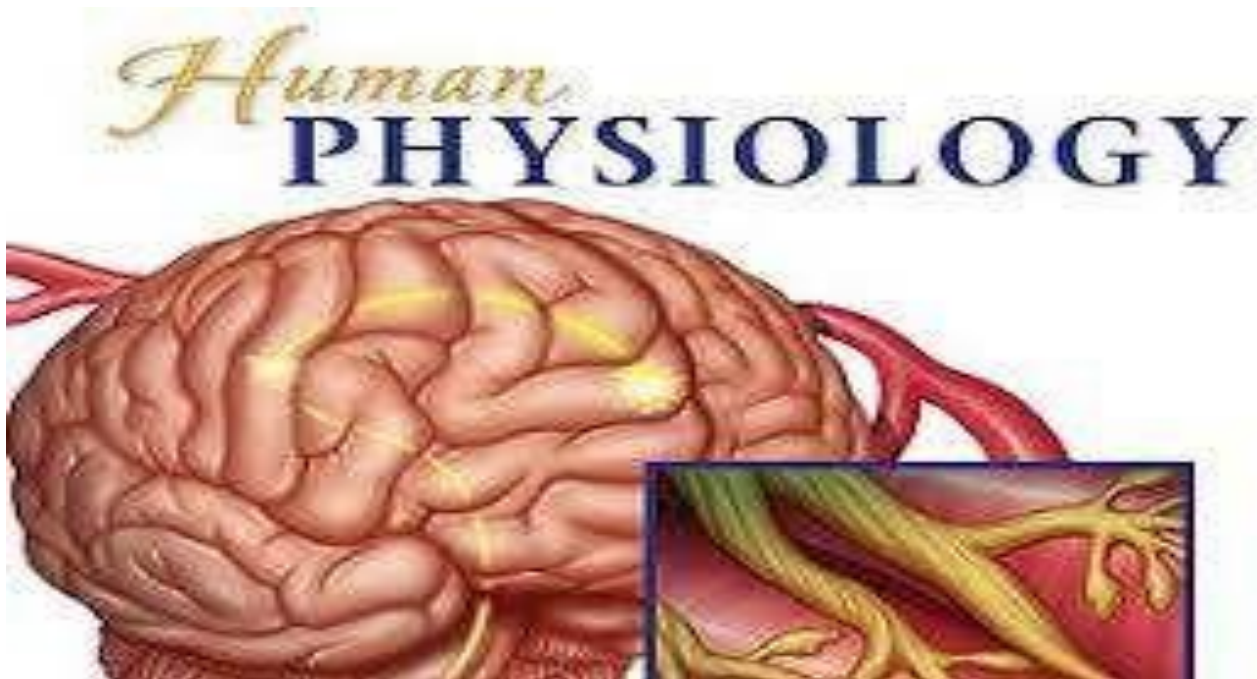
HUMAN PHYSIOLOGY

CONTENTS :

1. Definition
2. Digestion and absorption
3. Breathing and Exchange of gases
4. Body fluid and Circulation
5. Excretory products and their elimination
6. Locomotion and movement
7. Neural control and Coordination
8. Chemical coordination and integration

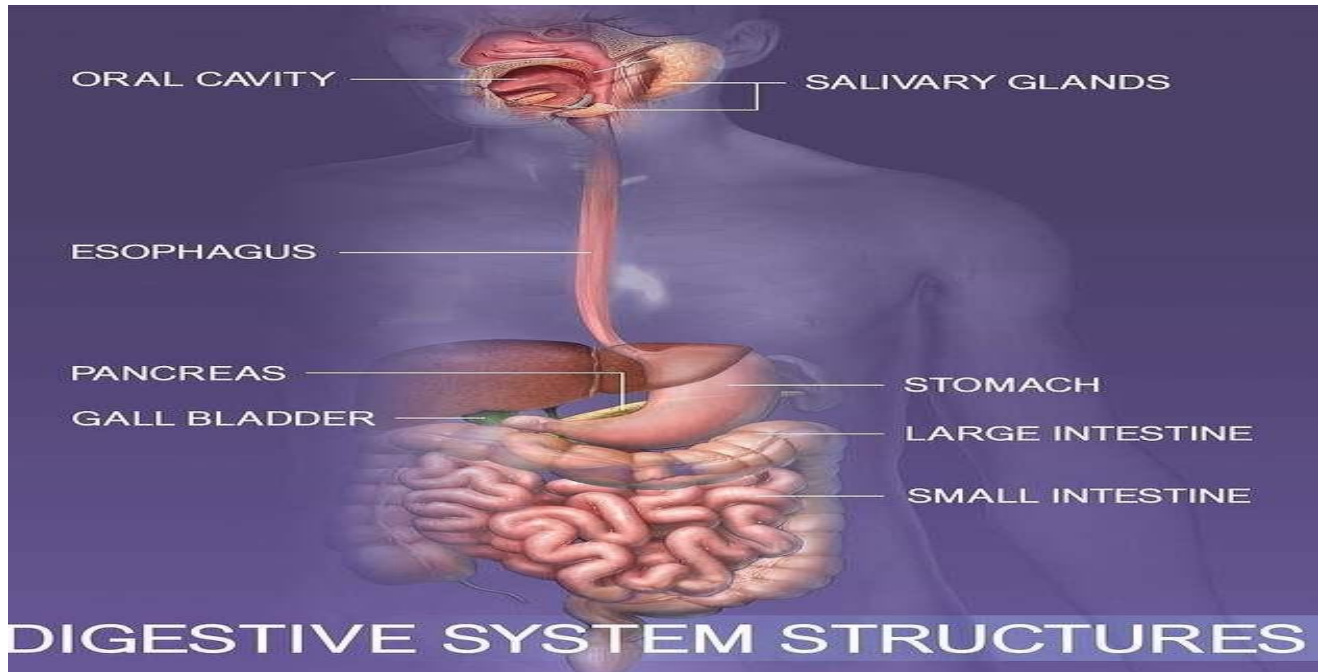
1. Definition :

As you have been introduced to the term ‘physiology ‘ Earlier while dealing with the plant physiology, similarly, human physiology is the branch of science that deals with the study of functionally of the organ system of the human body.



ii) Digestion and Absorption :

No doubt we all understand the utility of eating proper food and the subsequent role of our blood.

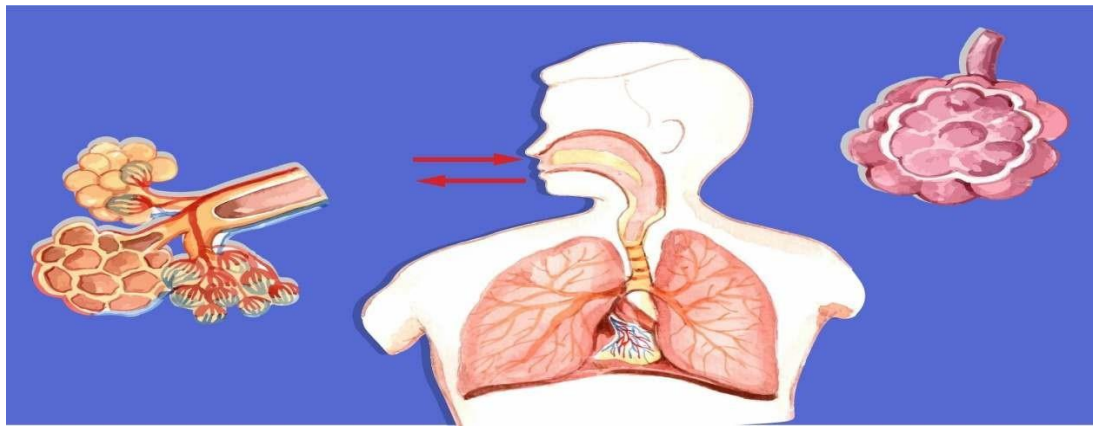


The topic digestion and Absorption of human physiology.

- Alimentary canal and digestive glands
- Role of digestive enzymes and gastrointestinal hormones
- Peristalsis
- Digestive absorption and assimilation of protein, carbohydrates and salt
- Egestion
- Nutritional digestive disorder

2) Breathing and Exchange of gases:

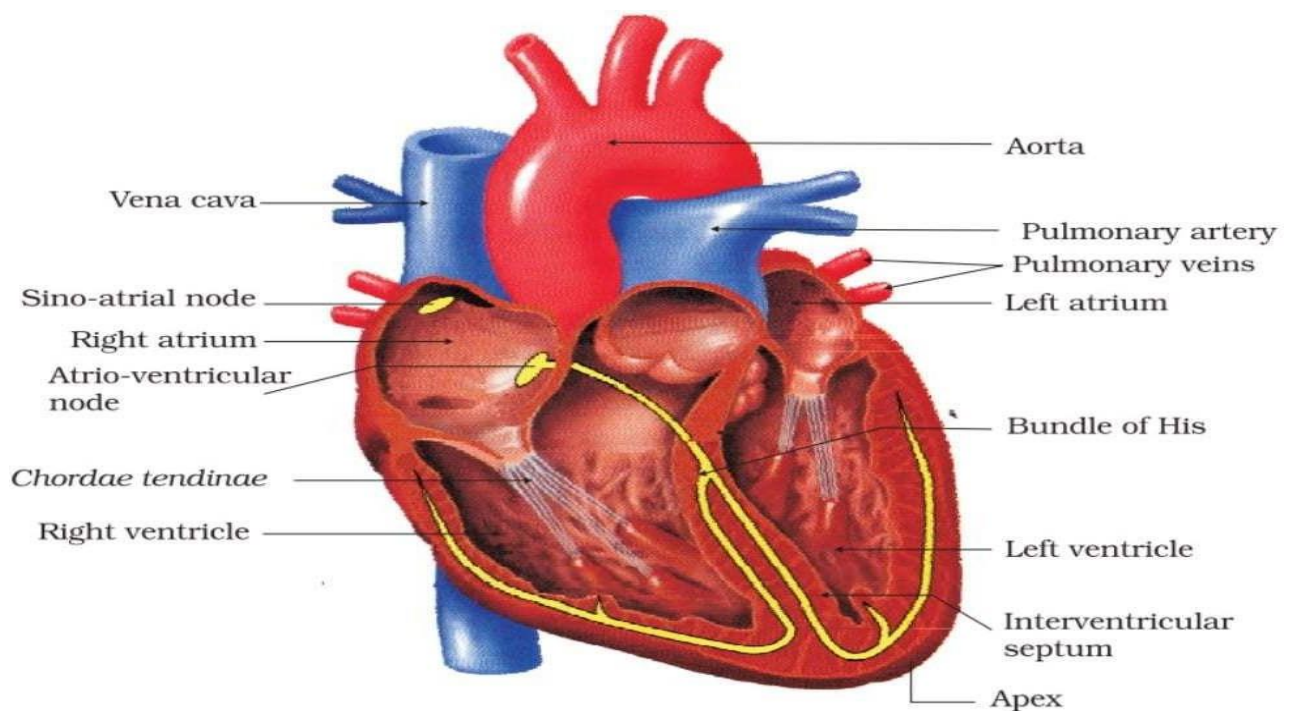
Breathing in and out is such a vital activity that it occurs even if you are not aware of it. Many times you can see yoga instructors telling in general, to watch out breathing pattern and try controlling the same to come out of depression and stress.



- Your breathing is controlled by the involuntary region of the nerves system
- Respiratory system in humans
- Mechanism of breathing and its regulation in humans
- Exchange of gases, transport of gases and regulation of respiration.
- Disorders related to respiration-Asthma, Emphysema, occupational respiration disorders.

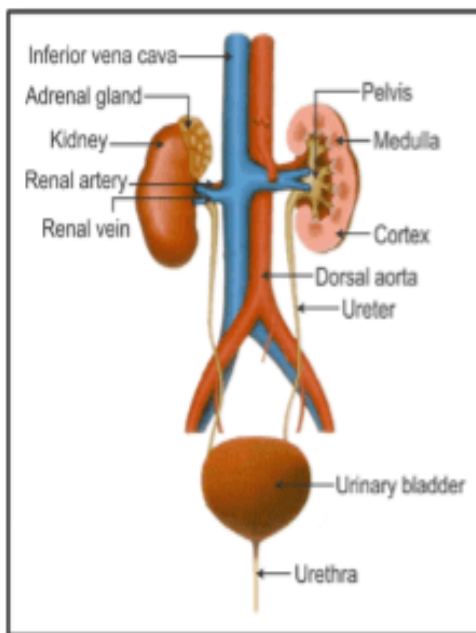
3) **Body Fluids and circulation:**

There are numerous organs in the human body, all of them are in need of nutrition and remove of excretory wastes, all of them need immunity and medicines incase of malfunction.

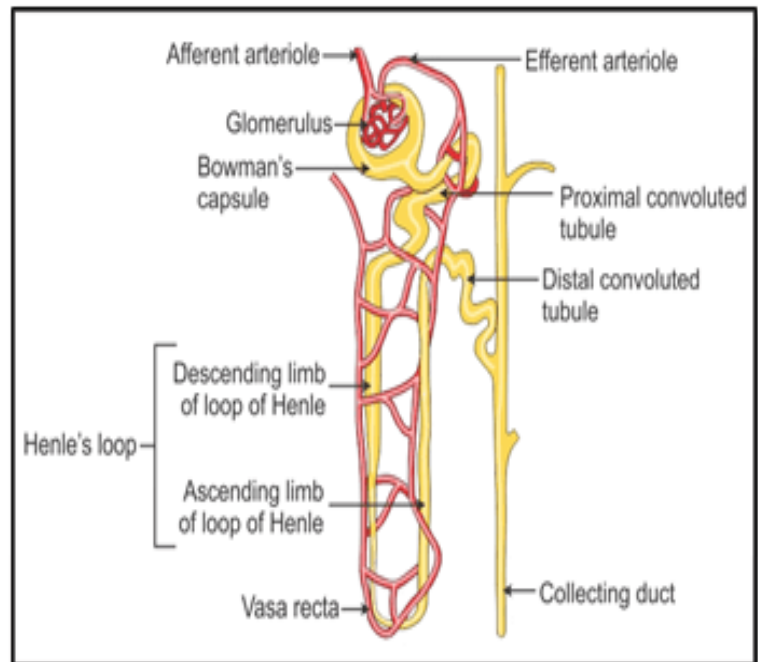


4) Excretory products and their Elimination:

Each all in the organs of the human body is performing the life sustaining metabolic activities these activity generate energy in the form of ATP (adenosine tri phosphate) along with the varies types of nitrogenous wastes, namelyurea, uric acid creatinine etc.



Human Excretory System

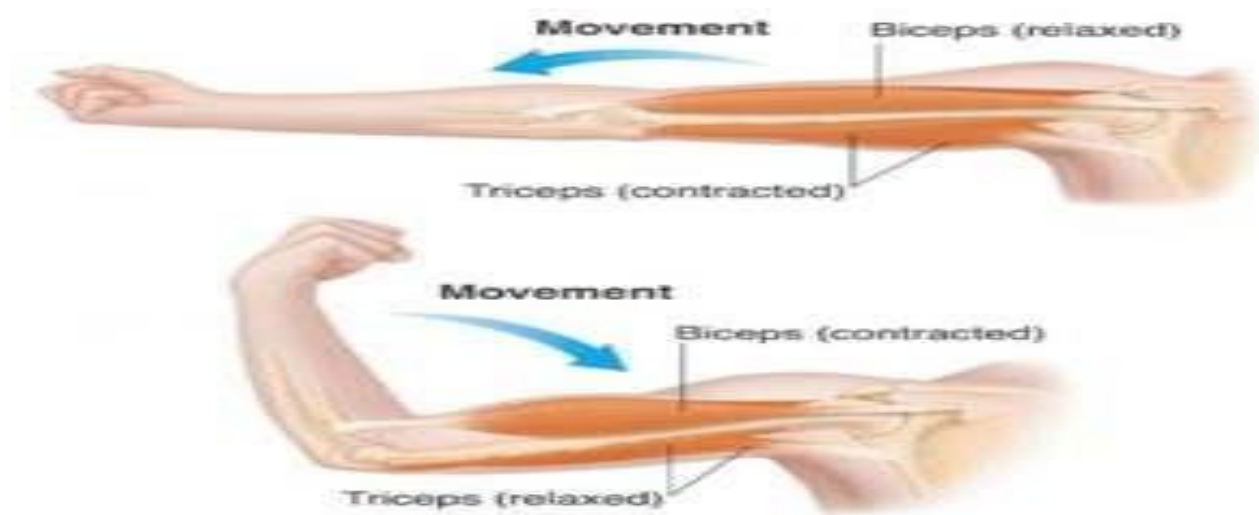


Structure of Nephron

- Major excretory organ are kidney.
- Excretory products and their elimination
- Modes of excretion –Ammonotelism, ureotelism ureotelism.
- Human excretory system and function
- Urine osmoregulation
- Disorders, ureamia, renal failure, renal calculi, nephritis, dialysis and artificial kidney.

5) Locomotion and movements:

How the human body is capable of showing locomotion along with various types of muscular movements will be understood in this chapter of human physiology.



Types of movement –Ciliary, Flagella muscular

- ✓ skeletal system and its functions
- ✓ Joints

Disorder of muscular and skeletal system –myasthenia gravis, tetany, muscular dystrophy, Arthritis, osteoporosis, gout.

6) Neural control and coordination:

Brain is the most enigmatic organ of the human physiology even now. However, manage aspects of the neural system have been discoed and are well- explained in this chapter.

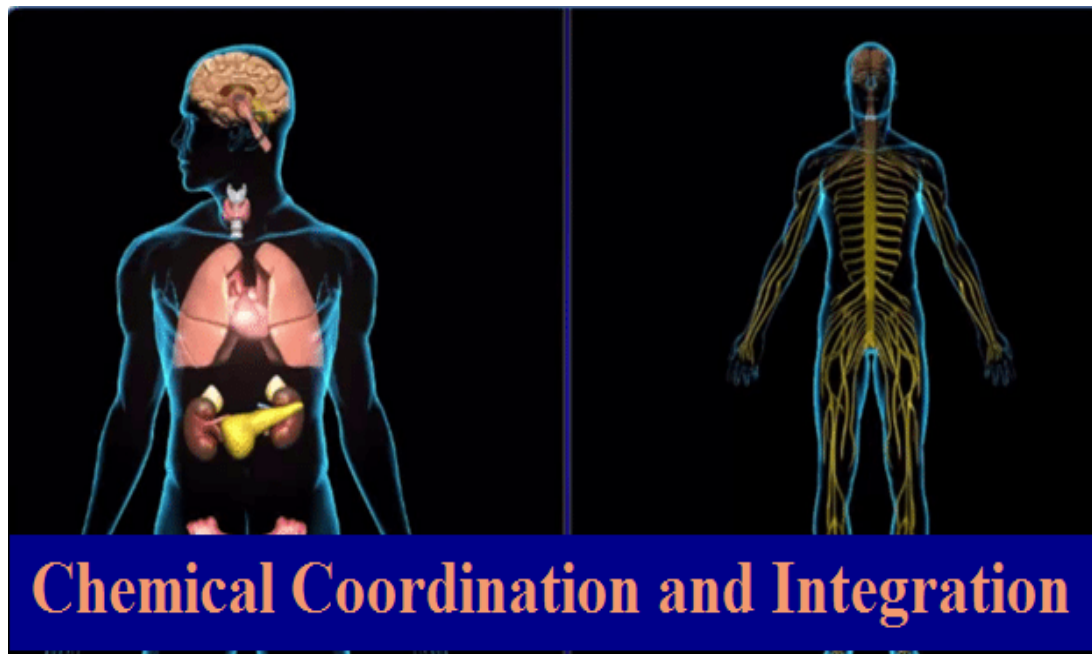


- ✓ Neuron and nerves
 - ✓ The nervous system ,peripheral nervous system and visceral nervous system
 - ✓ Generation and conduction of nerve impulse
 - ✓ Reflex action sense organs
 - ✓ Elementary structure and function of eye and air
- ## 7) Chemical coordination and integration:

Hormones play a decisive role in the metabolism of the human body and so, they are the key players of the human physiology

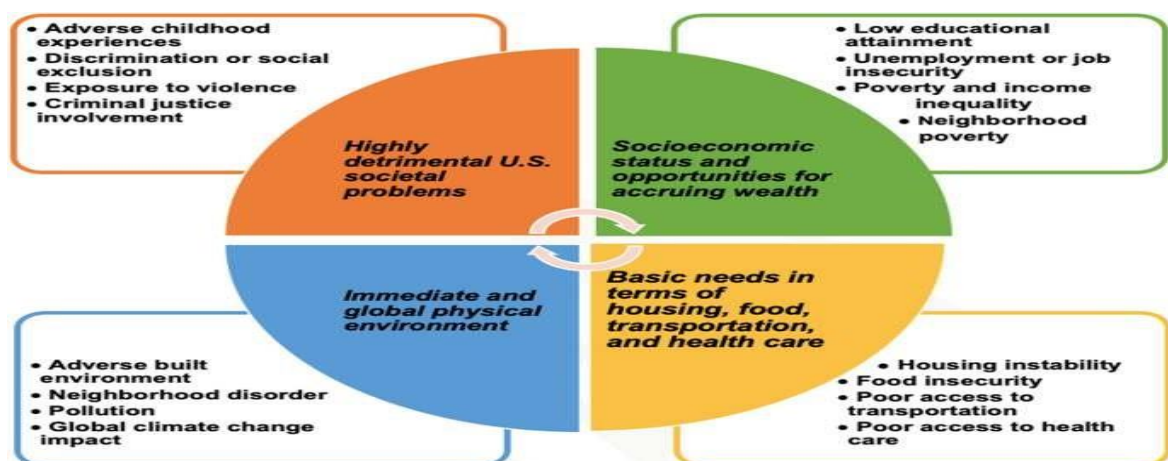
the endocrine glands, their function and disorder are the key take always of this chapter of human physiology.

- Endocrine glands and hormones
- Human endocrine system-Hypothalamus, pituitary, pineal, thyroid, parathyroid, Adrenal pancreas, gonads.
- Mechanism of hormone action.
- Role of hormones and messengers and regulators.



Common Disorder:

Dwarfism, Acromegaly, Cretinism, goiter, Exophthalmic goitre, diabetes, Addison's disease.



Choose the correct answer:

1) _____ is a branch of science that deals with the functioning of organ system.

a) Physiology b) cytology c) anatomy d) morphology

2) Which one is not present in digestive materials in the following _____.

a) Protein b) Carbohydrate c) Fat **d) Vitamins**

3) Breathing is controlled by the involuntary region of _____.

a) Endocrine system b) Carbohydrate

c) Nervous system d) Gonads

4) _____ is the mechanism of breathing and its regulation in human.

a) Respiratory system b) Digestive system

c) Circulatory system d) Integumentary system

5) _____ is not under the disorder related to respiration.

a) Asthma

b) Emphysema

c) Occupational respiratory disorder

d) Crinitism

6) The circulatory system consists of _____.

a) Blood b) Gonads c) Testes d) ovary

7) Which is the major excretory organs _____.

a) Heart **b) Kidney** c) Liver d) Pancreas

8) Which of the following is the major excretory product _____

a) Nitrogenous waste

b) CO₂

c) O₂

d) Water

9) Which one is not present in the circulatory system ?

a) Blood

b) Blood vessels

c) Pancreas

d) capillaries

10) In which the following is not present in the nitrogenous waste product is _____.

a) Urea

b) Uric acid

c) Glucose

d) Ammonia

11) Types of excretion in the urea _____.

a) Ureotelism

b) Metabolism

c) Digestion

d) Nephritis

12) Pick the odd one disorder of excretory system _____.

a) Jaundice

b) Uraemia

c) Renal failure

d) Nephritis

13) Find the odd one based on the muscular movements _____.

a) Ciliary

b) Flagellar

c) Contraction

d) Muscular

14) _____ the most enigmatic organ of the human physiology.

a) Kidney

b) Lungs

c) Brain

d) Heart

15) Scurvy is deficiency disease of _____

a) Vitamin-A

b) Vitamin-B

c) Vitamin-C

d) Vitamin-D

16) Which of the following is a respiratory disease ?

a) Polio

b) Arthritis

c) Asthma

d) Cancer

17) PNS stands for _____

a) Primary nervous spot

b) Peripheral nervous system

c) Primary net scale

d) Protoplasm nervous system

18) _____play a decisive role in the metabolism.

- a)Vitamin** b)Carbon c) Hormone d)Oxygen

19) Human endocrine system not contains _____.

- a) Pituitary b) Thyroid c) Adrenal **d) skin**

20) It is a disorder disease of pituitary

- a)Goitre b)Pancreas c)Add ison's **d)Acromegaly**

21) It is not present in the common disorder disease of endocrine gland

- a) Dwarfism b)Acromegaly
c) Crintinism **d) Blood pressure**

22) Goitre is a disorder disease of _____.

- a)Pancreas b) Pituitary **c)Thyroid** d)Night blindness

23) Adrenal gland associated with_____.

- a) Brain **b) Kidney** c) Pancreas d) Liver

24) Which is called master gland in the followings ?

- a)Adrenal **b) Pituitary** c)Thyroid d)Testes

25) Name the respiratory organ in the following_____.

- a)Lungs** b)Kidney c)Heart d) Testes

UNIT-4

ENERGY

Introduction:

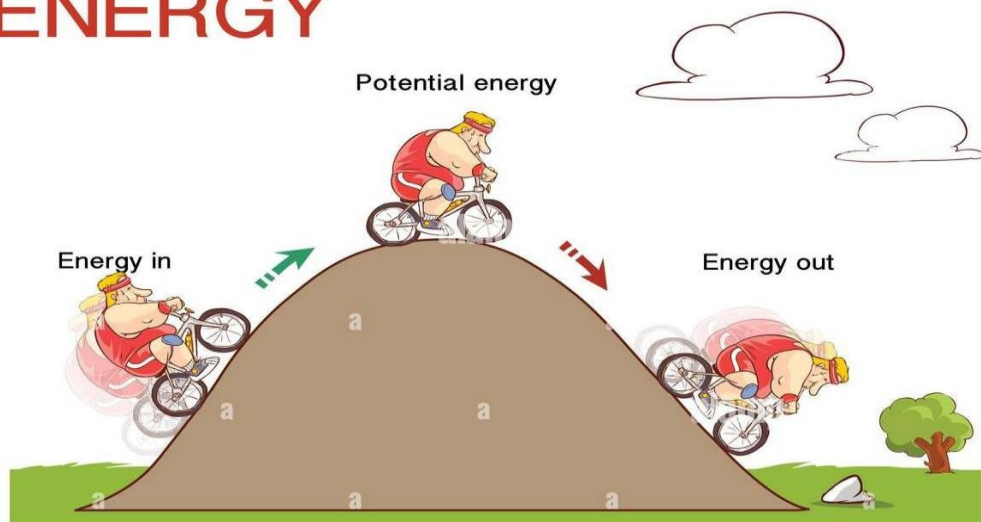
Energy is defined as the capacity to do work. In other words work done is the manifestation of energy.

In a broader sense, Mechanical energy is classified into two types.

- i) Kinetics Energy
- ii) Potential Energy

Potential And Kinetic

ENERGY



- ✓ The energy possessed by a body due to its motion it's called kinetic energy.
- ✓ The energy possessed by the body by virtue of its position is called potential energy.
- ✓ The SI unit of energy is the same as that of work done. i.e.,Nm (or) Joule (J)
- ✓ The Dimension of energy is also the same as that of work done
- ✓ The other units of energy and their SI equivalent values are given in table.

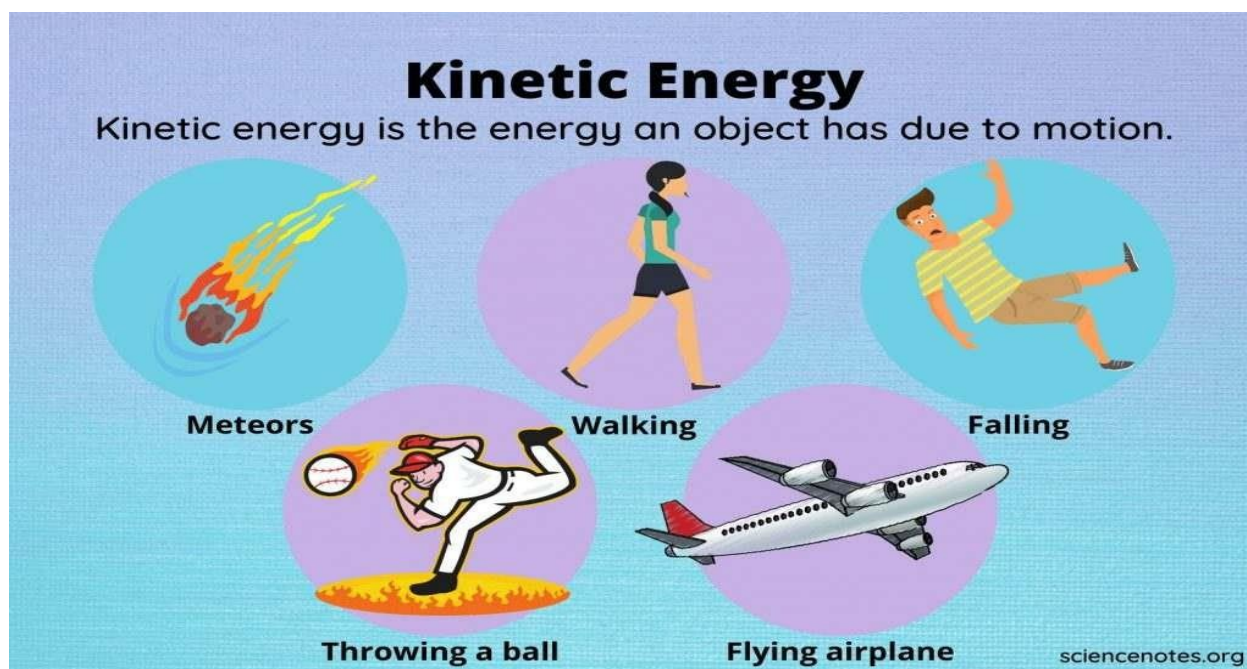
UNIT	EQUIVALENT IN JOULE
Erg(CG.S unit)	10^{-7} J
1 electron volt (ev)	1.6×10^{-19} J
1 calorie(cal)	4.186 J
1 kilowatt hour(kwh)	3.6×10^6 J

Kinetic Energy:

Kinetic energy is the energy possessed by a body by virtue of its motion.

All moving object have kinetic energy. A body that is in motion has the ability to do work.

Kinetic energy is measured by the amount of work that the body can perform before it comes to rest



The amount of work done by a moving depends both on the mass of the body and the magnitude of its velocity. A body which is not in motion does not have kinetic energy.

The work-kinetic energy theorem implies the following:

1. If the work done by the force on the body is positive then its kinetic energy increases.
2. If the work done by the force on the body is negative then its kinetic energy increases.
3. If there is no work done by the force on the body then there is no change in kinetic energy, which means that the body has moved at constant speed provided its mass remains constant.

Potential energy:

Potential energy of an object at a point P is defined as the amount of work done by an external force in moving the object at constant velocity from the point O potential energy can be taken as zero.

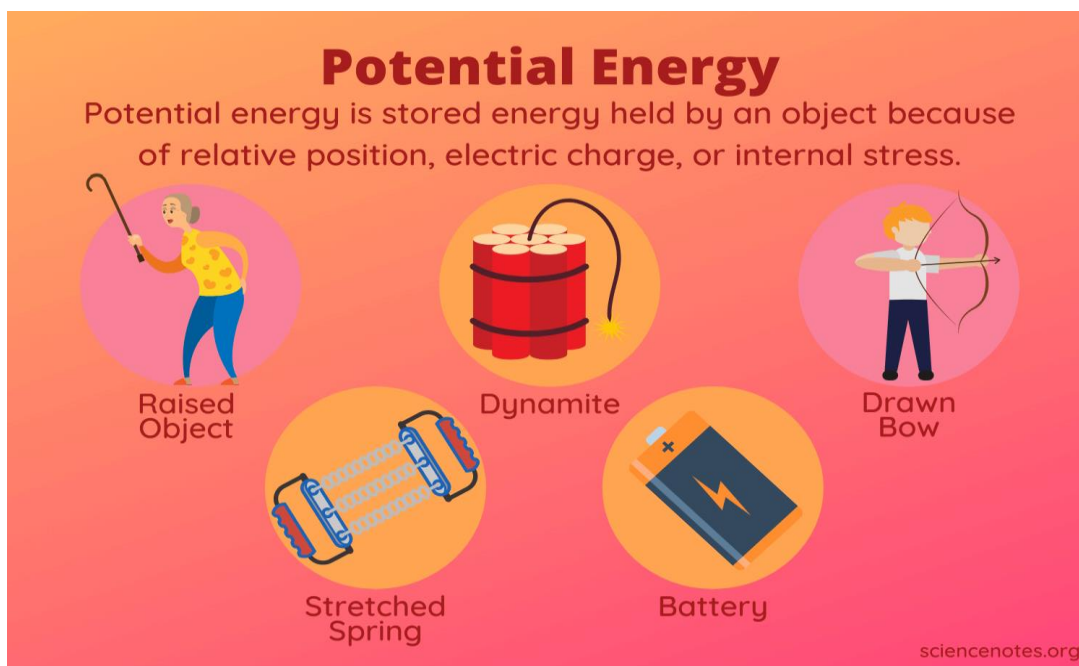
Mathematically, potential energy is defined as

$$U = \int \vec{F}_a \cdot d\vec{r}$$



Type of potential energy:

(i) The energy possessed by the body to gravitational force gives rise to gravitational energy.



Law of conservation of energy :

The law of conservation of energy states that energy can neither be created nor destroyed. It may be transformed from one form to another but total energy of an isolated system remains constant.

Power:

Power is a measure of how fast or slow a work is done.

Definition of power:

Power is defined as the rate of work done or energy delivered.

$$\text{Work done (W)} = \text{Power(P)} \times \text{Time taken(t)}$$

$$P = \frac{W}{t}$$

Unit of power:

Power is a scalar quantity. The SI unit of power is watts(W) named after the inventor of the steam engine James watt. One watt is defined as the power when one joule of work is done one second.

$$(1\text{w} = 1\text{J}\text{S}^{-1})$$

The higher units are,

$$1\text{kw} = 1000\text{w} = 10^3$$

$$1\text{MW} = 10^6$$

$$1\text{GW} = 10^9$$

For motors, engines and some automobiles an old unit of power still commercially in use which is called as the horse power(HP)

We have a conversion for horse power(HP) into (W),

Which is, $1\text{hp} = 746\text{w}$

$$1 \text{ electrical unit} = 1\text{kwh} = 1 \times 10^3\text{w} \times 1 \text{ hour}$$

$$1 \text{ hour} = 3600 \text{ seconds}$$

$$1 \text{ kwh} = 10^3 \times 3600\text{ws}$$

$1\text{kwh} = 3.6 \times 10^3\text{J}$

Electrically bills are generated in units of kwh for electrical energy Consumption 1 unit of electrical energy is 1 kwh.

Choose the correct answer:

- 1) Dimension equation of energy is _____.
a) ML^2T^{-1} **b) ML^2T^{-2}** c) ML^1T^{-1} d) ML^2T^2
- 2) Work done is the manifestation of _____.
a) Energy b) work done c) Power d) None of these.
- 3) Dimension equation of work is _____.
a) ML^2T^{-1} **b) ML^2T^{-2}** c) ML^1T^{-1} d) ML^2T^{-2}
- 4) Mechanical energy is classified into _____types.
a) One **b) Two** c) Three d) Six
- 5) The energy possessed by a body due to its motion is called as _____.
a) Kinetic energy b) Potential energy
c) Electrical energy d) Light- energy
- 6) The energy possessed by the body by virtue(virtual) of its position is called as _____.
a) Kinetic energy **b) Potential energy**
c) Electrical energy d) None of these.
- 7) SI unit of energy is _____.
a) Nm b) Joule **c) Both A and B** d) None
- 8) SI unit of work done is _____.
a) Nm b) Joule **c) Both A and B** d) None
- 9) 1 Erg (CGS unit) is.
a) $10^{-7}J$ b) $10^{-7}J$ c) $10^{-7}J$ d) $10^{-7}J$

10) 1 electron volt (ev) is _____.

- a) 10^{-7} J **b) 1.6×10^{-19} J** c) 4.186 J d) 3.6×10^6 J

11) 1 calorie is equal to _____.

- a) 10^{-7} J b) 1.6×10^{-19} J **c) 4.186 J** d) 3.6×10^6 J

12) 1 kilowatt hour (kwh) is equal to _____.

- a) 10^{-7} J b) 1.6×10^{-19} J c) 10^{-7} J **d) 3.6×10^6 J**

13) All moving object have _____.

- a) Kinetic energy** b) Potential energy
c) Electrical energy d) None

14) If the kinetic energy of the body of mass (m) moving with velocity (v) is equal to_____.

- a) $\frac{1}{2}mv$ b) mv **c) $\frac{1}{2}mv^2$** d) $\frac{1}{2}m^2v$

15) If the work done by force on the body is positive then its kinetic energy is_____.

- a) Increases** b) Decreases c) Constant d) Zero

16) If the work done by the force on the body is negative then its kinetic energy is_____.

- a) Increases** b) Decreases c) Remains constant d) Zero

17) Amount of work done by an external force in moving the object at constant velocity is called as_____.

- a)Kinetic energy **b)Potential energy**
c)Electrical energy d) None of these

18) If the energy possessed by the body due to gravitational force given rise to_____energy.

- a)Elastic potential energy **b)Gravitational potential energy**
c)Electrostatic potential energy d)None

19) If the energy due to spring force and other similar force give rise to_____.

- a)Gravitational potential energy b)Electrostatic potential energy
c)Elastic potential energy d)None of these

20) The law of conservation of energy, the total energy of an isolated system is _____.

- a)Remains constant** b)Zero c)Increase d)Decrease

21) Rise of change of work done is called_____.

- a)Energy b)Work energy **c)power** d)None

22) The unit of electrical energy is _____.

- a)Energy b)Work energy c)power **d)None**

23) The SI unit of gravitational potential energy is: _____.

- a) Newton (N) **b) Joule (J)** c) Watt (W) d) Pascal (Pa)

24) Gravitational potential energy depends on: _____.

- a) Mass and height** b) Only mass
c) Only speed d) Temperature

25) SI unit of power is _____.

a) Horse power (hp)

b) Joule(J)

c)Watts(w)

d) ms^{-1}

26) 1 watt is equal to_____.

a) $1\text{w}=1\text{JS}$

b)1w=1JS⁻¹

c) $1\text{w}=11\text{JS}^{-1}$ d) 1JS^2

27) Power is a_____ quantity.

a)Scalar

b)Vector

c) Null vector

d) None of these

28)1mw is equal to_____.

a)1× 10⁻³watt

b) 1×10^6 watt

c) 1×10^9 watt

d) 1×10^{10} watt

29) The process which results in the energy changing from one form to another is known as_____.

a) Energy stored

b) Conservation of energy

c) Energy transformation

d) Kinetic energy

30) Radiant energy and is experienced in the form of heat is_____.

a) Electrical energy

b)Solar energy

c)Thermal energy

d)Light energy

31) The warmth that you feel emanating from the engine is an example of_____.

a)Wave energy

b) Thermal energy

c)Tidal energy

d)Green energy

32) If the energy associated with the mechanical movement of object is called as_____.

- a) Wave energy
- b) Mechanical energy**
- c) Hydro electric energy
- d) Wind energy

33) Mechanical energy is generally defined as_____.

- a) The sum of kinetic energy
- b) The sum of potential energy

c) The sum of kinetic and potential energy

- d) The sum of wave- energy

34) Light energy is a kind of_____.

- a) Potential energy
- b) Kinetic energy**
- c) Heat energy
- d) Electrical- energy

35) Light is known as a type of_____.

- a) Electromagnetic source
- b) Electromagnetic radiation**
- c) Electric field
- d) Magnetic field

UNIT-5

SOLIDS

Introduction:

A solid is a state of matter characterized by particles arranged such that their shape and volume are relatively stable.

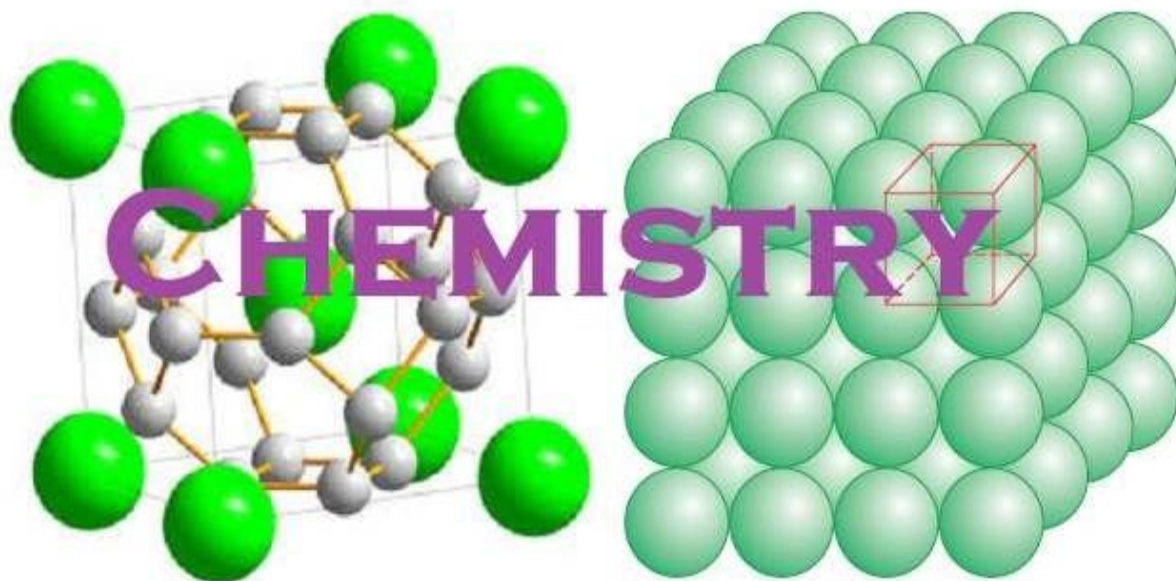
Physical and chemical properties of solids:

- Solids are incompressible, meaning the constituent particle is arranged close to each other and because of that, there is negligible space between the constituent particles.
- Solids are rigid. This is due to lack of space between the constituent particles which make it rigid or fixed.
- Solids have definite mass, volume and shape due to which it has a compact arrangement of constituent particles.
- The intermolecular distance between molecules is short. Due to this, the force between the constituent particles (Atoms, molecules ions) is very strong.
- The constituent's particles can only oscillate about their mean positions.

Solid state chemistry:

Solid- state in chemistry is the study of the structure, properties and the synthesis of solid materials. It also sometimes called as material chemistry. More significantly, in solid-state chemistry, we study the concept of a compound in a deeper level. it basically helps us understand the compound from a molecular level to the crystal structure level.

SOLID STATE



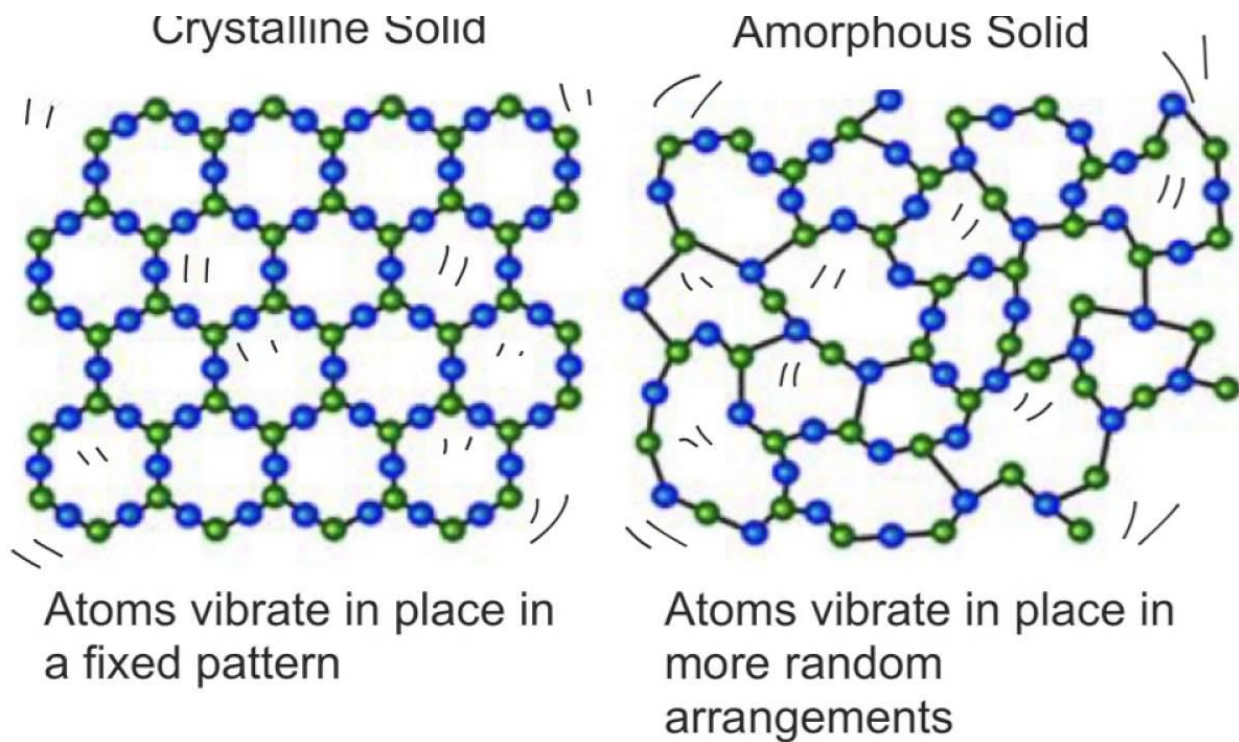
Types of solid states:

Based on the arrangement of constituent particles, solids are classified into two- state types:

1. Crystalline solids
2. Amorphous solids

Crystalline solid state:

Crystalline solids are those that have typical geometry. In such types of solids, there are definite arrangements of particles (atoms, molecules or ions) through the 3-dimentional network of a crystal in a long-range order.



Examples include sodium chloride, Quartz, Diamond, etc.

Properties of Crystalline solids:

- Crystalline solids have a sharp melting point and start melting when it reaches a particular temperature.
- The shape of crystalline solids are definite and having typical arrangements of particles.
- They show cleavage property i.e. when they are cut with the edge of a sharp tool they split into two pieces and the newly generated surfaces are smooth and plain.
- They have definite heat of fusion (amount of energy needed to melt a given mass of solid at its melting point).
- Crystalline solids are anisotropic which means their physical properties like electrical resistance or refractive index show different values when they are measured along with different directions in the same crystal.
- Crystalline solids are true solids.

Types of crystalline solids:

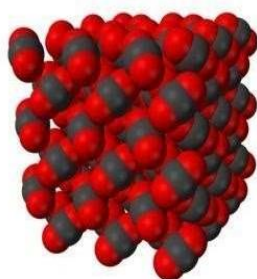
On the basis of the nature of intermolecular force or chemical bonding. Crystalline solids are further classified into four categories. They are:

- Molecular solids
- Ionic solids
- Metallic solids
- Covalent solids

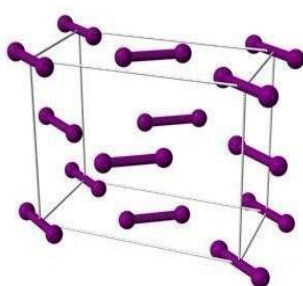
Molecular solids:

In molecular solids the constituent particles are molecules. They are further divided into three categories:

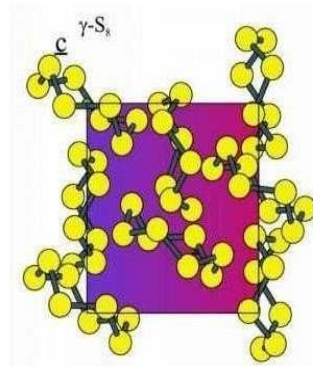
Molecular Solids



Carbon Dioxide



Iodine (I_2)



Sulfur (S_8)

1. Non-polar Molecular solids:

These solids are formed from molecules or atoms that share a non-polar covalent bond. The atoms or molecules are held by weak dispersion force or London forces.

- The physical nature of non-polar solids are soft.
- They don't conduct electricity so they are insulators.
- They have a very low melting point.
- Examples: H_2 , Cl_2 , etc.

2. Polar Molecular solids:

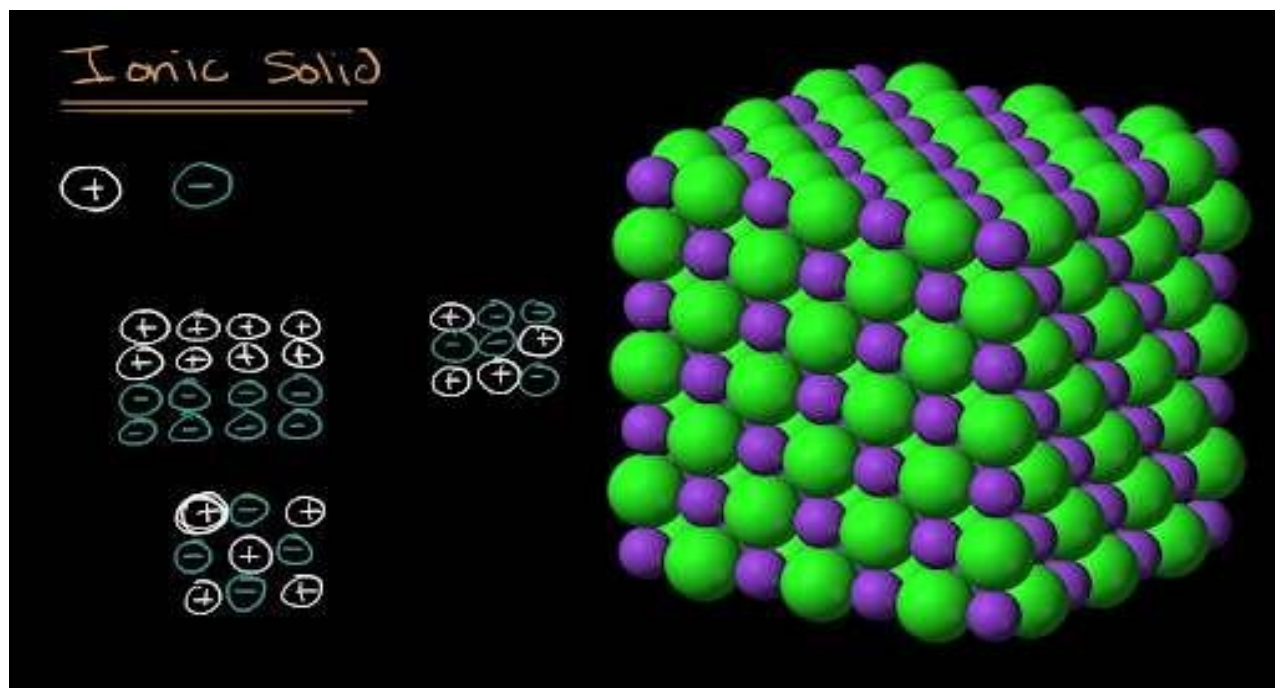
- These solids are held together by Polar covalent bonds and the atoms/molecules are bonded by relatively stronger dipole-dipole interactions.
- The physical nature is soft and most of these are gases or liquids at room temperature.
- They do not conduct electricity and they have a higher melting point than the non-polar molecular solids.
- Examples: HCl , SO_2 , NH_3 , etc.

3. Hydrogen-Bonded Molecular solids:

The solids contain polar covalent bonds with Hydrogen, Fluorine, Oxygen and Nitrogen atoms. In these solids, molecules are held together via strong hydrogen bonding.

- The physical natures of such solids are hard.
- They do not conduct electricity.
- The physical state of these solids are volatile liquids or soft solids under room temperature.
- They have high melting point
- Example: H_2O (Ice).

Ionic solids:



In ionic solids the constituent particles are ions. These are formed by the arrangement of cations and anions by strong Coulombic forces.

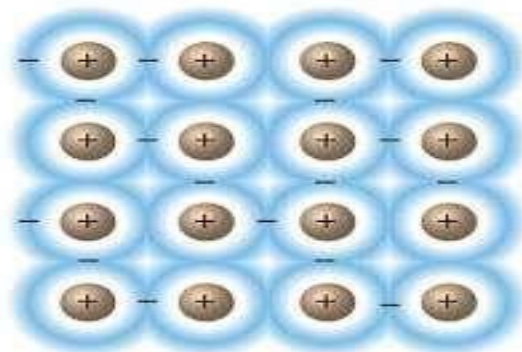
- These are hard and brittle in nature.
- Ionic solids act as an insulator in a solid-state but are conductors in a molten and aqueous state.
- They have a High melting point.
- Examples: NaCl, MgO, ZnS, CaF_2 , etc.

Metallic solids:

- Positive metal ions in a sea of delocalized electrons. These electrons are evenly spread out throughout the crystal.
- Due to the presence of free and mobile electrons. They are responsible for high electrical and thermal conductivity.
- They are conductors in both solid and molten state.
- They have high melting point than ionic solids.
- Example: Fe, Cu, Ag, Mg, etc.

Metallic Solids

- Metals are not covalently bonded, but the attractions between atoms are too strong to be van der Waals forces.
- In metals, valence electrons are delocalized throughout the solid.



Covalent or Network solids:

A wide range of crystalline solids of non-metal form covalent bond between adjacent atoms throughout the crystal and form a giant molecular or large molecules.

- These solids are hard like diamond and soft like graphite which are isotopes of carbon.
- They are insulators as in case of a diamond but in case of graphite due to free electrons, they conduct electricity and act as a conductor.

Amorphous solid state:

Amorphous solid-state comprises of those solids which have the property of rigidity and incompressibility but to a certain extent. They do not have a definite geometrical form or long range of order. Examples include glass, rubber, plastic, etc.

Properties of Amorphous solids:

- Amorphous solids are gradually softened over a range of temperature and they can be moulded into different shapes on heating.
- Amorphous solids are pseudo solids or super cooled liquids which means they have a tendency to flow very slowly. If you observe that the glass pans which is fixed to windows of old buildings they are found to be slightly thicker from the bottom than at the top.
- Amorphous solids have irregular shapes i.e. their constituent particles do not have definite geometry of arrangements.
- When amorphous solids are cut with a sharp edge tool they form pieces with irregular surfaces.
- Amorphous solids do not have definite heat of fusion due to its irregular arrangement of the particles.
- Amorphous solids do not have definite heat of fusion due to its irregular arrangement of the particles.
- Amorphous solids are isotropic in nature which means the value of any physical property would be same along any direction because of the irregular arrangement of particles.

Amorphous solids uses:

Amorphous silicon is one of the best photovoltaic material convert's sunlight into electricity.

Choose the correct answer:

1. Solids are _____ nature.
a) In compressible b) Compressible c) Flexible d) None of these
2. Diamond is a _____ solid
a) Amorphous b) Polar
c) Hydrogen bonded d) All of these
- 3) Ice is a _____ molecular solids.
a) Non polar **b) Hcl** c) NH_3 d) SO_2
- 4) Give example for ionic solids _____.
a) Fe b) Cu c) CO_2 **d) NaCl**
- 5) Find out the odd once _____.
a) Nacl b) Mgo c) Zns **d) Ag**
- 6) Glass and rubber are the examples for solids _____.
a) Crystalline **b) Amorphous** c) Ionic d) All of these
- 7) Amorphous solids are _____ solids
a) Real **b) Pseudo** c) Semi d) Ionic
- 8) Intermolecular distance between the solids are _____.
a) Long **b) Short**
c) Moderate d) None of these

9) In solids the constituent particles are_____about their mean position.

- a) Not oscillate **b) Oscillate** c)Standard d)Move

10) What kind of forces between the cations and anions if it is Ionic Solids ?

- a)Nuclear force **b) Columbic force**
c)Repulsive force d)Both (a) and (b)

11) Crystalline solids are_____

- a)Anisotropic** b)Isotropic c) Amorphous d) Pseudo

12) Ionic solids conduct electricity in _____

- a) Solids state b)Isotropic
c) Both(a) and (b) **d) None of these**

13) Amorphous solids are_____.

- a) Anisotropic b) Isotropic
c) Both(a) and (b) d) None of these

14) H_2 and Cl_2 , I_2 are called as_____.

- a) Polar molecular solids **b) Non polar molecular solids**
c) Ionic solids d)Crystalline solids.

15) Non polar molecular solids are _____.

- a) Conduct electricity **b) Don't conduct electricity**
c) Some time conduct d) All of these

- 16) _____ is the most stable solids.
a) NaCl b) CO₂ c) KCl **d) Diamond.**
- 17) Amorphous solids have _____ shape.
a) Regular b) Linear **c) Irregular** d) None of these
- 18) Crystalline solids are _____.
a) True solids b) Pseudo solids
c) Semi solids d) None of these
- 19) Which type of solids are hard and brittle ?
a) Ionic solids b) Covalent solids
c) Molecular solids d) All of these
- 20) Which of the following is an amorphous solid?
a) Rubber b) NaCl c) Plastic **d) Both (a) and (c)**
- 21) Graphite is a good conductor of electricity, due to the presence of _____.
a) Lone pair of electrons **b) Free valence electrons**
c) Cations d) Anions
- 22) Which of the following conditions favour the existence of substances in the solid state ?
a) Low temperature **b) Low temperature**
c) High thermal energy d) Weak cohesive force
- 23) The positive metal ions in a sea of delocalized electrons are called _____.
a) Metallic solids b) Ionic solids
c) Covalent solids d) All of these

24) Which type of crystal can be moulded into different shapes on heating_____.

a) Ionic solids

b) Crystalline solids

c) Amorphous solids

d) Covalent solids

25) Which type of solids have sharp melting point?

a) Molecular solid

b) Crystalline solids

c) Amorphous solids

d) All of these

26) The amount of heat energy needed to melt given mass of solids at its melting point is called?

a) Heat of fusion

b) Melting

c) Freezing

d) Heat of boiling

27) Cutting of amorphous solids cut by sharp edge tool they form_____ surface.

a) Irregular

b) Regular

c) Zic-Zac

d) All of these

28) Crystalline solids are classed into_____ types.

a) 1

b) 2

c) 3

d) 4

29) What is the reason for isotropic nature of amorphous solids ?

a) Regular arrangement of particle

b) Irregular arrangement of Particles

c) Both (a) and (b)

d) None of these

30) _____is used as photo voltaic material.

a) Carbon

b) Silicon

c) Aluminum

d) Diamond

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First Edition: April – 2022

Second Edition : April – 2025

Third Edition : April - 2026

Edited by: Ms. S.ATCHAYA, M.Sc., DCA

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