Chapter - 4

Structure Of The Atom

Meanings :-

1. Embedded	fixed firmly.	स्थापित करना।
2. Accomodated	to make suitable.	अनुकूल बनना।
3. Spectrum	the band or series of colours	विभिन्न रंगों की पट्टियाँ।
4. Postulates	to assume something.	स्वीकार कर लेना
5. Implication	something hinted or suggested or explained.	आशय।
6. Major	large, heavy and solid	भारी।

Questions & Answers.

1. What were the canal rays ?

A. The radiations which were positively charged named as canal rays.

2. If an atom contains one electron & one proton, will it carry any charge or not ?

A. No.

3. On the basis of Thomson's model of an atom, explain how the atom is neutral as a whole.

A. J. J. Thomson said that -

(1). Atom is a positively charged sphere & negatively charged electrons are embedded in it. Like the seeds of watermelon.

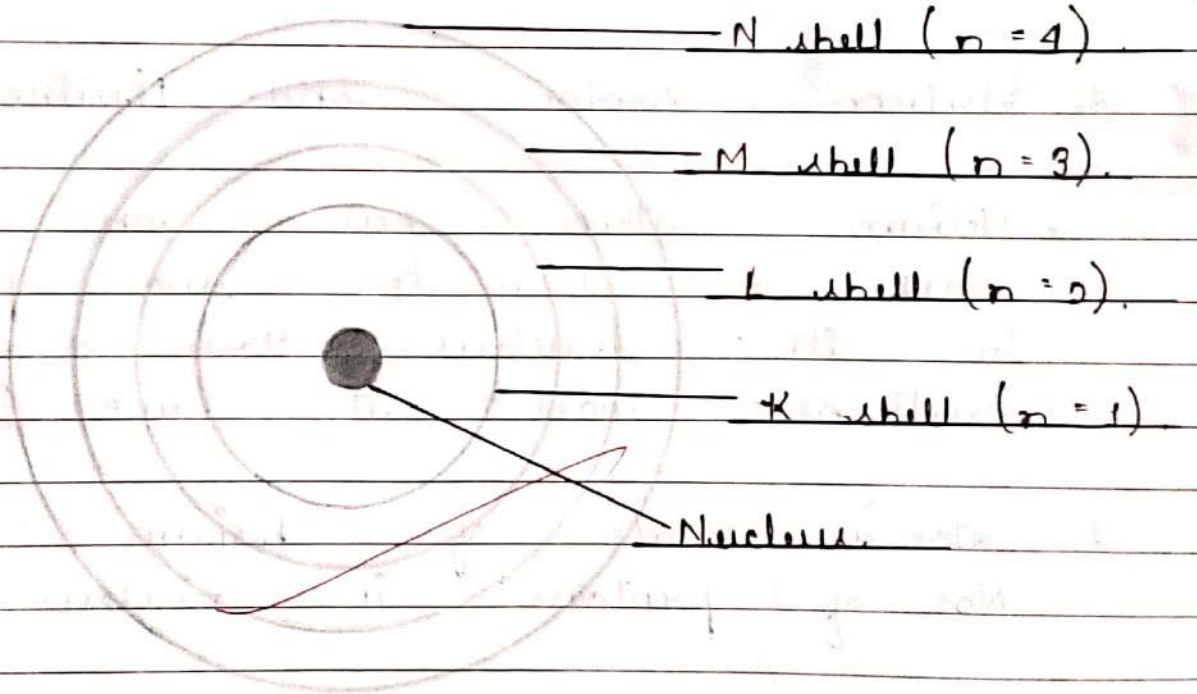
(2). The positive and negative charges are equal and that's why the atom is neutral.

4. On the basis of Rutherford's model of an atom, which sub-atomic particle is present in nucleus of an atom?

A. Proton which is positively charged particle.

5. Draw a sketch of Bohr's model of an atom with three shells.

A.



6. What do you think would be the observation if the α-particle scattering experiment is carried out using a foil of a metal other than gold?

A. Gold is the most malleable metal and to get very thin foil which is thick equal approximately 1000 atoms is possible but to get so thin foil of any other metal is not possible & therefore the α-particles scattering experiment is only possible with gold, not with other metals.

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7. Name the 3 sub-atomic particles of an atom?

A. Electron, Proton and Neutron.

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8. Helium atom has an atomic mass of 4 u & two protons in its nucleus. How many neutrons does it have?

A. Atomic mass of helium = 4
No. of protons in nucleus = 2

Atomic Mass = No. of protons + No. of neutrons.

4 = 2 + No. of neutrons
4 − 2 = No. of neutrons
2 = No. of neutrons.

No. of neutrons = 2 A.

9. Write the distribution of electrons in carbon & Sodium atoms.

A.

Name of Atom	Atomic Number	Electronic configuration	Valency
1). Carbon (C)	6	2, 4	4
2). Sodium (Na)	11	2, 8, 1	1
3). Chlorine (Cl)	17	2, 8, 7	1
4). Sulphur (S)	16	2, 8, 6	2
5). Magnesium (Mg)	12	2, 8, 2	2

10. If K and L shells of an atom are full, then what would be the total number of electrons in the atom?

A. Maximum no. of ~~shell~~ electrons in a shell = $2n^2$

We know that for K shell,

$n = 1$

So, $2n^2 = 2(1)^2 = 2$

Maximum no. of electrons in L shell will be

Here $n = 2$

So, $2n^2 = 2(2)^2 = 2 \times 4 = 8$

If K and L shells of an atom are full means complete then two electrons are present in K shell & eight electrons are present in L shell. So the total no. of electrons in an atom is

8 + 2 = 10.

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11. If no. of electrons in an atom is 8 & no. of protons is also 8, then (i) what is atomic no. of atom? and (ii) what is charge on the atom?

A. (i). Atomic No. = No. of Protons or No. of Electrons = 8

(ii). No. of protons & electrons is equal so that a mass is neutral.

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12. With the help of Table 4.1, find out mass no. of oxygen & sulphur atom.

A. Atomic mass of oxygen =
No. of Protons + No. of Neutrons
= 8 + 8
= 16

Atomic mass of sulphur :
No. of Protons + No. of Neutrons
: 16 + 16
: 32 .

13. For the symbol H, D and T Tabulate 3 sub-atomic particles found in each of them .

A.	Symbol	Name	Formula	Proton	Electron	Neutron
i).	H	Protium	$^{1}_{1}H$	1	1	0
ii).	D	Deuterium	$^{2}_{1}H$	1	1	1
iii).	T	Tritium	$^{3}_{1}H$	1	1	2

14. Write the electronic configuration of any one pair of isotopes & isobars .

A. Isotope of Chlorine .
$^{35}_{17}Cl$, $^{37}_{17}Cl$

But they both have electronic configuration 2, 8, 7.

Example of isobars are
$^{40}_{20}Ca$, $^{40}_{18}Ar$

Electronic configuration of calcium : 2, 8, 8, 2.

Electronic configuration of $^{40}_{18}Ar$ = 2, 8, 8.

15. Compare properties of electrons, protons & neutrons.

Properties	Electrons	Protons	Neutrons
1). Discovered by	J. J. Thomson.	Goldstein.	J. Chadwick.
2). Symbol	e	p	n
3). Charge	Negative	Positive	Neutral
4). Mass	less than 2000 times than mass of proton.	More than 2000 times than mass of electron.	Equal to the mass of proton.

16. What were the limitations of J. J. Thomson's model of atom?

A. Thomson's model explained well that the atoms are electrically neutral but the result of experiments done by other scientist could not be explained by this model.

17. What are the limitations of Rutherford's model

Ans. The major drawback of this model is that it does not explain the stability of an atom.

When a particle get charged it emits the radiation which cause reduction in the energy of electron & the size of its orbit. Therefore finally it will fall into the nucleus. Rutherford could not explain why this did not ~~some~~ come to be happening.

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18. Describe Bohr's model of the atom.

Ans. The main postulates of this model are —

1). Atom has a nucleus in the centre. Centre of the atom surrounded by electrons.

2). The electrons in an atom revolve around the nucleus in certain fixed circular path and this path are known as orbits or shells.

3). Each orbit have a fixed energy and thats why they are called

energy levels.

4). The orbits are numbered as 1, 2, 3, 4 or K, L, M, N.

5). The change in the energy of an electron take place only when it jumps from one energy level to another. When electron gain energy it jum from lower to higher energ level & vice - versa.

19. Summarise the rules for writing of distribution of electrons in various shells for first eighteen elements.

Ans. For the distribution of electron different shells of an atom Bohr give a law which tells us about the maximu no. of electron present in any orbit which is $2n^2$ where n = number of orbits that is n = 1, 2, 3, 4 etc.

1). K shell = $2n^2 = 2 \times (1)^2 = 2 \times 1 = 2$ el

2). L shell = $2n^2 = 2 \times (2)^2 = 2 \times 4 = 8$ el

3). M shell = $2n^2 = 2 \times (3)^2$

4). N shell = $2n^2 = 2 \times (4)^2 = 2 \times 16 = 32$ electrons.

20. Define valency by taking examples of silicon & oxygen.

Ans. Valency is the combining tendency of an atom & is equal to the number of electrons gain, lost or shared by it.

Example :

1). Silicon has four valence electrons. It can share, lose or gain four electrons to complete their octet. & thats why its valency is 4.

2). Oxygen has six valence electrons. So, it can gain two electrons to complete its octet and hence its valency is 2.

21. Explain with examples -

i). Atomic Number.

Ans. The no. of proton present in the nucleus of an atom is called its Atomic Number (Z).

Example - Atomic

is 2 means it has TWO protons.

ii). Mass Number:

A. The sum of number of proton & no. of neutron present in the nucleus is called Atomic Mass or Mass Number (A).

Example: The Mass no. of Carbon is 12 means it contain 6 protons & 6 neutrons.

iii) Isotopes:

A. Atoms of same element having same atomic no. but different atomic mass are called Isotopes.

Examples: $^{35}_{17}Cl$, $^{37}_{17}Cl$.

iv) Isobars:

A. The atoms of the different elements having same atomic mass & different atomic no. are called Isobars.

Example: $^{40}_{20}Ca$, $^{40}_{18}Ar$.

v). Uses of Isotopes.

(1) In nuclear reactors * Isotopes of Uranium is used as a fuel in nuclear reactor.

(2) In Carbon Dating * This technique is used to determine the age of minerals, fossils of dead plant & animal. The Carbon Isotopes are used in this technique.

(3) In treatment of disease * Some radioactive isotopes are used in the treatment of diseases particularly in radio therapy.

Examples. • Cobalt (Co) 60 is used for treatment of Cancer tumor.

• Iron (Fe) 509 is used in the detection of Anemia.

• Phosphorus (P) 32 is used for treatment of Blood Cancer.

• Iodine (I) 131 is used for the treatment of disorder in thyroid gland.

thyroid gland.

22 Na^+ has completely filled K & L shell. Explain.

A. Atomic Number of Sodium (Na) is 11.
Electronic configuration of Na is 2, 8, 1.

In Na^+, we know positive sign shows the donation of electrons means for the formation of Na^+, Na donate one electron from the outer most shell so Na^+ have only 10 electrons & have electronic configuration 2, 8 means K and L shells filled completely.

23. If bromine atom is available in form of, say, two isotapes $^{79}_{35}Br$ (49.7%) and $^{81}_{35}Br$ (50.3%) calculate average atomic mass of bromine atom.

A. Present percent of Bromine $^{79}_{35}Br$ is 49.7 %.
Present percentage of $^{81}_{35}Br$ = 50.3 %.

Average atomic mass = $\frac{79 \times 49.7 + 81 \times 50.3}{100}$

= 80.006 u.

24. If x = 3, what would be valency of element? Also, name element.

Ans. If x = 3, so electronic configuration of atom is 2, 1. Its outer shell contain 1 electron & therefore its valency is 1. And the name of element is Lithium (Li).

25. Composition of the nuclei of two atomic species X & Y are given —

	X	Y
Protons	= 6	6
Neutrons	= 6	8

Ans. Mass number = Sum of no. of protons & neutrons.

Atomic no. = No. of protons.

So, for X & Y both atoms, atomic no. is 6.

Atomic mass of X it will be.

Atomic mass of X = 6+6 = 12.

Atomic mass of Y = 6+8 = 14.

This two species are having same atomic number and different atomic masses that means they both are the isotopes pair of $^{12}_{6}C$, $^{14}_{6}C$.

Q6. The average atomic mass of sample of element X is 16.2 u. What are % of isotopes $^{16}_{8}X$ & $^{18}_{8}X$ in sample ?

Ans. It is given that the average atomic mass of the sample of element X is 16.2 u.
Let the percentage of isotope $^{18}_{8}X$ be y%
Thus the percentage of isotope $^{16}_{8}X$ will be (100-y)%

$\therefore 18 \times y\% + 16 \times (100-y)\% = 16.2$

$\frac{18 \times y}{100} + \frac{1600 - 16y}{100} = 16.2$

$\frac{18y + 1600 - 16y}{100} = \frac{162}{10}$

$\frac{2y + 1600}{10} = 162$

$2y + 1600 = 162 \times 10$

$2y + 1600 = 1620$

$y = \frac{1620 - 1600}{2}$

$y = 10$

Composition of Atoms of the first Eighteen Elements with Electron Distribution in Various Shells.

Name of Element	Symbol	Atomic No.	No. of Proton	No. of Neutron	No. of Electron	Distribution of Electrons.				Valency
						K	L	M	N	
Hydrogen	H	1	1	-	1	1	-	-	-	1
Helium	He	2	2	2	2	2	-	-	-	0
Lithium	Li	3	3	4	3	2	1	-	-	1
Berylium	Be	4	4	5	4	2	2	-	-	2
Boron	B	5	5	6	5	2	3	-	-	3
Carbon	C	6	6	6	6	2	4	-	-	4
Nitrogen	N	7	7	7	7	2	5	-	-	3
Oxygen	O	8	8	8	8	2	6	-	-	2
Fluorine	F	9	9	10	9	2	7	-	-	1
Neon	Ne	10	10	10	10	2	8	-	-	0
Sodium	Na	11	11	12	11	2	8	1	-	1
Magnesium	Mg	12	12	12	12	2	8	2	-	2
Aluminium	Al	13	13	14	13	2	8	3	-	3
Silicon	Si	14	14	14	14	2	8	4	-	4
Phosphorus	P	15	15	16	15	2	8	5	-	3, 5
Sulphur	S	16	16	16	16	2	8	6	-	2
Chlorine	Cl	17	17	18	17	2	8	7	-	1
Argon	Ar	18	18	22	18	2	8	8	-	0

A.26. Therefore the percentage of isotope $^{18}_{8}X$ is 10%.

And the percentage of isotope $^{16}_{8}X$ is $100 - y$ %
$= 100 - 10$ %
$= 90$ %.

27. Compare all the proposed models of an atom given in this chapter.

A. Thomson's model	Rutherford's model	Bohr's model
An atom consists of a positively charged sphere with electrons embedded in it.	An atom consist of a positively charged particles concentrated at the centre known as the nucleus. The size of the nucleus is very small as compared to the size of the atom. The electrons revolve around the nucleus in well defined orbits.	There are only certain orbits known as discrete orbits inside the atom which electron revolve around the nucleus. Electrons do not radiate energy while revolving.

Well
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Chapter - 13

Why do we fall ill

Q. Meanings.

1. Symptoms	a sign of disease or physical disturbance.	बिमारी के लक्षण।
2. Chronic	long duration.	दीर्घ कालिक।
3. Ache	to suffer continous or prolonged pain.	लगातार दर्द होना।
4. Haematology	branch of medical science dealing with disease of blood.	रक्त संबंधि रोग विज्ञान।
5. Vaccination	immunisation against disease.	टिकाकरण।
6. Stagnate	not flow.	बहाव रुक जाना।
7. Discomfort	to make uneasy & restlessness.	बेचैन होना।
8. Epidemic	communicable disease	महामारी।

Q). Ques and ans.

1. State any two conditions essentia for good health.

A. Two conditions essential for good health —

1). A person can be said healthy only when he is free from disease.

2). The person should be free from mental tensions and social problems because only the person who is physically, mentaly & socially fit is called healthy.

2. State any two conditions essential for being free of disease.

A. The two conditions essential for being free of disease —

1). Living in hygenic environment.

2). Getting vaccinated against common infectious disease.

3. Are the answers to the above ques necessarily the same or different, why?

A. Both the question have different answers by term health we means the mental & social health of person while to be free of disease refrence only to physical health hence, both are different.

4. List any 3 reasons why you should think that you are sick & ought to see a doctor. If only one of these symptoms were present, would you still go to the doctor? why are why not?

A. Some general symptoms are -

Headache
Cough
Dysentery

If any of the symptoms is observed, the person should immediately contact the doctors.

Cause → Any of the symptom can be the cause of

disease. If these are ignored, the person may have to face a dangerous situation.

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5. In which of the following case do you think the long-term effects on your health are likely to be most unpleasant?

Ans. Jaundice, it is chronic disease. Jaundice is a result of virus. Hepatitis. In jaundice our liver is affected and it takes more time to recover by taking proper treatment under the supervision of doctors. But lice and acne can be removed easily.

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6. Why are we normally advised to take bland & nourishing food when we are sick?

Ans. When we are sick one or more organs of our body do not function properly. We lost apetite & due to improper digestion we feel sick & weak. During infection, the immune power of body decreases. So to maintain the imune powers & fast recovery, we

which infectious diseases are spread ?

Ans. Following are the reasons of spread of disease :—

1). By water ⇒ The microbes enter in our body by drinking polluted & contaminated water.

2). By air ⇒ By sneezing & coughing microbes spread into the air & enter in body of healthy person.

3). By sexual contact ⇒ Some disease like AIDS spread by sexual contact with infected person.

4). By vectors ⇒ Some organism like mosquito also were to spread the disease.

6. What precautions can you take in your school to reduce at incidence of infectious diseases ?

A. Following precautions we can take in our school to reduce the incidence of infectious disease —

1). Providing clean and fresh drinking water.

2). By keeping toilets clean and proper sanitation in school & its surrounding.

3). Vaccination of students against common infectious disease from time to time.

4). Educating students about the causes of infectious disease.

5). By allowing the infected student not come to school till they recover from infectious disease.

6). By avoiding the use of uncovered food & fruits.

7). By using handkerchief to cover the mouth at time of sneezing & coughing.

9. What is immunisation ?

A. Immunisation is a technique in which people are given particular vaccine. So that they develop temporary or permanent immunity against a particular infectious disease. In other words, immunisation is a specific way to prevent disease by using a vaccine to kill the microbes or to prevent their entry into the body. It increase the immune power of body & thats why it is called immunisation.

10. What are the immunisation programmes available at nearest health centre in your locality ? Which of these diseases are major health problems in your area ?

A. At the nearest health centre in our locality following immunisation programmes are available -

1. Vaccine against measles.

1). Hepatitis
2). Small pox
3). Tuberculosis

11. A doctor/ nurse/ health worker is exposed to more sick people than other in community. find out how she/ he avoids getting sick herself / himself.

A. 1). They use handgloves before touching the patient.

2). After examing the infected person they use soap or disinfected solution.

3). They keep their work place clean with disinfectant.

4). They use mask.

12. The three most common diseases in my neighbourhood are –

1). Diarrhea.
2). Cough & cold.
3). Typhoid.

Three steps that should be taken by authority are –

1). Providing clean drinking water regularly.

2). Providing better sanitation.

3). Arranging immunisation programme from time to time against common infectious diseases.

13. A baby is not able to tell her/his mother that he/she is sick. What would help us to find out?

a). That the body is sick?

measure he used.

3). Every disease has its own indication by which we can identify the disease. If child is continuously vommitting, not eating, lazy, restless, fever & weeping means he was suffering dysentry.

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14. Under which of the following conditions is a person most likely to fall sick?

a). When she is recovering from malaria?

b). When she has recovered from malaria & is taking care of someone suffering from chicken-po

c). When she is on a four day fast after recoving from malaria & is taking care of someone suffering from chicken pox why?

Ans. In above choices, condition - (c) is responsible to fall again sick

Reason → After sickness the immun system of body get we Due to fasting it will be mo

weak. Due to which mutual contamination disease like small-pox will be causing maximum chance of catching the person.

15. Under which of following conditions are you most likely to fall sick ?

a). When you are taking examinations?
b). When you have travelled by bus or train for two days ?
c). When your friend is suffering from measles ?

Why ?

A. When your friend is sick with measles the chance of getting sick increases because measles is an infectious disease & by remaining more in contact with infected person, a healthy person is also infected. Bacteria of this disease are disposed by contact from one person to another.

i). Think of one change you could make in your habits in order to avoid any of / most of above illness.

ii). Think of one change you would wish for in your surroundings in order to avoid any of / most of above illness.

A. Only once I fell ill in last 1 years. I suffered from sore throat & cough.

1). I stopped drinking cold water immediately after taking food.

2). Planting more trees.

One change I could wish is removing weeds & regular disposal of garbage.

17. Write down difference between acute & chronic disease.

A.

Acute	Chronic
1). This last for only short period of time.	This last for a long period of time much. life time.

2). This disease do not cause long term bad effect on human health. Ex. ~~Cancer~~, ~~Diabetes~~ Cough, Cold.	This cause drastic long term effect on human health. Ex. Cancer, Diabetes.

18. What are antibiotics ? Explain with example.

Ans. An antibiotic is a biochemical material produced by a micro-organism which kill or block the growth of other microorganisms by blocking their life without human cell. Ex. Penicillin, Streptomycin.

19. Why are antibiotics not effective for viral diseases ?

Ans. Antibiotics are effective against bacteria & other non-viral pathogens, as they blocked some of their biosynthetic pathway without harming the human cell. Virus do not have their own metabolic mechanism. There are very few biochemical processes that can block viral multiplication. Generally antibiotics are not effective for viral disease.

20. Difference between signs & symptoms.

Signs.	Symptoms.
1). They provide information about the presence of a particular disease.	They indicate the presence of disease.
2). They are distint for different disease.	Symptoms are collective indication of no. of diseases in a particular part or organ.

11. Define disease & how many types of diseases are There ?

A. Any physical or functional change from the normal state. That gives discomfort or disability in life of living organism is called disease.

Disease

- Congential Disease (By Birth)
  - Colour blindness
  - Haemophilis
- Acquired Disease (After Birth)
  - Communicable
    - Common cell
    - Viral fever
  - Non communicable
    - Hormonal di

Explain how does vaccine works.

A vaccine is an antigen that is injected & causes the development of active immunity in the patient. Small quantity of antigen introduced in the particular body, stimulate the production of antibodies as in if the body was infected by disease.

Chapter - 3

Atoms and Molecules.

Q. Meanings.

1. Atom	a smallest particle of matter.	परमाणु।
2. Reactivity	the state of being reactive.	प्रतिकार।
3. Matter	having mass and occupy space.	पदार्थ।
4. Element	an essential component.	तत्व।
5. Postulate	to assume something.	स्वीकार कर लेना।

Q. **Classification Of Matter**

Matter
(Anything that has mass & occupy space).

→ **Pure substances** (have fixed composition)

- **Elements** (contain only 1 kind of particle)
  - **Metals** - loose electrons & form cations.
  - **Non-metals** - Gain electrons & form anions.
  - **Metalloids** - Show property of both metal & non-metal.
- **Compounds** (contain more than 1 kind of particle)
  - **Inorganic compound.** (They are mineral origin)
  - **Organic compound.** (They are plant origin)

→ **Mixtures** (have variable composition)

- **Homogeneous mixture** (have uniform composition).
- **Heterogeneous mixture** (non uniform composition)

Q. Answer the questions.

1. Explain postulates of Dalton's atomic theory ?

Ans. The postulates of Dalton's atom theory are as follows -

1). All matter is made of very tiny particles called atoms, which participate in chemical reaction.

2). Atoms are indivisible particles, which can not be created or destroyed in a chemical reaction.

3). Atoms of a given element are identical in mass and chemical properties.

4). Atoms of different element have different masses and chemical properties.

5). Atoms combine in ratio of small whole numbers to form compounds.

6). The relative number & kinds of atoms are constant in a

given compound.

2. How big are atoms ?

A. Atoms are very small, they are smaller than anything that we can imagine or compare with. More than millions of atoms when stacked would make a layer barely as thick as the sheet of paper.

3. What is an atom ?

A. An atom is an smallest particle which can take part in a chemical reaction. It may or may not be capable of independent existence.

4. What is a molecule ?

A. A molecule can be defined as the smallest particle of an element or a compound that is capable of an independent existence & shows all the properties of that substance. Atoms of the same element or of different elements can join together to form molecule.

5. What is an ion?

A. The charged species are known as ions. An ion is a charged particle and can be negatively or positively charged. A negatively charged ion is called an 'anion' and the positively charged ion a 'cation'.

6. Calculate the relative molecular mass of water (H_2O)

A. Atomic mass of hydrogen = 1 u
Oxygen = 16 u

So the molecular mass of water which contains two atoms of hydrogen & one atom of oxygen is

$= 2 \times 1 + 1 \times 16$
$= 18$ u.

7. What is meant by the term 'chemical formula'?

A. The chemical formula of a compound is a symbolic representation of its composition. The chemical formula

different compounds can be written easily. The combining power (capacity) of an element is known as its valency. Valency can be used to find out how the atoms of an elements will combine with the atoms of another element to form a chemical compound.

8. Write down the formula of :

Ans. i). Formula of sodium oxide.

Symbol Na O

Charge 1+ 2-

Formula : Na_2O

ii). Formula of aluminium chloride.

Symbol Al Cl

Charge 3+ 1-

Formula : $AlCl_3$

3). Formula of sodium sulphide.

Symbol Na S

Charge 1+ 2-

Formula : Na_2S .

4). Formula of magnesium hydroxide.

Symbol Mg OH

Charge 2+ 1-

Formula : $Mg(OH)_2$.

9. Write down the names of the compounds represented by the the formulas :

1). $Al_2(SO_4)_3$
– Aluminium sulphate.

2). $CaCl_2$
– Calcium chloride.

3). K_2SO_4
– Potassium sulphate.

4). KNO_3

– Potassium nitrate.

5). $CaCO_3$
– Calcium carbonate.

10. How many atoms are present in a –

i). H_2S molecule.
ii). PO_4^{3-} ion ?

A. (i). H_2S = 2 atoms of hydrogen + 1 atom of sulphur =

= 3 atoms.

(ii). PO_4^{3-} = 1 atom of phosphorus + 4 atoms of oxygen =

= 5 atoms.

3). Cl_2

$Cl_2 = 2 \times 35.5 = 71$ u.

4). CO_2

$CO_2 = (1 \times 12 + 2 \times 16) = 44$ u.

5). CH_4

$CH_4 = (1 \times 12 + 4 \times 1) = 16$ u.

6). C_2H_6

$C_2H_6 = (2 \times 12 + 6 \times 1) = 30$ u.

7). C_2H_4

$C_2H_4 = (2 \times 12 + 4 \times 1) = 28$ u.

8). NH_3

$NH_3 = (1 \times 14 + 3 \times 1) = 17$ u.

9). CH_3OH

$CH_3OH = (1 \times 12 + 1 \times 3 + 1 \times 16 + 1 \times 1) = 32$ u.

12. Calculate the formula unit mass of ZnO, Na_2O, K_2CO_3, given atomic masses of $Zn = 65$ u, $Na = 23$ u, $K = 39$ u, $C = 12$ u, $O = 16$ u.

A. Formula unit mass of

i). $ZnO = (1 \times 65 + 1 \times 16)$ u.
$= 65 + 16$
$= 81$ u.

ii). $Na_2O = (2 \times 23 + 1 \times 16)$ u.
$= 46 + 16$
$= 62$ u.

iii). $K_2CO_3 = (2 \times 39 + 1 \times 12 + 3 \times 16)$ u.
$= 78 + 12 + 48$
$= 138$ u.

13. In a reaction 5·3 g. of sodium carbonate reacted with 6 g. of ~~acetic~~ ethanoic acid. The products were 2·2 g. of sodium ethanoate. Show that these observations are in agreement with the law of conservation of mass.

Sodium carbonate + ethanoic acid → sodium ethanoate + carbon dioxide + water.

A. The reaction is,

Sodium carbonate + ethanoic acid → sodium ethanoate + carbon dioxide + water.

5·3 g + 6 g. ~~gives~~ → 8·2 g + 2·2 g + 0·9

Now,

Total mass of reactants = (5·3 + 6) g. = 11·3 g.

Total mass of product = (8·2 + 2·2 + 0·9) g. = 11·3 g.

So, mass of reactants = Mass of product

It shows the law of conservation of mass.

14. Hydrogen & oxygen combine in ratio is of 1:8 by mass to form water. What mass of oxygen gas would be required to react completely with 3 g. of hydrogen gas?

Ans. My Ratio of hydrogen & oxygen in water = 1:8

So oxygen is 8 times that of hydrogen by mass

Let, x g. of oxygen will react with 3 g. of hydrogen.

Thus,

$1 : 8 = 3 : x$

$x = 8 \times 3$

$x = 24$ g.

Therefore, 24 g. of oxygen gas is required.

15. Which postulate of Dalton's atomic theory is the result of law of conservation of mass?

A. Postulate of Dalton's atomic theory based on law of conservation of mass is "atoms are indivisible particles which can neither be created nor destroyed in a chemical reaction".

16. Which postulates of Dalton's atomic theory can explain the law of definite proportions?

A. Postulate is the relative number and kinds of atom remains constant in a given compound.

17. Define atomic mass unit.

A. Atomic mass unit is the mass unit equal to ~~one by last~~ $\frac{1}{12}^{th}$ part of one carbon

= 12 atoms.

18. Why is it not possible to see an atom with naked eyes?

A. The size of an atom is very very small that we can not see with naked eyes. The size of an atom lies in nanometres (n.m.).

19. If one mole of carbon atoms weighs 12 g., what is the mass (in grams) of 1 atom of carbon?

A. 1 mole of carbon atom = 6022×10^{23} atoms.

Also, 1 mole of carbon atom = 12

6022×10^{23} atom of carbon weight = 1

1 atom of carbon weight = 1.99×10^{23}

20. Which has more number of atoms 100 grams of sodium or 100 g of iron (given atomic mass of Na = 23 u, Fe = 56 u?)

A. 1 mole of sodium = 23

Atoms = 6.022

23 g. of Na = 6.022×10^{23} atoms.

100 g. of Na = $\frac{100}{23} \times 6.022 \times 10^{23}$

= 2.617×10^{24} atoms.

1 mole of iron atom = 56 g. of Fe

56 g. of iron = 6.022×10^{23} atoms.

100 g. of Fe = $\frac{100}{56} \times 6.022 \times 10^{23} = 1.675 \times 10^{24}$ atom

So, 100 g. of Na contains more atoms.

Chapter - 5

The Fundamental Unit of Life

Q. Meanings -

1. Magnifying	the act of magnification.	बृहत्तर
2. Forcep	a pair of surgical pincers.	चिमटा
3. Biogenesis	the doctorine that life is derived from life.	जीव से उ का
4. Pipesicles	a small bladder.	~~छो~~

Q. Ques. and Ans.

1. Define Mitochondria.

A. Mitochondria are known are as the powerhouses of cell. The energy required for various chemical activities needed for life is realased by mitochondria in the form of ATP (Adinosine Triphas-phate) molecules. ATP is known as the energy - currency of the cell. Mitochondria are strange organelles in the sense that they have their own DNA and ribasomes.

2. Write difference between plant cell and animal cell.

A.	Plant Cell	Animal Cell
1.	The outermost covering of the plant cell is the cell wall which is formed of cellulose.	The outermost covering is the plasma membrane.
2.	Plastids (ex. Chloroplast, leucoplast) present.	Plastids absent.

4].	Large vacuole present.	No or small vacuoles are present.
4].	Centrioles are absent but plastids are present.	Centrioles are present within centrosomes.

3. How is a prokaryotic cell different from a eukaryotic cell

Ans.

	Prokaryotic Cell	Eukaryotic Cell
1].	Cell size is generally small (1 to 10 mm).	Cell is generally large (5-100 mm).
2].	Nuclear region is called nucleoid is not surrounded by a nuclear membrane.	Nuclear material surrounded by nuclear membrane
3].	Only a single chromosome is present.	More than one chromosomes are present.
4].	Nucleolus is absent.	Nucleolus is pres
5].	Membrane bound cell organelles are absent.	Cell organelles bounded by memb are present.

6. Cell division by fission or budding.	Cell division mitotic or meiotic.

4. Who discovered cells and how ?

A. Robert Hooke (1665), by chance observed a slice of cork through a self-designed microscope. He observed that it contain many little compartments, like a honeycomb, which he named as cells.

However, Leeuwenhoek (1674) discovered the free living cells in pond water for the first time, by his improved microscope.

5. Why is the cell called the structural & functional unit of life ?

A. The body of all organisms consists of one or many cells, Therefore, cell is called the structural unit of life. All processes associated with life such as respiration, digestion, excretion are performed by self. So cell is also called as fundamental unit of life.

6. How do substances like CO_2 & water move in & out of cell ? Discuss.

A. When concentration of CO_2 is more inside the cell than outside, it diffuses from the cell to outside of cell. If CO_2 concentration inside the cell is less, CO_2 moves inside the cell from outside.

The water move in and out of the cell by the process of osmosis. Osmosis is the passage of water from a region of high water concentration through semi-permiable membrane (cell membrane) to a region of low concentration of water.

7. Why is plasma membrane called a selectively permiable membrane?

A. Plasma membrane permits the entry and exit of some material in & out of cell. It also prevents movement of some other materials, so, it is called selectively permeable membrane.

8. Can you name two organelles we have studied that contain their own genetic material ?

A. Mitochondria and Plastids (chloroplast)

9. If organisation of a cell is destroyed due to some physical or chemical influence, what will happen?

A. Each cell has got certain specific cell organelles. Each cell organelle performs a special function. Ex - making of new material, removal of waste from the cell, release of energy etc. If organisation of a cell is destroyed, the functioning of cell organelles will be disturbed, control of nucleus will be lost. Ultimately cell will die.

10. Why are lysosomes known as "suicide bags"?

A. Lysosome is a membrane bound bag like cell organelles which contain powerful enzymes. If lysosome bursts, its enzymes eat up (digest) other organelles of its own cell. Therefore they are known as "Suicide Bags".

11. Where are proteins synthesised inside the cell?

A. Ribosomes.

12. What would happen to the li of a cell if there was Golgi apparatus.

A. It collects simpler molecules fro ER and convert them into more complex molecules. These then packaged in small vesicl and are stored or transpo inside or outside the cell. If golgi apparatus is not present in the cell, al the above processes of modification, storage and tran -lation will not be possib Golgi apparatus is also involved in the formation o lysosomes. If there was no golgi apparatus in the cell lysosomes would not be form and hence foreign material like bacteria could easily inv & destroy the cell.

13. Whichere ~~are~~ do the lipids and proteins constituting the cell membrane get synthesized? rough

A. The Endoplasmic Reticulum (RER) synthesizes proteins constituting cell membrane.

Smooth Endoplasmic Reticulum (SE

synthesizes and secretes lipids constituting cell membrane.

14. How does an amoeba obtain its food ?

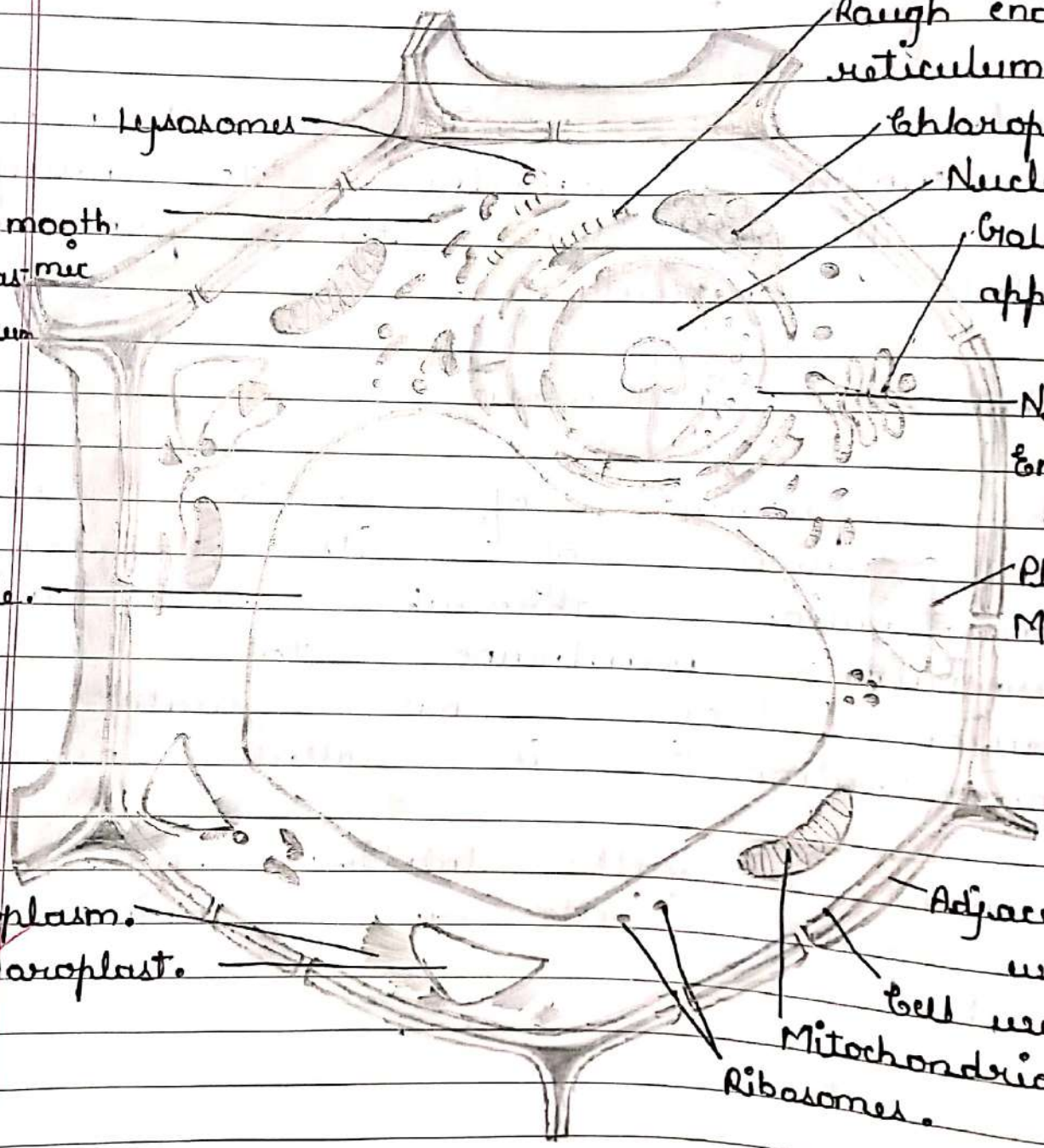
Ans. Amoeba has flexible cell membrane. It enables amoeba to engulf in food by the process called endocytosis.

15. What is osmosis ?

Ans. The passage of water from a region of its higher concentration through a semi-permiable membrane to a region of low water concentration is called osmosis.

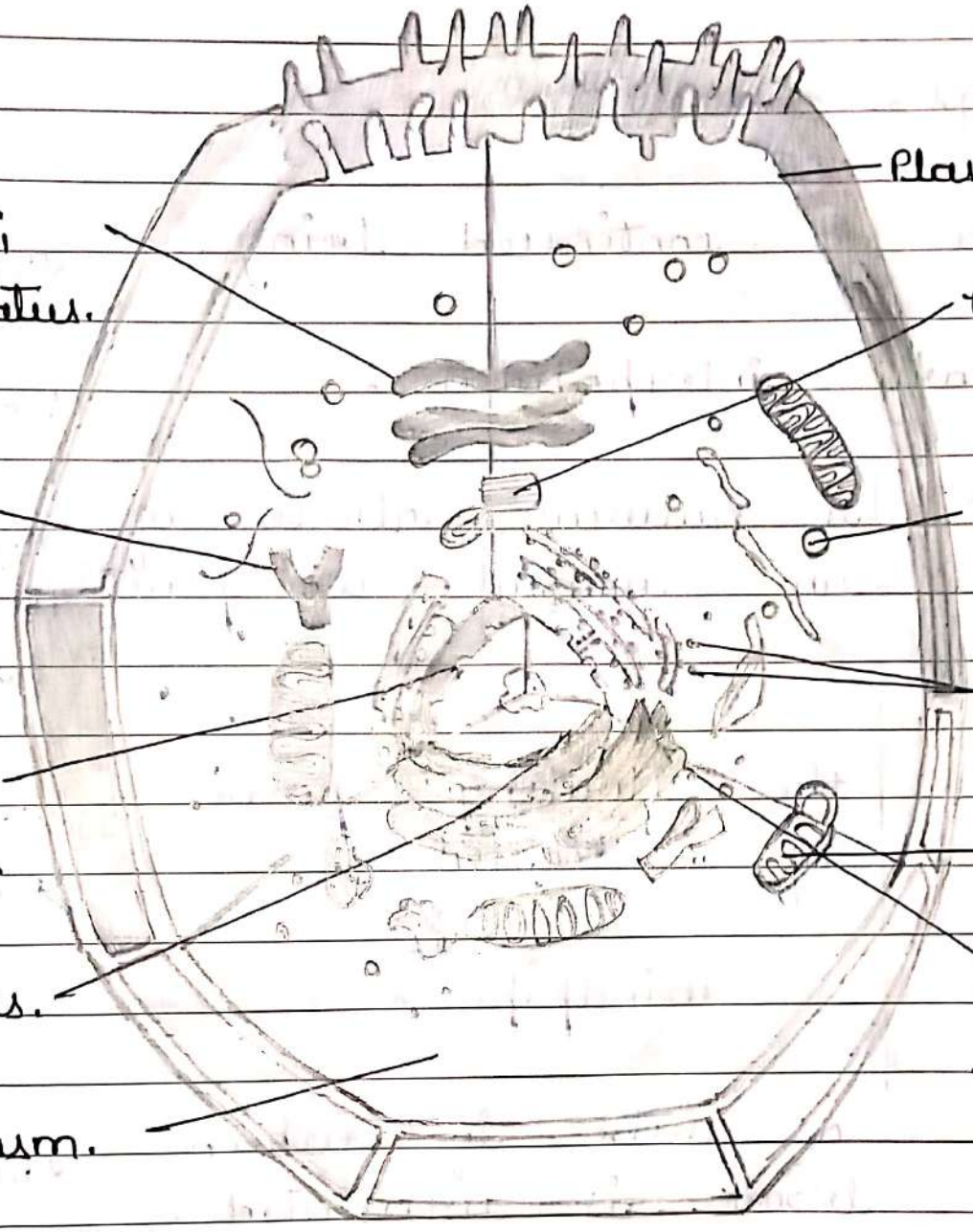
16. Draw a well labelled diagram of plant cell and animal

Plant Cell.



Plant Cell.

Animal Cell



Animal Cell.

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Chapter - 6

Tissues

Q. Meanings -

1. Existence	a continued being.	सत्ता
2. Intercalary	interpolated.	अन्तरीय
3. Habitat	a natural abode of an animal or plant.	जन्तु या का प्राकृ वास स्था
4. Byoyance	the floating power of liquid.	तरल पदार्थ प्र लवनशी
5. Trachids	windpipe.	
6. Vessels	a tube in which blood is circulated.	रक्त वाहिनी नली

Q. Answer these questions.

1. What is a tissue ?

A. A group of cells that are similar in structure and work together to achieve a particular function forms a tissue.

2. What is the utility of tissues in multicellular organisms ?

A. In multicellular organism, different types of tissues perform different functions. Since a particular group of cells carry out only a particular function, they do it very efficiently. So, multicellular organism possess a specific division of labour.

3. Name types of simple tissues.

A. Parenchyma
Collenchyma
Sclerenchyma

3. Which tissues make up the husk of coconut ?

A. Sclerenchymatous tissue makes up the husk of coconut.

4. What are the constituents of phloem ?

A. Phloem is made up of four types of elements : They are

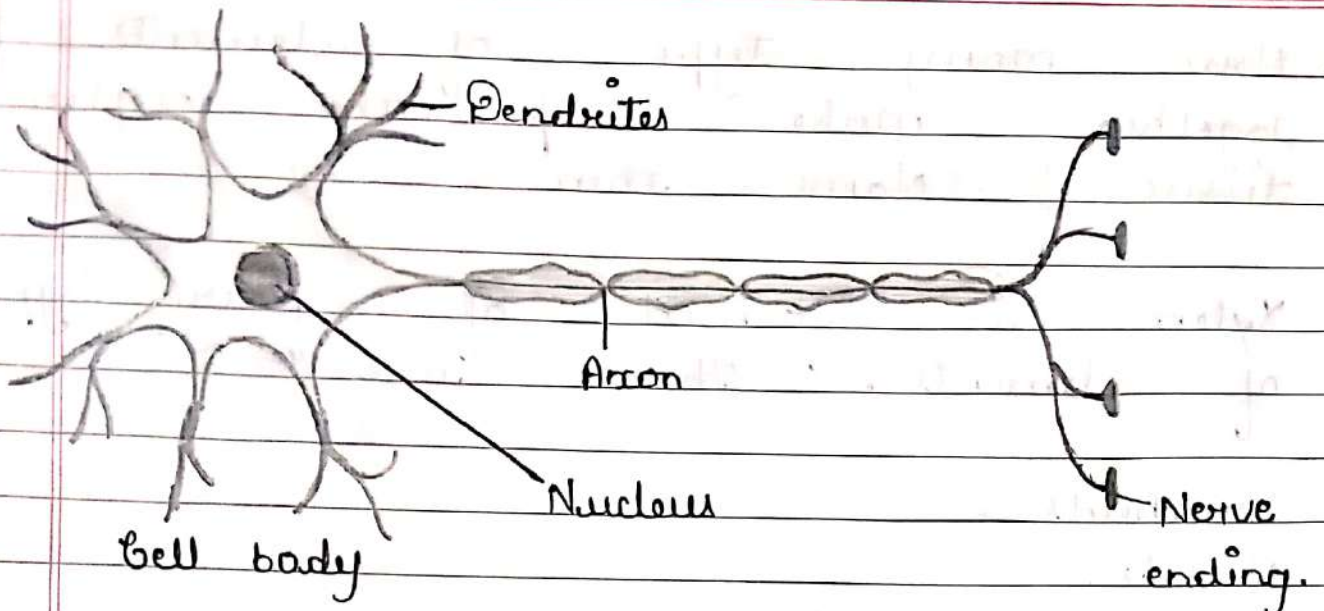
Sieve tube
Companion cells
Phloem fibres
Phloem parenchyma.

5. Name the tissue responsible for movement in our body.

A. Muscular tissue

6. What does a neuron look like ?

A. A neuron is the unit of nervous system. It is elongated in shape and consists of three parts dendrites, cell body and axon



7. Give three features of cardiac muscles.

A. The features of cardiac muscles are as follows -

1). Cardiac muscle cells are cylindrical branched and uninucleate.

2). They show rhythmic contraction and relaxation throughout life.

3). They are involuntary muscles.

8. What are the functions of areolar tissue?

A. Areolar tissue fills space inside the organs, supports internal organs, and helps in repair

9. How many types of elements together make up the xylem tissue? Name them.

A. Xylem is formed of four types of elements. They are —

Tracheids.
Vessels.
Xylem Parenchyma.
Xylem fibre.

10. How are simple tissues different from complex tissues in plants?

A. Simple tissues are made of one type of cells which coordinate to perform a common function. Complex tissues are made of more than one type of cells. All these coordinate to perform a common function.

11. Differentiate between parenchyma, collenchyma & sclerenchyma.

A.

Parenchyma	Collenchyma	Sclerenchyma
The cells of parenchyma have thin walls made of cellulose.	The cells of this tissue have walls thickened at corners due to cellulose deposition	The walls of sclerenchymatous cells are thick due to lignin

12. What are functions of stomata.

A. The functions of stomata are as follows -

1). Exchange of gases, particularly CO_2 and O_2 with atmosphere.

2). Loss of water in the form of vapours during transpiration.

13. Differentiate between striated, unstriated & cardiac muscles on basis of their structure & location in body.

Characters	Striated muscles	Unstriated muscles	Cardiac muscles.
Shape	Cells are long, cylindrical, non-tapering and are unbranched.	Cells are long with tapering ends and are unbranched.	Cells are non-Tapering, cylindrical in shape and are branched.
Location in body	In hands, legs & skeletal muscles.	The wall of stomach, intestine, ureter and bronchi etc.	In the heart.
Light & Dark Bands	Present.	Absent.	Present but less prominent.

14. Name the following.

1) Tissue that forms the inner lining of our mouth ?

A. Squamous Epithelium.

2). Tissue that connects muscle to bone in humans.

A. Tendon.

3). Tissue that transports food in plants.

A. Phloem.

4). Tissue that stores fat in our body.

A. Adipose tissue.

5). Connective tissue with a fluid matrix.

A. Blood.

6). Tissue present in the brain.

A. Nervous tissue.

15. Identify the type of tissue in the following : skin, bark of tree,

bone, lining of kidney Tubule, vascular bundle.

A. Skin ⇒ Striated Squamous Epithelium.

Bark of tree ⇒ Cork (Protective tissue).

Bone ⇒ Connective tissue.

Lining of kidney Tubule ⇒ Cuboidal Epithelium Tissue.

Vascular bundle ⇒ Conducting Tissue (Xylem and Phloem).

18. Name the regions in which parenchyma tissue is present.

A. Parenchyma is found in cortex and pith of both root and shoot stem. When it contain chlorophyll, it is called chlorenchyma, found in green leaves.

19. What is role of epidermis in plants?

A. Cells of epidermis form a continuous layer without intercellular spaces. It protect all the parts of plants.

20. How does the cork act as a protective tissue ?

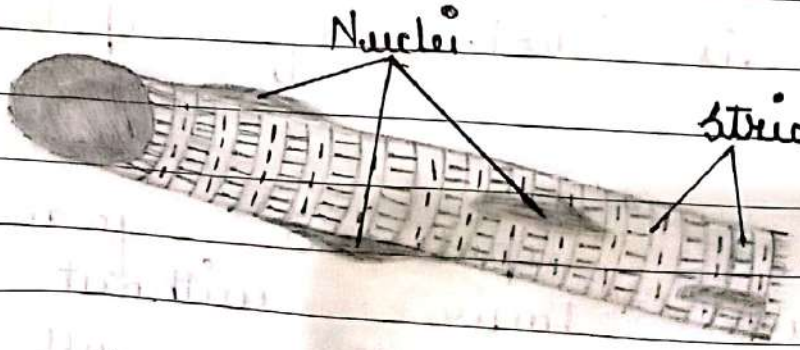
Ans. In older plants, the secondary meristem forms on its outer side several layered thick cork or the bark. Cork acts as a protective tissue because :

1). Its cells are dead and compactly arranged without intercellular spaces.

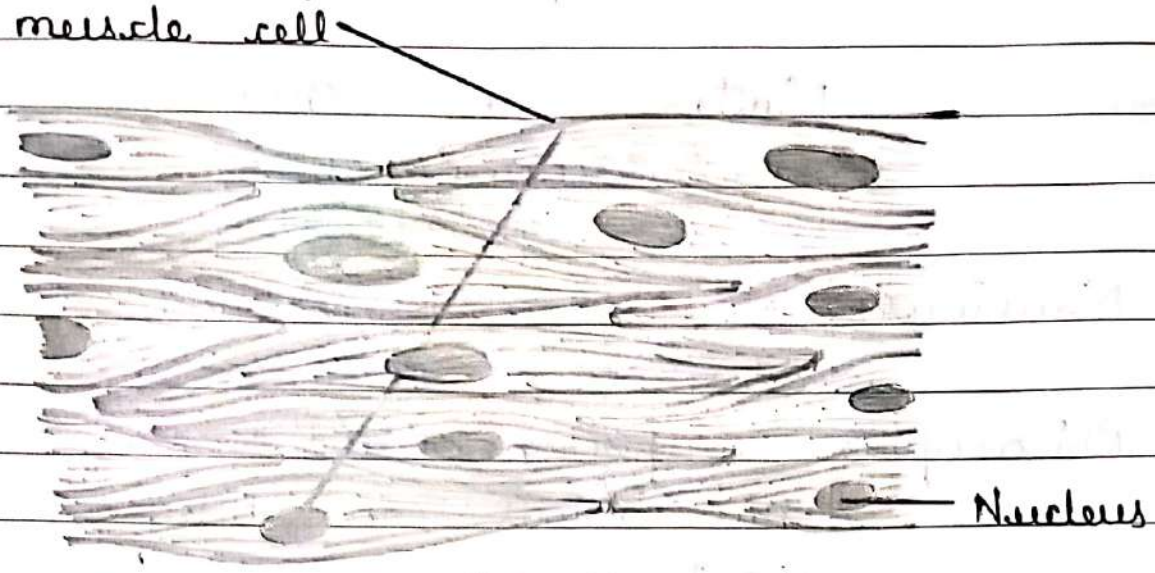
2). Its cells are also have deposition of suberin in their walls that makes them impervious to gases and water. Thus, cork protects the underline tissue from excessive loss of water, adverse external environment and mechanical injuries.

21. Diagramatically show difference between three types of muscle fibres.

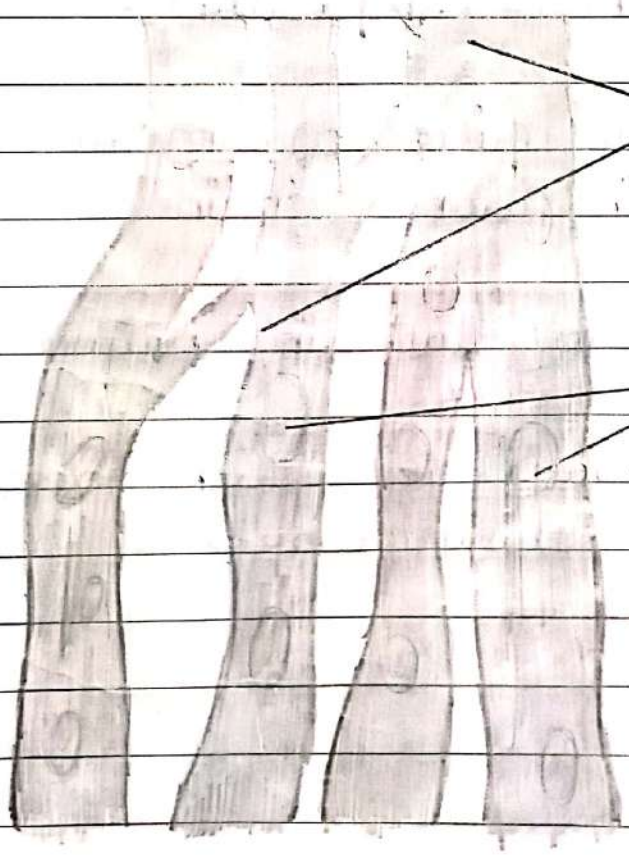
Ans.



Striated M.



Smooth Muscle



Cardiac Muscle

Chapter - 1

Matter In Our Surroundings.

Q. Meanings.

1. Philosopher	a person who has ideas and beliefs about meaning of life.	दार्शनिक
2. Diffusion	moving of molecules.	विसरण
3. Negligible	not important.	नगण्य
4. Piston	a piece of metal in an engine.	धातु का टुकड़ा जो इंजन में लगी
5. Phenomenon	a fact in nature.	घटना
6. Mechanism	way in which something works.	क्रिया-विधि
7.		

characteristics of particles of matter ?

Ans. The characteristics of particles of matter are as follows –

1). Particle of matter are very small.

2). Particles of matter have space between them.

3). Particles of matter are continuasly moving.

4). Particles of matter attract each other.

2. What do you mean by latent heat ?

Ans. It is the heat energy which is required to change the state of a substance.

1). Latent heat of fusion * It is the amount of heat required to convert 1 kg.

its temperature.

2. Latent heat of Vapourisation :- It is amount of heat required to convert 1 kg. of a liquid into vapour or gas at its boiling point without raising its temperature.

3. What is Sublimation ?

A. The phenomenon of change of state directly from solid to gas or vapours and vice - versa without changing it into liquid state is called Sublimation.

4. What is Evaporation ?

A. The process of changing of a substance from its liquid state to vapour state due to increase in Temperature or pressure.

5. Which of the following are matter :

Chair, air, love, smell, hate, almonds, th...

A. Chair, air, almonds, lemon water.

6. Give reasons for following observation

The smell of hot sizzling food reaches you several metres away, but to get smell from cold food you have to go close.

A. The particles of hot food have more kinetic energy due to higher temperature, so their rate of diffusion is more and they move several metres away as compared to the particles of cold food.

7. A diver is able to cut through water in a swimming pool. Which propirty of matter does this observation show?

A. This shows that the particle of matter have space between them and a weak force of attraction between them.

8. The mass per unit volume of a substance is called density. (density = mass / volume). Arrange following in order of increasing density — air, exhaust from chimneys, honey, water, chalk, cotton and iron.

A. Air < exhaust from chimneys < cotton < water < honey < chalk < iron.

9. a). Tabulate differences in characteristics of states of matter.

A. Characteristics	Solid	Liquid	Gas
a. Shape	Definite shape	Do not have definite shape.	Do not h definite shape.

4.	Compressibility	Incompressible	Incompressible	Highly compressible.
5.	Inter molecular space	least inter molecular space.	More than solids but less than gases.	Maximum inter molecular space.
6.	Inter Molecular Force	Maximum	less than solid.	Minimum or least.
7.	Diffuse	Can not diffuse.	Can diffuse slowly.	Can diffuse easily and rapidly.

b). Comment on the following -

i). Rigidity ⇒ It is the tendency of matter to retain or maintain its shape when an outside force is applied. Solids are rigid in nature.

ii). Compressibility ⇒ It is the property of matter due to which it can be compressed to lower volume.

Solids have minimum compressibility, but gases have maximum.

iii) Fluidity ⇒ It is the tendency of a matter are particles of a matter to flow. Liquid and gases has fluidity so they are fluids.

iv) Filling a gas container ⇒ Gas particles fill the container completely due to negligible intermolecular force and maximum space between particles.

v) Shape ⇒ It is the property of matter which indicates its boundaries.
Solids have fixed shape but liquids and gases have no fixed shape.

vi) Kinitic Energy ⇒ The energy of matter or particles of matter due to their motion is called Kinitic Energy.
Particles of gases have highest kinetic energy and liquids have less kinetic energy than gases but more than solids.

viii) Density ⇒ It is mass per unit volume.

Solids have highest density, liquids have low density than solids but greater than gases.

10. Give reasons.

i) A gas fills completely the vessel in which it is kept.

A. The molecules of gas have very less force of attraction and possess high kinetic energy due to which they move in all directions and fill the vessel completely.

ii) A gas exerts pressure on the walls of container.

A. The particles of gas move freely and randomly in all directions. So, they collaid with each other and also with the walls of the container, due to which they exert a pressure on its walls.

iii) A wooden table should be call a solid.

A. A wooden table has a fixed shape, fixed volume. It is rigid and can not be compressed. So it should be called a ~~solid~~.

iv) We can easily move our hand in air but to do the same through a solid block of wood we need a karate expert.

A. The particles of air have very less force of attraction between them, so we can easily move our hand but particles of wood have strong force of attraction, so we have to apply a greater amount of force to break it and pass through solid wood.

ii. Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Find out why?

A. As we know that ice is solid and water is liquid, but the structure of ice is cage like due to which the molecules of water are not closely packed and have vacant space between them due to which ice has low density than water and floats over it.

12. Convert the following Temperature to celsius scale.

a). 300 K

A. 1° C = 273 K
= (300 − 273)
= 27° C

b). 573 K

A. (573 − 273)
= 300° C

13. What is physical state of water at :

a). 250° C ⇒ Gaseous state.

b). 100° C ⇒ liquid and gaseous state.

14. For any substance, why does temperature remain constant during change of state?

Ans. During the change of state of any substance, the temperature remains constant because the heat supplied to substance is used in overcoming the force of attraction between the particles and change its state. This hidden heat is called latent heat.

15. Suggest a method to liquify atmospheric gases.

Ans. The atmospheric gases can be liquefy by cooling & applying pressure on them in a closed chamber are cylinder.

16. Why does a desert cooler cool better on a hot dry day?

Ans. On a hot dry day, the rate of evaporation is high because of low humidity. So, water sprinkling on the pats of cooler gets evaporated from outside which results

in making its walls cool and then ~~they~~ we receive cool air

17. How does the water kept in an earthern pot become cool during summer?

A. The earthern pot has a lot of pores on its surface. So, water comes out and gets evaporated from these pores and cools the water inside the pot.

18. Why does our palm feel cold when we put some acetone or petrol or perfume on it.

A. When we put acetone or petrol or perfume on our palm, then these liquids absorb energy from our palm and gets evaporated which cause cooling effect on our palm.

19. Why are we able to sip hot Tea or milk faster from a saucer rather than a cup?

A. Saucer has a large surface area than a cup. So, the rate of evaporation is more in saucer than cup which cause faster cooling of the hot Tea. Hence, we can sip hot Tea from a saucer faster than a cup.

20. What type of clothes should we wear in summer?

A. Light coloured cotton clothe should we wear in summer because light colour reflects heat and cotton absorbs sweat quickly and evaporate it easily which makes our body feel cool and dry.

21. Convert the following Temperatures to celsius scale.

a). 293 K

A. 293 K into °C
293 - 273 = 20° C

b). 470 K.

A. 470 K into °C
470 − 273 = 197° C

22. Convert the following Temperature to Kelvin Scale.

a). 25° C.

A. 25 + 273 = 298 K

b). 373° C

A. 373 + 273 = 646 K.

23. Give reason for following observations —

i). Naphthalene balls disappear with time without leaving any solid.

A. Naphthalene balls disappear with time without leaving any solid because naphthalene balls sublime and directly change into vapour state without leaving any solid.

ii). We can get the smell of perfume sitting several metres away.

A. We can get the smell of perfume sitting several metres away because perfume contains volatile solvent, gaseous particles, which have high speed and large between them and diffuse faster and can reach people sitting several metres away.

24. Give two reasons.

i). Water at room temperature is a liquid.

A. Water at room temperature is a liquid because its freezing point is 0° C and boiling point is 100° C.

ii). An iron almirah is a solid at room temperature.

A. An iron almirah is a solid at room temperature because melting point of iron is higher than the room temperature.

25. Why is ice at 273 K more effective in cooling than wate[r] same temperature?

A. Ice at 273 K will absorb heat energy or latent heat from the medium to overcom the heat of fusion to become water. Hence, the cooling effect of ice is more than the water at same temperature because wat does not absorb this extra heat from the medium.

26. What produces more severe burns, boiling water or steam

A. Steam at 100°C will produce more severe burns as extra heat is hidden in it called latent heat. whereas, the boiling water does not have this hidden heat.

Chapter - 2

Is Matter Around Us Pure ?

Q. Meanings.

1. Mixture	substance made by mixing different substances together.	मिश्रण।
2. Spatula	a tool with wide flat part.	चपटा चम्मच
3. Homogenous	made up of parts that are of same type.	समांगी।
4. Heterogeneous	consisting of different kinds of particles.	विषमांगी।
5. Dispersed	to separate.	बिखर जाना
6. Immiscible	liquid that can not be mixed together.	अमिश्रणीय द्रव पदार्थ

Ans.

1. Define diffusion, on which features does it depends ?

A. It is the mixing of particles of different matters. It depends on the state, temperature & kinetic energy of particles.

2. Define how can we liquify gas ? How is it useful to us ?

A. Gases can be liquified by cooling them and by applying pressure into a closed chamber like cylinder. It property of compressibility is useful for us and we use it through different ways. Example. LPG (Liquified Petroleum Gas), CNG (Compressed Natural Gas).

other kinds of matter by any physical process.
Example. Water, Sugar.

4. List the points of differences between homogeneous and heterogeneous mixtures.

A.	Homogeneous Mixture	Heterogeneous Mixture
1).	Uniform composition throughout the mass.	Non-uniform composition through the mass.
2).	It has ~~Heterogeneous~~ invisible boundaries of separation between the constituents.	It has visible boundaries of separation between various constituents
3).	Constituents are not visible by naked eyes.	Constituents are visible by naked eyes.
4).	Example. Water + Salt and Water + Sugar.	Example. Powder + Stones.

5. How are sol, solution and suspension different from each other?

A. Sol ⇒

1). They appear to be homogeneous. but actually they are heterogeneous.

2). The size of solute particles is more than true solution. (1nm) but less than suspension (100nm).

3). Particles can not be separated by filtration.

4). Particles are not visible to naked eyes.

5). They scatter a beam of light.

6). Example. Smoke, blood and ink.

Solution.

1). They are homogeneous mixtures.

2). The size of solute particles is less than 1 nanometer in diameter.

3). Particles can not be separated by filtration.

4). Particles are not visible to naked eyes.

5). They do not scatter a beam of light.

6). Example. Sugar in water and Salt in water.

Suspension.

1). They are heterogeneous mixture

2). The size of solute particles is more than 100 nanometer in diameter.

3). Particles can be separated by filtration.

4). Particles are visible to naked eyes.

5). They scatter a beam of light.

6). Example. Dust in Air, Mud in water.

water at 293 K. Find its concentration at this temperature.

Ans. We know,

Concentration of solution =

$$= \frac{\text{Mass of solute}}{\text{Mass of solution}} \times 100$$

Now, mass of solute = (sodium chloride)
= 36 g.

Mass of solvent (water) = 100 g.

So, Mass of solution = Mass of solute + Mass of solvent.
= (36 + 100 g) = 136 g.

Then,

$$\text{Concentration of solution} = \frac{36}{136} \times 100$$

= 2647 % by mass.

7. How will you separate a mixture contain kerosene and petrol (difference in their boiling point is more than 25°C), which are miscible with each other?

A. The difference in the boiling point of kerosene and petrol is 25 °C. So, they can be separated by the process of simple distillation.

Method.

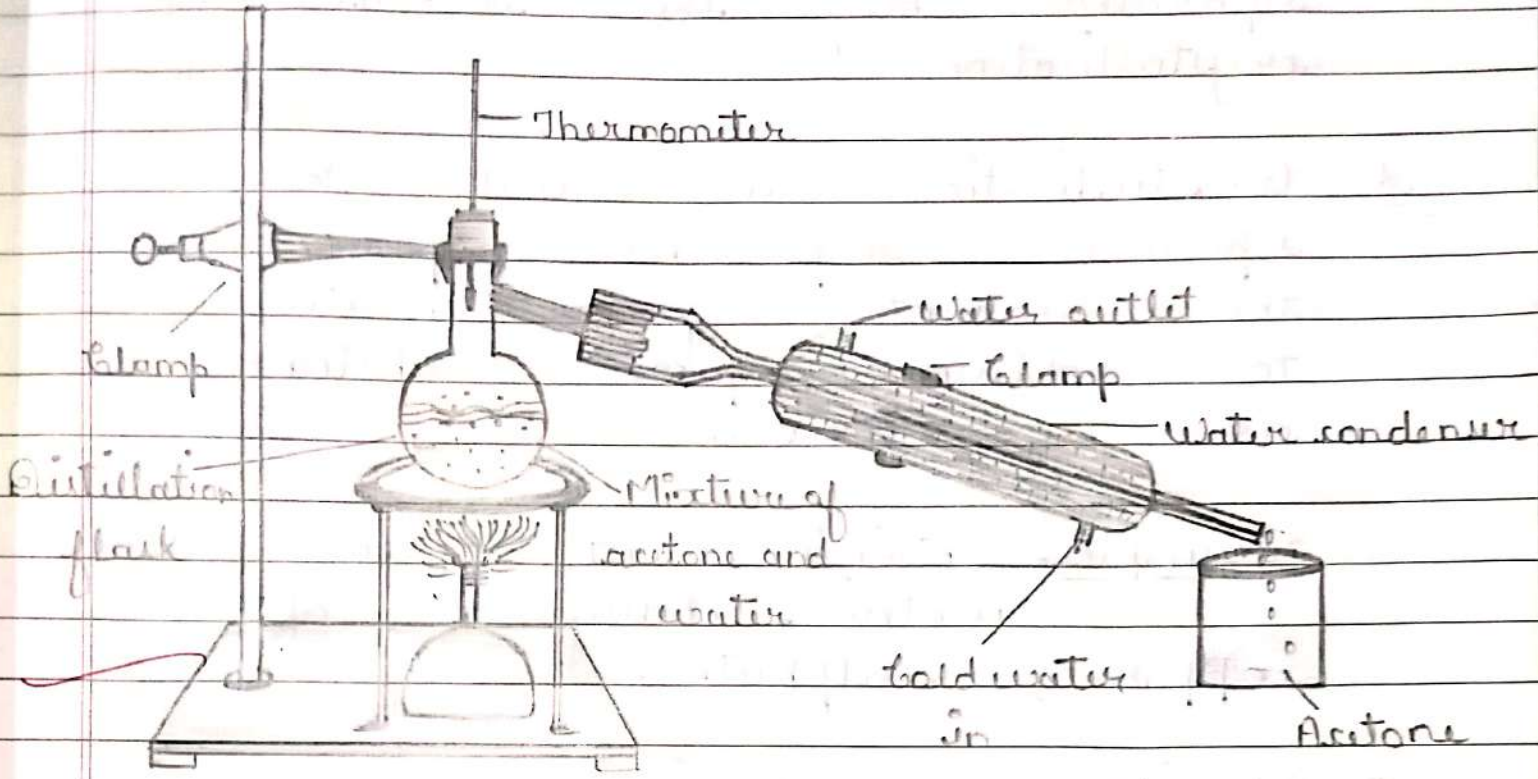
1). Take the mixture in a distillation flask and fit a thermometer in it.

2). Make the arrangement as shown in figure.

3). Heat slowly and observe.

4). Petrol has lower boiling point, so it vapourises first and get condensed in the condenser and finally get collected in the receiver.

5). Kerosene has higher boiling point so it will be left behind.



Separation of two miscible liquids by distillation.

8. Name the technique to separate.

i) Butter from curd.

Centrifugation.

ii). Salt from sea-water.

Evaporation.

iii). Camphor from salt.

Sublimation.

9. What type of mixtures are separated by the technique of crystallisation ?

A. Crystallisation is used to separate impurities present in the solvent from mixtures to obtain pure substance as a crystal.

Example. Obtaining salt from sea-water, Purification of copper sulphate.

10. Classify as chemical or physical changes.

1). Cutting of Trees.
Physical change.

2). Melting of butter in a pan.
Physical change.

3). Rusting of almirah.
Chemical change.

4). Boiling of water to form steam
Physical change.

5). Passing of electric current through water & water breaking down into hydrogen and oxygen gases.

Chemical change.

6). Dissolving common salt in water.
Physical change.

7). Making a fruit salad with raw fruits.
Physical change.

8). Burning of paper and wood.
Chemical change.

11. Try segregating the things around you as pure substances or mixtures.

Pure Substance → Salt, Sugar, Water, Silver, Diamond, Alcohol.

Mixture → Milk, Air, Plastic, Bronze, Cold drink.

12. Write the steps you would use for making Tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

2). Add 3-4 teaspoons of sugar, 2 teaspoons of tea leaves as a solute, making it a solution and boil it.

3). Add 1 cup of milk as a solute which will make a dark brown mixture. Leave it to boil.

4). Sugar will get dissolved in solution but tea leaves remains insoluble. So, it will not get dissolved in the mixture.

5). Boil the mixture for few more minutes.

6). Filter the solution through tea-strainer and collect the filtrate in a cup.

7). The tea leaves being insoluble will be left as residue.

13. Explain the following -

i) Saturated Solution

A. The solution in which more solut

temperature is called saturated solution.

Example. In aqueous sugar solution, if no more sugar can be dissolved at that temperature, then it will be called as saturated solution.

ii) Pure Substance.

It is the substance which contains only one kind of particles and its composition is same throughout.

Example. Water, Sugar.

iii) Colloid.

It is the heterogeneous mixture in which the size of particles lie between True solution and suspension. The particles can not be seen through naked eyes but they can scatter a beam of light and possess Tyndall effect.

Example. Smoke, Milk, Blood.

iv) Suspension

It is a heterogeneous mixture in which solute particles remain undissolved & get suspended within the medium. The particles scatter a beam of light and are visible through naked eyes.

Example - Mud in water, Sand in water.

classmate
Date
Page 97

Chapter - 8

Motion

Q. Meanings.

1. Motion	way of moving or movement.	गति करने का प्रकार या गति
2. Evidence	proof, that make you believe that something is true.	सबूत, गवाह।
3. Perceive	to notice or realise.	बोध होना।
4. Stationary	not moving.	स्थिर।
5. Magnitude	great size.	बड़ा आकार।
6. Displacement	change in position.	विस्थापन।
7. Odometer	an instrument for measuring distance travelled by a wheeled vehicle	दूरी मापने का यंत्र जो गाड़ियों में लगा हो।

1. Define Motion.

A. A body is set to be in motion when its posit changes with respect to time continuously with reference to stationary object like a car changing its position and moving continuously with respect to a stationary object like a pole or a tree.

2. Define Distance and displacement.

A. Distance ⇒ It is the actual length of the way covered by the body from initial point to final point without giving importa to direction. It has only magnitude. It is scalar quantity.

Displacement ⇒ It is the short distance between intial point and final

point along with direction. It has magnitude as well as direction. So, it is vector quantity.

3. Explain types of motion.

Ans. There are two types of motion which are as follows-

1) Uniform Motion → If a body covers equal distance in equal interval of time then its motion is said to be uniform.

Example. A car moving on a highway with same speed.

2) Non - Uniform Motion → If a body covers unequal distance in equal interval of time then its motion is said to be non-uniform.

Example. A body moving in a circular path.

1. Speed → It is the distance travelled by the body per unit time.
That is:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

S.I. unit is metres per sec m/s. It is a scalar quantity.

Velocity → It is the distance travelled by the body in a particular direction.

i.e. Velocity = $\frac{\text{Distance in a particular direction}}{\text{Time}}$

Or we can say that, velocity is the displacement covered by the body per unit time.

i.e. Velocity = $\frac{\text{Displacement}}{\text{Time}}$.

S.I. unit is same as that

5. Define Acceleration.

A. It is the rate of change of velocity per unit time.

Acceleration = $\frac{\text{Change in velocity}}{\text{Time taken}}$

Or $\frac{\text{final velocity} - \text{Intial Velocity}}{\text{Time taken}}$

Or $a = \frac{v-u}{t}$.

The S.I. unit is metres per second square or m/s^2.

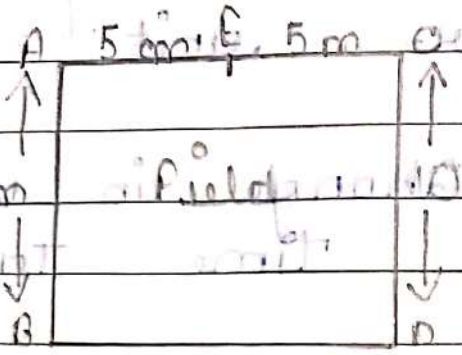
6. An object has moved through a distance. Can it have zero displacement? If yes, support your answer with an example.

A. Yes, if an object start from a point and finally reaches the same point. Then, it has distance but displacement is zero.

7. A farmer moves along the boundary of a square field of side 10 m in 40 s. What will be the magnitude of

displacement of the farmer at end of 2 minutes 20 seconds from his initial position.

d.



Suppose farmer start from A to the square field.

Now, he covered 10 m. in 40 sec.
Now, 2 minutes 20 seconds = 140 sec.

So, he covered 140 sec.

$$= \frac{10 \times 140}{40}$$

$$= 35 \text{ m.}$$

Now, in square field = 35 m.

AB + BC + CD + DE + $\left(\frac{1}{2}AD\right)$

So he will reach at E.

Then, this displacement

AE = 5 m

Q. 8. Under what conditions is the magnitude of average velocity of an object equal to its average speed?

A. When a body is moving in a straight line in a particular direction then the magnitude of average velocity of an object is equal to the average speed.

9. What does the odometer of an automobile measures?

A. It measures the distance travelled the vehicle.

10. What does the path of an object look like when it is in uniform motion?

A. Straight line.

11. During an experiment, a signal from a spaceship reached the ground station in 5 minutes. What was distance of spaceship from the ground station?
The signal travels at the speed of light, that is, 3×10^8 ms^{-1}.

A. Time taken by signal to reach station = 5 min.
= 5 x 60 sec.
= 300 sec.

Distance between spaceship and ground station = Speed x Time
= $3 \times 10^8 \times 300$
= 9×10^{10} m.

12. When will you say a body is in (i) uniform and (ii) non-uniform acceleration?

A. i) Uniform Acceleration ⇒ A body is in uniform acceleration if its velocity changes uniformly with equal intervals of time.

Example. Freely falling object.

ii) Non-Uniform Acceleration ⇒ A body is in non-uniform acceleration if its velocity changes non-uniformly with equal intervals of time.

Example. A bus running in a city.

13. A bus decreases its speed from 80 km h^{-1} to 60 km h^{-1} in 5 s. Find acceleration of the bus.

A. Initial velocity of the bus is = 8 km/h.

$$= \frac{80 \times 1000}{60 \times 60}$$

$$\text{is } \frac{800}{360} \text{ m/s}$$

Final velocity of the bus v = 60 km/h

$$= \frac{60 \times 100}{60 \times 60} \text{ m/s}$$

$$= \frac{600}{960} \text{ m/s}.$$

Time taken by bus to change its speed

$$t = 5 \text{ seconds}.$$

Acceleration $a = \frac{v-u}{t}$

$$\left(\frac{600-800}{360} \quad \frac{360}{}\right)$$

$= \frac{-200}{36} \times \frac{1}{5}$

$= \frac{-10}{9}$ m/s²

$= -1.11$ m/s²

14. A train starting from a railway station and moving with uniform acceleration attains a speed 40 km h⁻¹ in 10 minutes. Find its acceleration.

Ans. Initial velocity = 0

Final velocity = 40 km/h

= 40000 m/ 3600 sec

Time taken = 1 m = 60 s.

10 m = 10 × 60

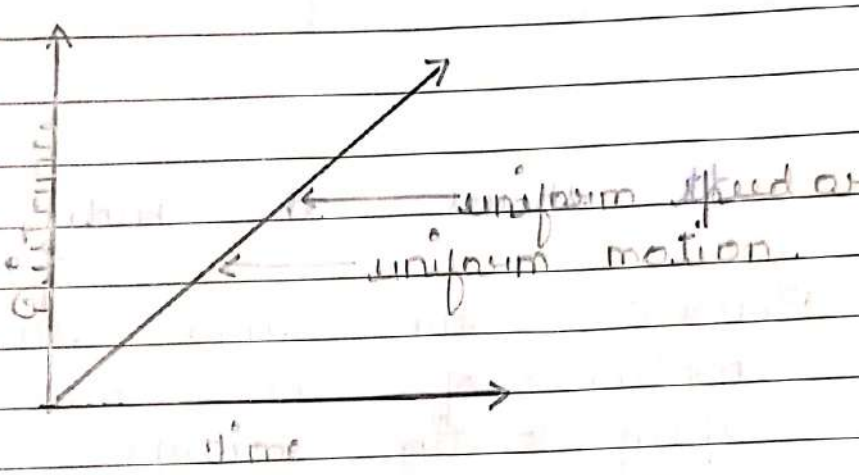
= 600 s

$a = \frac{v-u}{t} = \frac{40000}{3600} - 0$

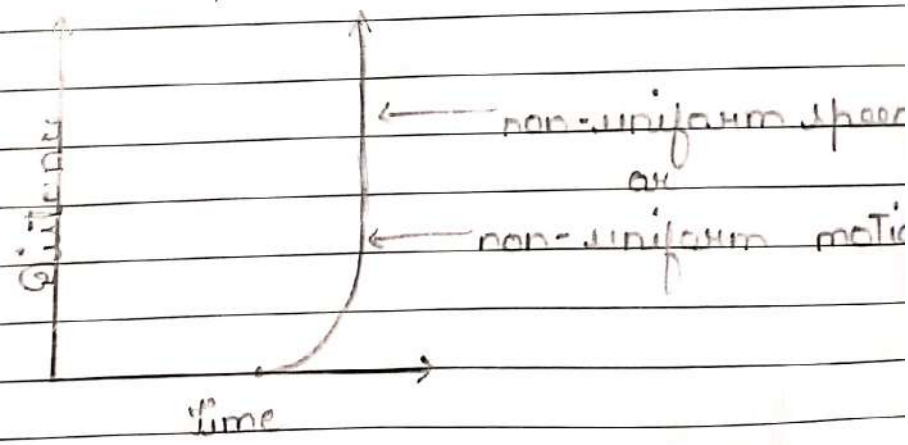
$= \frac{400}{36} - 0$ $= \frac{400}{36} \times \frac{1}{600}$

15. What is the nature of distance time graphs for uniform and non-uniform motion of an object ?

Ans. For uniform motion, it is a straight line.

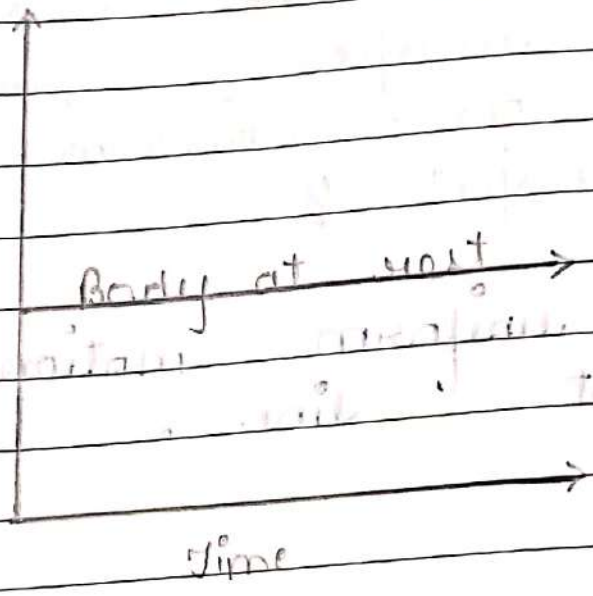


For non-uniform motion, it is a curved line.



16. What can you say about motion of an object whose distance - time graph is a straight line parallel to time axis?

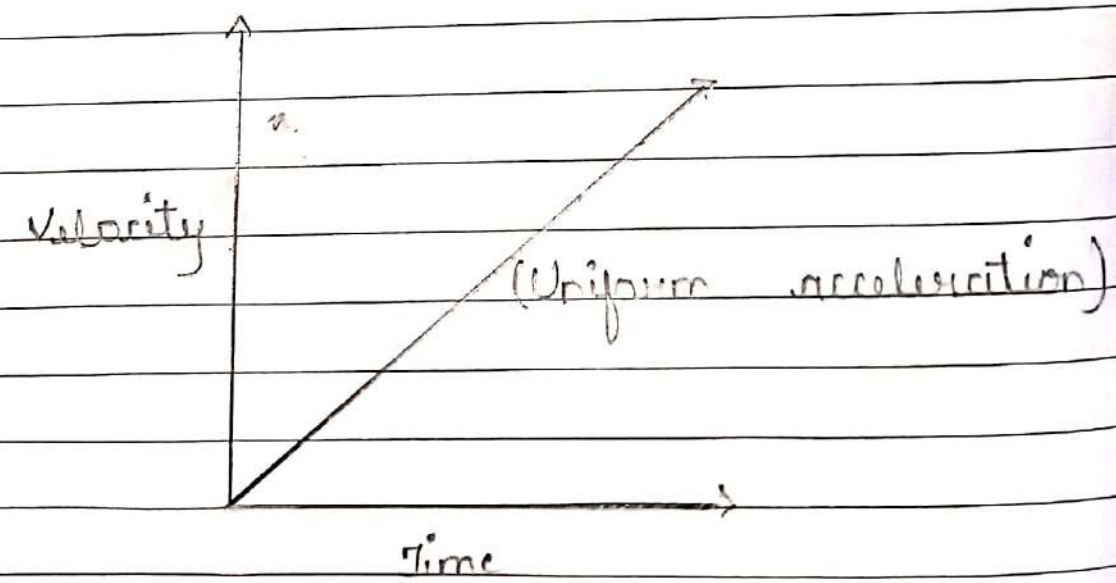
A.



It shows the body at rest.

17. What can you say about motion of an object if its speed - time graph is a straight line parallel to time axis ?

A.



It means body has constant speed or uniform motion with zero acceleration.

18. What is quantity which is measured by area occupied below velocity - time graph?

A. Distance Travelled.

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19. A bus starting from rest moves with a uniform acceleration of $0.1\ m\ s^{-2}$ for 2 min. Find (a) the speed acquired (b) distance Travelled.

A. Initial velocity $(u) = 0$

Acceleration $(a) = 0.1\ m/s^{-2}$

Time $(t) = 2\ min = 2 \times 60\ sec$
$= 120\ sec$

Velocity (v) = ?

a). We know that

$$v = u + at$$
$$v = 0 + 0.1 \times 120$$
$$v = 12\ m/s$$

$$= 0 \times 120 + \frac{1}{2}(0.1 \times 120^2)$$

$$= \frac{1}{2} \times \frac{1}{10} \times 120 \times 120$$

$$= 720 \text{ m}$$

20. A Train is travelling at a speed of 90 km h^{-1}. Brakes are applied so as to produce a uniform acceleration of -0.5 m s^{-2}. Find how far the Train will go before it is brought to rest.

Sol. Initial Velocity (u) = 90 km/h
$= 90000/3600$ m/s

Final Velocity (v) = 0

Acceleration = -0.5 m/s^2

Now,

$v^2 - u^2 = 2as$

$(0)^2 - \left(\frac{\cancel{90000}^{25}}{\cancel{3600}}\right)^2 = 2(-0.5)(s)$

$0 - 625 = -1\,s$

$\frac{-625}{-1} = s = 625$ m.

Distance travelled by Train is 625

21. A Trolley, while going down an inclined plane has an acceleration of $2\ cm\ s^{-2}$. What will be its velocity 3 s after the start?

Sol. Acceleration (a) = 2 cm/s

Time = 3 sec.

Initial velocity = 0

Final velocity = ?

Now,

$v = u + at$

$v = 0 + 2 \times 3$

$v = 6\ cm/s$

Final velocity = 6 cm/s.

22. A racing car has a uniform acceleration of $4\ m\ s^{-2}$ What distance will it cover in 10 s after start?

Sol. Acceleration (a) = $4\ m/s^2$

Time = 10 s.

Initial Velocity (u) = 0

Distance = ?

We know that,

$$s = ut + \frac{1}{2}at^2$$

$$s = (0)(10) + \frac{1}{2}(4)(10)^2$$

$$s = 0 + 2(100)$$

$$s = 200 \text{ m} = \text{Distance}.$$

23. A stone is thrown in a vertically upward direction with a velocity of $5\ ms^{-1}$. If the accration of the stone during its motion is $10\ ms^{-2}$ in the downward direction, what will be the height attained by the stone and how much time will it take to reach there ?

Sol. Acceleration = $-10\ m/s^2$ (It is from opposite direction.)

Time t = ?

Initial Velocity (u) = 5 m/s

Final Velocity (v) = 0

Distance s = ?

We know that,

$$v^2 = u^2 + 2as$$
$$(0)^2 = (5)^2 + 2(-10)(s)$$
$$0 = 25 + (-20)(s)$$
$$0 = 25 - 20s$$
$$s = \frac{25}{20} = \frac{5}{4}$$

$s = 1.25$ m. Ans.

$$v = u + at$$
$$0 = 5 + (-10)(t)$$
$$0 = 5 - 10t$$
$$-5 = -10t$$
$$\frac{+5}{+10} = t$$

$t = 0.5$ sec. Ans.

24. Abdul, while driving to school computes the average speed for his trip to be 20 km h^{-1}. On his return trip along the same route, there is less traffic and average speed is 30 km h^{-1}. What is average speed for trip?

A. Let the distance between Abdul's home & school = x km.

Let time taken from home to school = t_1 hr.

And time taken from school to home = t_2 hr.

Now,

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$t = \frac{x}{20} \text{ hr.}$$

$$t_2 = \frac{x}{30} \text{ hr.}$$

Average Speed = Total ...

$$= \frac{x + x}{t_1 + t_2} = \frac{x + x}{x/20 + x/30}$$

$$= \frac{2x}{\frac{30x + 20x}{600}} = \frac{2x \times 600}{50x}$$

Average speed $= \frac{100}{5} = 24$ km/h

25. A motorboat starting from rest on a lake accelerates in a straight line at a constant rate of $3.0\ ms^{-2}$ for 8.0s. How far does the boat travel, during this time?

A. Initial velocity $u = 0$

Acceleration $a = 3.0\ m/s^2$
$= 3\ m/s^2$

Time $t = 8$ sec.

Now, $s = ut + \frac{1}{2}at^2$

$$s = 0 \times 8 + \frac{1}{2} \times 3 \times (8)^2$$

$$s = 0 + \frac{1}{2} \times 3 \times 64$$

$s = 96$ m.

Distance travelled by boat is 96 m.

26. A ball is gently dropped from a height of 20 m. If its velocity increases uniformly at rate of 10 ms^{-2} with what velocity will it strike the ground ? After what time will it strike the ground ?

A. Distance = 20 m.

Initial velocity = 0

Accelaration = 10 m/s

Now, $S = ut + \frac{1}{2} at^2$

$20 = 0 \times t + \frac{1}{2} \times 10 \times t^2$

$20 = 5 \times t^2$

$t^2 = \frac{20}{5} = 4$

$t = \sqrt{4} = 2$ sec.

Also, $V = u + at = 0 +$

so, it will strike the ground after 2 seconds with the velocity of 20 m/s.

27. An artificial satellite is moving in a circular orbit of radius 42250 km. Calculate its speed if it takes 24 hours to revolve around the earth.

Sol. Radius of orbit = 42250 km.
= 42250 × 1000 m.

Time taken to complete 1 revolution
= 24 hrs.

= 24 × 60 × 60 sec.

Distance covered by satellite to complete revolution = $2\pi r$

$= 2 \times \frac{22}{7} \times 42250 \times 1000$

So, speed of the satellite =

= $\frac{\text{Distance in one revolution}}{\text{Time Taken}}$

Chapter - 9

Force And Laws Of Motion

:- Meanings.

1. Resist	withstand the action or effect of.	विरोध
2. Inertia	A tendency to do nothing or to remain unchanged.	जड़ता
3. Angular	having angle and sharp corners.	कोणीय
4. Momentum	speed	गति
5. Proportional	corresponding in size or among to something else.	अनुपातिक
6. Isolated	having minimum or little in common with other.	पृथक

Q. Ques. and Ans.

1. What is Force ?

A. It is a push or pull on an object that produces acceleration in the body on which it acts. S.I. Unit of Force is Newton.

2. Define Inertia, friction, and momentum ?

A. Inertia ⇒ The natural tendency of an object to resist a change in its state of rest or of uniform motion is called Inertia.

Friction ⇒ Whenever a body slides or rolls over the surface of another body, a force comes into action, which acts in the opposite direction of the motion of a body. This opposing force is called Friction.

as that of the velocity. Its S.I. unit is kg m/s.

$$p = m \times v.$$

3. Which of the has more inertia a). a rubber ball and a stone of same size ? b). a bicycle and a train ? c). a five - rupees coin and a one - rupee coin ?

Ans. As we know, inertia is the calculated value for the mass of the body. It is proportional to mass of the body.

a). Inertia of the stone is greater than that of a rubber ball as mass of a stone is more than the mass of a rubber ball for same size.

b). Inertia of train is greater than that of the bicycle. As mass of a train is more than mass of a bicycle.

c). Mass of a five rupee coin

is more than that of one rupee coin. Hence, inertia of five rupee coin is greater than that of one rupee coin.

4 In the following example, try to identify the number of times the velocity of ball changes:

"A football player kicks a football to another player of his team who kicks the football towards the goal. The goalkeeper of the opposite team collects the football and kicks it towards a player of his own team."

Also identify the agent supplying the force in each case.

A. ⇒ First, when a football player kicks a football to another player. Agents supplying the force:

First case - First player.

⇒ Second, when that player kicks the football to the goalkeeper. Agent supplying the force:

Second case - Second player.

⇒ Third, when the goalkeeper stops the football. Agent supplying the force:
Third case - Goalkeeper.

⇒ Forth, when the goalkeeper kicks the football toward a player of his own team. Agent supplying the force:
Forth case - goalkeeper.

5. Explain why some of the leaves may get detached from a tree if we vigorously shake its branch

A. When we shake any trees branches vigorously, some leaves of that tree get detached because branches comes in motion while the leaves tend to remain at rest due to inertia of rest.

A. Due to inertia of motion, we fall in the forward direction when a moving bus brakes to a stop and fall backwards when it accelerates from rest.

Case 1st ⇒ Since the driver applies brakes and bus comes to rest. But, the passenger tries to maintain its inertia of motion as a result, a forward force is exerted on him.

Case 2nd ⇒ The passenger tends to fall backwards when the bus accelerates from rest because when the bus accelerates, the inertia of rest of the passenger tends to oppose the forward motion of the bus.

A. According to Newton's third law of motion, a force is exerted by the earth on the horse in the forward direction while horse pushes the ground in the backward direction. As a result, the cart moves forward.

8. Explain why is it difficult for a fireman to hold a hose, which ejects large amounts of water at a high velocity.

A. According to Newton's third law of motion, a reaction force is exerted over fireman by the ejecting water in the backward direction when a fireman holds a hose, which is ejecting large amount of water at a high velocity. As a result of the backward force, the stability of the fireman get affected. Hence, it is difficult for him to remain stable while holding the hose.

9. From a rifle of mass 4 kg. a bullet of mass 50 g. is fired with an initial velocity of 35 ms^{-1}. Calculate the initial recoil velocity of the rifle.

A. Given,
Mass of the rifle m_1 = 4 kg.
Mass of the bullet m_2 = 0.05 kg.

Recoil velocity of the rifle = V_1

Bullet is fired with an initial velocity, V_2 = 35 m/s.

Condition,
Initially the rifle is at rest.

Thus, its initial velocity u = 0

Total initial momentum of the rifle and bullet system
$(m_1 + m_2) v = 0$

Total momentum of the rifle and bullet system.

$= m_1 + m_2$

As per the law of conservation of momentum.

Total momentum after firing = total momentum before firing.

So, the rifle recoils backward with the velocity of 0.4375 m/s because value is negative.

10. Two objects of masses 100 g and 200 g are moving along the same line and direction with velocities of 2 $m\,s^{-1}$ and 1 $m\,s^{-1}$, respectively. They collide and after the collision, the first object moves at a velocity of 1.67 $m\,s^{-1}$. Determine the velocity of the second object.

A. Given,

$m_1 = 100\ g = 0.1\ kg.$
$m_2 = 200\ g = 0.2\ kg.$

Velocity of m_1 before collision = $V_1 = 2\ m/s$.

Velocity of m_2 before collision = $V_2 = 1$ m/s

Velocity of m_1 after collision = $V_3 = 1.67$ m/s

Velocity of m_2 after collision = V_4

As per the law of conservation of momentum.

Total momentum before collision = Total momentum after collision

Hence, $m_1 V_1 + m_2 V_2 = m_1 V_3 + m_2 V_4$

Putting values,

$2 \times (0.1) + 1 \times (0.2) = (1.67) \times (0.1) + (0.2) \times V_4$

$0.4 = 0.167 + 0.2\ V_4$

$V_4 = 1.165$ m/s

Velocity of the second object = 1.165 m/s.

11. An object experiences a net zero external unbalanced force. Is it possible for the object to be Travelling with a non-zero velocity? If yes,

state the conditions that must be placed on the magnitude and direction of the velocity. If no, provide a reason.

A. Yes, an object may travel with a non-zero velocity even when the net external force on it is zero. A raindrop falls down with a constant velocity. The weight of the drop is balanced by the upthrust and velocity of air. The net force on the drop is zero.

Q. When a carpet is beaten with a stick. Dust comes out of it. Explain.

A. When we beat the carpet with a stick, it comes into motion. But the dust particles continue to be at rest due to inertia and get detached from the carpet.

13. Why is it advised to tie any luggage kept on the roof of a bus, with a rope?

Ans. Due to sudden jerks are due to the bus taking sharp turn on the road, the luggage may fall down from the roof because of its tendency to continue moving in the original direction. To avoid this, the luggage is tied with a rope on the roof.

14. A Truck starts from rest and rolls down a hill with a constant acceleration. It travels a distance of 400 m in 20 seconds. Find its acceleration. Find the force acting on it if its mass in 7 tonnes. (1 tonne = 1000 kg.)

Ans. Hence,

$u = 0$

$s = 400$ m.

$t = 20$ s.

$a = ?$

$f = ?$

$m = 7$ Tonnes

$= 7 \times 1000$ kg.

$= 7000$ kg.

$S = ut + \frac{1}{2} at^2$

$400 = (0 \times 20) + \frac{1}{2} a(20)^2$

$= \frac{400 \times 2}{20^2} = a$

$= \frac{\cancel{400} \times 2}{\cancel{400}} = a$

$= a = 2 \, m/s^2$

$f = ma$

$= 7000 \times 2$

$= 14000$

15. A stone of 1 kg is thrown with a velocity of 20 ms^{-1} across the frozen surface of a lake and comes to rest after travelling a distance of 50 m. What is the force of friction between the stone and

A. $m = 1\ kg$
$u = 20\ m/s$
$s = 50\ m$

$v = 0$
$f = ?$
$a = ?$

$v^2 - u^2 = 2as$
$(0)^2 - (20)^2 = 2(a)(50)$
$-400 = 100a$
$\frac{-400}{100} = a$

$a = -4\ m/s^2$

Force of friction $= m \times a$
$= 1\ kg \times -4\ m/s^2$
$= -4\ N$

16. An automobile vehicle has a mass of 1500 kg. What must be the force between the vehicle and road if the vehicle is to be stopped with a negative acceleration of $1.7\ m\ s^{-2}$?

A. Here,
mass $= 1500\ kg$.
$a = 1.7\ m/s^2$

The force between the vehicle and road is 2·550 N, in a direction opposite to the direction of the vehicle.

17. Using a horizontal force of 200 N, we intend to move a wooden cabinet across a floor at a constant velocity. What is friction force that will be exerted on the cabinet?

A. The cabinet will move with constant velocity only when the net force on it is zero.

Force of friction on the cabinet equal to 200 N, in a direction opposite to the direction of motion of the cabinet.

18. Two objects each of mass 1·5 kg, are moving in the same straight line but in opposite directions. The velocity of each object is 2·5 $m s^{-1}$ before the collision during which they stick

together. What will be the velocity of the combined object after collision?

A. Here,

$m_1 = m_2 = 1.5$ kg.
$u_1 = 2.5$ m s^{-1}
$u_2 = -2.5$ m s^{-1}

Total momentum after collision = Total momentum before collision.

$(m_1 + m_2)v = m_1u_1 + m_2u_2$
$(1.5 + 1.5)v = 1.5 \times 2.5 + 1.5 \times -2.5$
$(3.0)v = 0$
or
$v = 0$ m s^{-1}

19. How much momentum will a dumb-bell of mass 10 kg. transfer to the floor if it falls from a height of 80 cm? Take its downward acceleration to be 10 m s^{-2}?

A. Here,

$m = 10$ kg, $u = 0$, $s = 80$ cm $= 0.80$ m
$a = 10$ m/s^2

Let v be the velocity gained by the dumb-bell as it reaches the floor.

As we know,

$$v^2 - u^2 = 2as$$
$$v^2 - (0)^2 = 2 \times 10 \times 0.80$$
$$v^2 = 16$$
$$v = 4 \text{ m/s}$$

Momentum transferred by the dumb-bell to the floor.

$$P = mv$$
$$= 10 \times 4$$
$$= 40 \text{ kg m/s}^{-1}$$

Chapter - 7

Diversity in Living Organisms.

Classification of Plants

Plants

Do not have differentiated plant body.

Have differentiated plant body.

Thallophyta

Without specialised vascular tissue

Bryophyta

With vascular tissue

Do not produce seeds

Pteridophyta

Produce seeds

Phanerogams

Bear naked seeds

Gymnosperms

Bear seeds inside fruit

Angiosperms

Have seeds with two cotyledons

Dicots

Have seeds with one cotyledon

Monocots

Classification Of Animals :

Animals

- Cellular level of organisation
  - Porifera
- Tissue level of organisation
  - No body cavity between epidermis and gastrodermis
    - Coelenterata, Platyhelminthes
  - Pseudocoelom
    - Nematoda
  - Coelomate
    - Mesodermal cells from a single cell during growth of the embryo
      - Annelida, Mollusca, Arthropoda
    - Coelom formed from pouches pinched off from the endoderm
      - No notochord
        - Echinodermata
      - Notochord present
        - Chordata
          - Notochord present in at least larval forms, but very rudimentary
            - Protochordata
          - Notochord replaced by vertebral column in adults
            - Vertebrata
              - Jawless, eel-like, circular mouth, scaleless, slimy skin
                - Cyclostomata
              - Gills in larva, lungs in most adults, slimy skin
                - Amphibia
              - Exoskeleton of feathers, lay eggs outside water, flight possible
                - Aves
              - Exoskeleton of scales, endoskeleton of bone/cartilage, breathing through gills
                - Pisces
              - Exoskeleton of scales, laying eggs outside water
                - Reptilia
              - Exoskeleton of hair, external ears, mostly giving birth to live young
                - Mammalia

Answer the ques.

1. Why do we classify organisms?

Ans. Classification of organisms make it easy to study the milions of organisms on this earth. Similarities among them is the basis to classify them into different classes. Classification makes study easier.

2. Give 3 examples of range of variations you see in life-forms around you?

Ans. Variations observed in life are -

1) Size ⇒ Organisms very greatly in size from microscopic bacteria to elephant, whales and large trees.

2) Appearance ⇒ The colour of various animals is quite different. Number of pigments are found in plants. Their body built also varries.

3). life - time ⇒ The life span of different organisms is varried.

3. Which do you think is more basic characteristic for classifying organisms?

a). the place where they live.
b). the kind of cells they are made of.

A. b) The kind of cells they are made of.

Because placement of organisms to other destination can create a easy confusion.

And different organisms may share some habitat but may have a entirely different form and structure. So, the place where they live cannot be a basis of classification.

A. The primary characteristic on which the first division of organisms is made is nature of the cell — Prokaryotic or Eukaryotic cells.

5. On what bases are plant and animals put into different categories ?

A. Plant and Animals are very different from each other but main basis to differentiate these 'mode of nutrition'. Plants are autotrophs. They can make their food own while animals are Heterotrophs which are dependent on other for food. Locomotion, Absence of chloroplast etc also make them different.

6. Which organisms are called primitive & how are they different from so-called advanced organisms ?

A. The Primitive organisms is the one which has a simple body structure and ancient body design that have not

changed much over a period of time. As per the body designed, the primitive organisms which have simple structures are different from those so-called advanced organisms which have complex body structure and organisation.

7. Will advanced organisms be same as complex organisms? Why?

A. Yes, they are developed from same ancestor. They have relatively acquired their complexity recently. There is a possibility that these advanced organisms acquire more complex structure during evolutionary time to compete & survive in the changing environment.

organisms belonging to kingdom Protista are unicellular and eukaryotic. This is the main criterion of their classification.

9. In which kingdom will you place an organism which is single celled, eukaryotic & photosynthetic?

A. Kingdom Protista.

10. In hierarchy of classification, which grouping will have the smallest no. of organisms with maximum common characteristics & which will have largest no. of organisms?

A. In the hierarchy of classification "Species" will have smallest no. of organisms with a maximum of characteristics in common whereas "The Kingdom" will have largest number of organisms.

11. Which division among plants has simplest organisms?

Ans. Division : Thallophyta.

12. How are pteridophytes different from the phanerogams?

Ans. 1). Pteridophyta :- They have inconspicuous or less differentiated reproductive organs. They produce naked embryos called spores. Example. Fern, Marsilea.

2). Phanerogams :- They have well developed reproductive organs. They produce seed. Example. Pinus, Cycas etc.

13. How do gymnosperms and angiosperms differ from each other?

Ans. Gymnosperms :-

1). They are non-flowering plants.

2). They are Naked seeds not enclosed inside fruits are produced.

3). Example. Pinus, Cycas, Fir etc.

Angiosperms.

1). They are flowering plants.

2). Seeds are enclosed inside fruit.

3). Example. Coconut, Mango etc.

14. How do poriferan animals differ from coelenterate animals?

A.	Poriferan	Coelenterate
1).	Mostly marine, non-motile.	Motile marine animals that either live in colonies or have solitary life-span
2).	Cellular level of organisation.	Tissue level of organisation.
3).	Example. Euplectella, Leucon, Spongilla.	Example. Hydra, Sea anemone.

15. How do annelid animals differ from arthropoda?

A.	Annelids	Arthropoda
1).	Closed circulatory system.	Open circulatory system.

2). The body is divided into several identical segments.	The body is divided into four specialised segments.
3). Ex. Nereis, Leech, Earthworm.	Ex. Butterfly, Spider, Prawn.

16. What are difference between reptile and amphibian?

Reptile	Amphibian
1). They are completely terrestrial.	They live at land and water both.
2). Scales is covered with scales.	Scales are absent.
3). They lay egg on land.	They lay egg in water.
4). Ex. Turtle, lizards, snake.	Ex. Frog, Toads.

17. What are advantages of classifying organisms.

do Advantages of classifi

2). Easier study for scientific research.

3). Better understanding of human's relation and dependancy on other organism.

4). Helps in cross breeding and genetic engineering for commercial purposes.

18. How would you choose between two characteristics to be used for developing a hierarchy in classification.

Ans. Gross character will form the basis of start of hierarchy & fine character will form the basis of further steps of single hierarchy. For example —

1). Presence of vertebral column in human being can be taken under vertebrata.

2). Presence of 4 limbs makes them member of Tetrapoda.

3). Presence of mammary glands keep them under mamalia.

19. Explain the basis of grouping organisms into five kingdom.

A. Basis of classification.

1) Number of cells → Unicellular or multicellular.

2) Complexity of cell structure → Prakaryotic and Eukaryotic.

3) Absence or presence of cell walls.

4) Mode of nutrition.

5) Level of organisation.

20. What are major division in Plantae? What are basis of this division?

A. Major divisions of kingdom Plantae —

Division	Basis of classification
1. Thallophyta	Thallus like body, plant body is not differentiate into root, stem etc. Exo Algae.

2). Bryophyta	Body is divided into leaf and stem, lack of vascular tissue. Eg. Marchantia, Funaria.
3). Pteridophyta	Body is divided into root, stem and leaf. Lack of seeds. Eg. Marsilea, Fern.
4). Gymnosperms	Seeds bearing, naked seeds, lack of flowers. Eg. Pinus, Cycas.
5). Angiosperms	Seeds bearing, covered seed produce flowers. Eg. Monocot, Dicot.

21. How are the criteria for deciding divisions in plants different from the criteria for deciding the subgroups among animals?

A. In plants, basic structure of their body is a major criteria based on which thallophytes are different from bryophytes. Apart from these, absense and presence of seeds is another important criteria. Gymnosperms and

angiosperms further segregated based on if seeds are covered or not. It is clear that the morphological character which makes the basis for classification of plants.

In animal, classification is based on more minute structural variations. So, in place of morphology, cytology forms the bases. Animals are classified based on layers of cells. Further higher category animals are classified based on presence or absence of smaller features.

Q. Explain how animals in vertebrata are classified into further subgroups.

A. Vertebrates are divided into two super classes – Pisces and Tetrapoda. Animal of pisces have streamlined body with fins and tail to assist in swimming. Animals of Tetrapoda have forelimbs for locomation. Tetrapoda is

divided into following classes -

1) Amphibia ⇒ Amphibians are adopted to live in water and on land. They can breathe oxygen through skin when under water.

2) Reptilia ⇒ These are crawling animals. Skin is hard to extreme temperature.

3) Aves ⇒ Forelimbs are modified into wings to assist in flying. Beaks are present. Body is covered with feathers.

4) Mammalia ⇒ Mammary glands are present to nourish their young ones. Skin is covered with hair.

Q3. Wat do you mean by biodiversity?

Ans Biodiversity means the diversity of life-forms. It is a

refer to the variety of life forms found in a particular region. Diverse life forms share the environment and are affected by each other too. As a result, a stable community of different species comes into existence.

Q. Meanings.

1. Hierarchy	a system of organisation that has many levels.	श्रेणी वद्ध संस्था / प्रणाली
2. Isolation	act of separating something.	पृथक करना
3. Evolution	gradual of process change & development of something.	परिवर्तन और विकास की क्रमिक प्रक्रिय
4. Complexity	difficult to understand	जटिलता
5. Inconspicuous	not easily noticed	जिस पर आसानी से ध्यान न जाए
6. Perennial	living for two years or more.	दो या दो अधिक वर्ष तक जीवित रहने वाला
7. Triploblastic	having body derived into three	

31/10

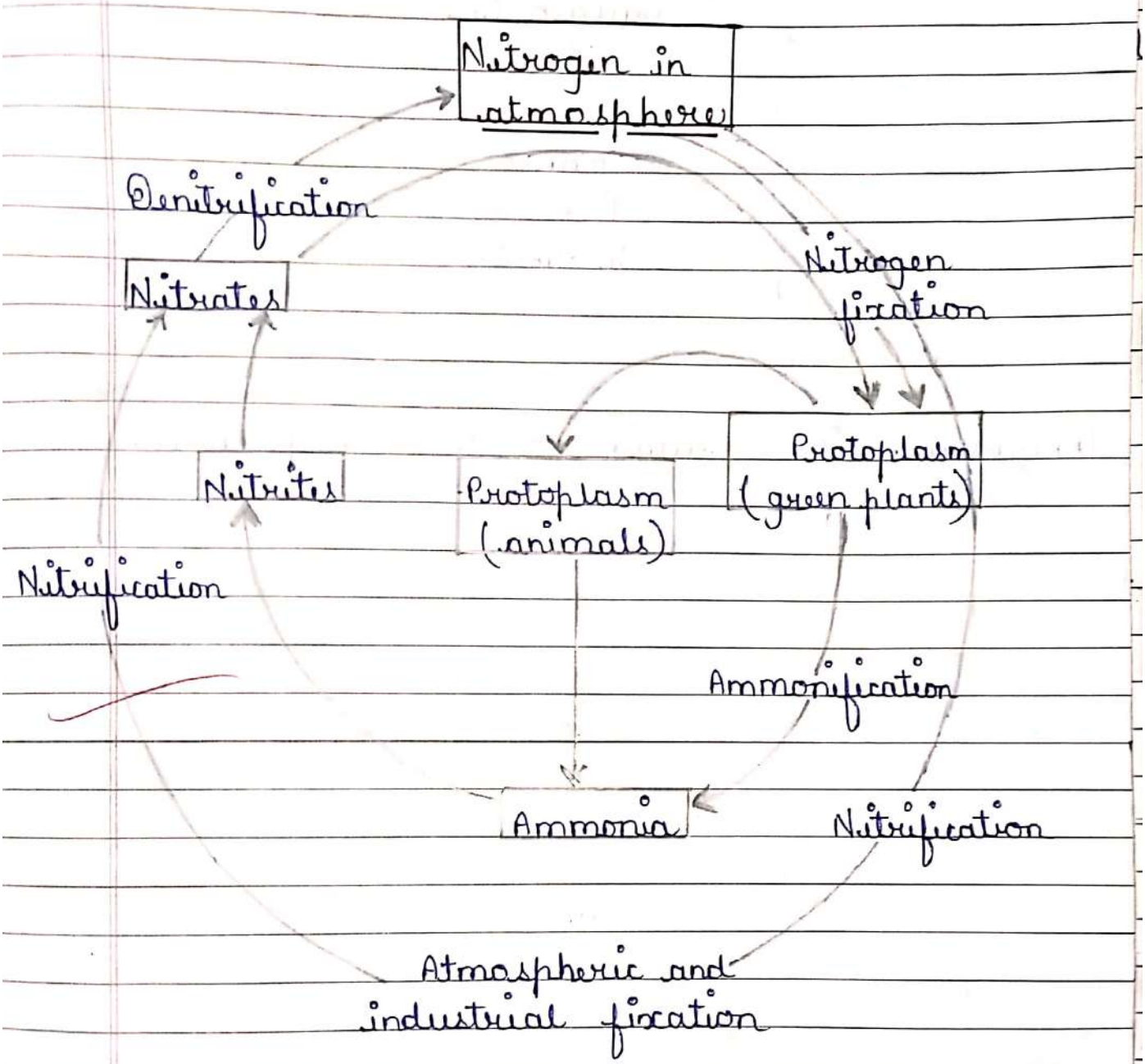
Chapter - 14

Natural Resources

Q. Meanings.

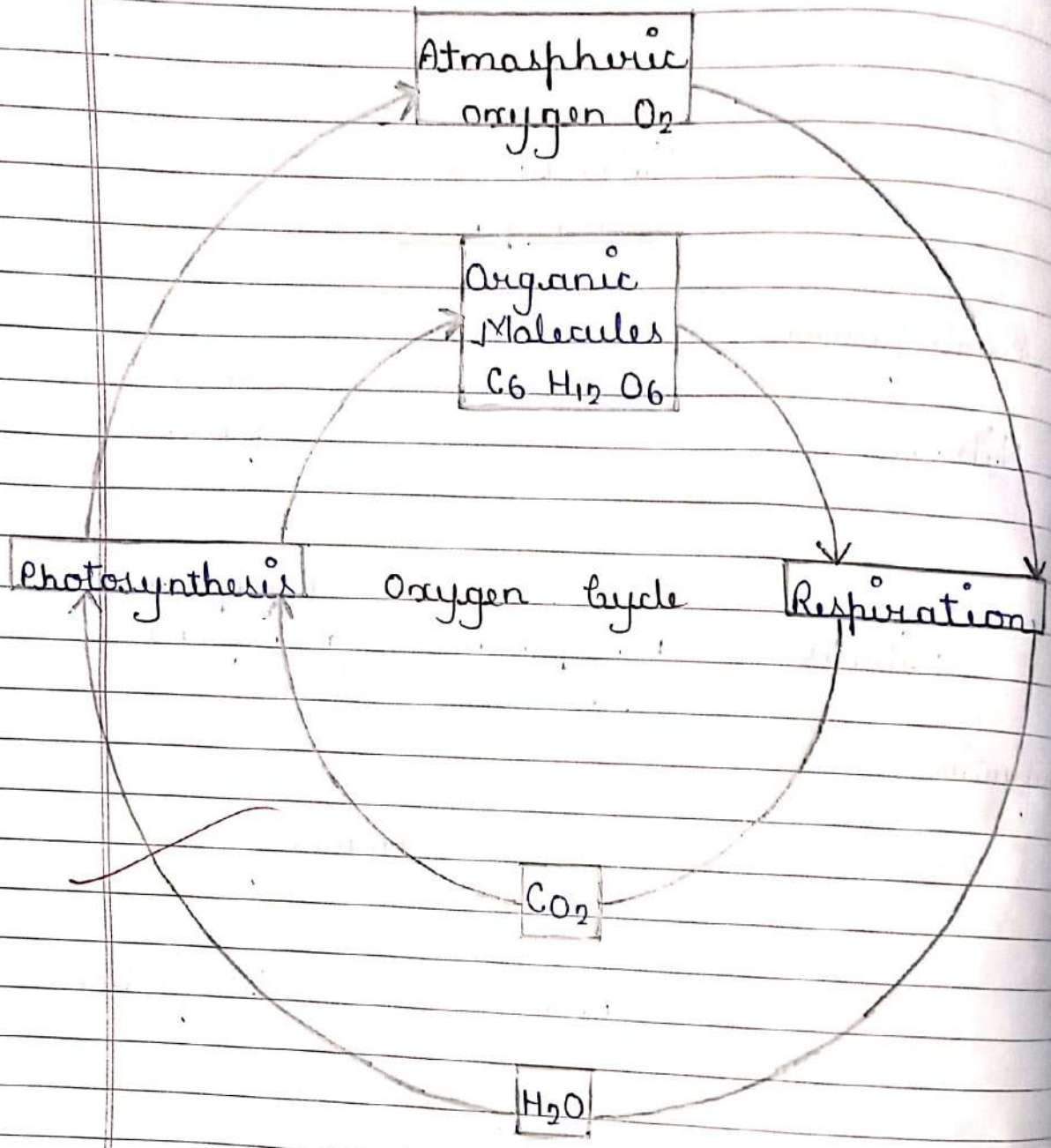
1. Resources	a piece of equipment.	संसाधन
2. Sustaining	to keep somebody alike or healthy.	किसी को जीवित या स्वस्थ बन रखना
3. Consumption	amount of fuel etc. that something use.	प्रयुक्त ईंध आदि की
4. Breeze	a sing wind.	मंद पवन
5. Terrible	causing great shock on injury.	बहुत तकलीफ पहुचाने वा
6. Prevailing	exhausting or most common at a particular time.	समय विशे में विद्यमान
7. Undesirable	unpleasant or not wanted	अप्रिय
8. Humus	a substance made from dead leaves & plants.	सड़े पत्तों और पेड़ो

Q. Draw a nitrogen cycle.

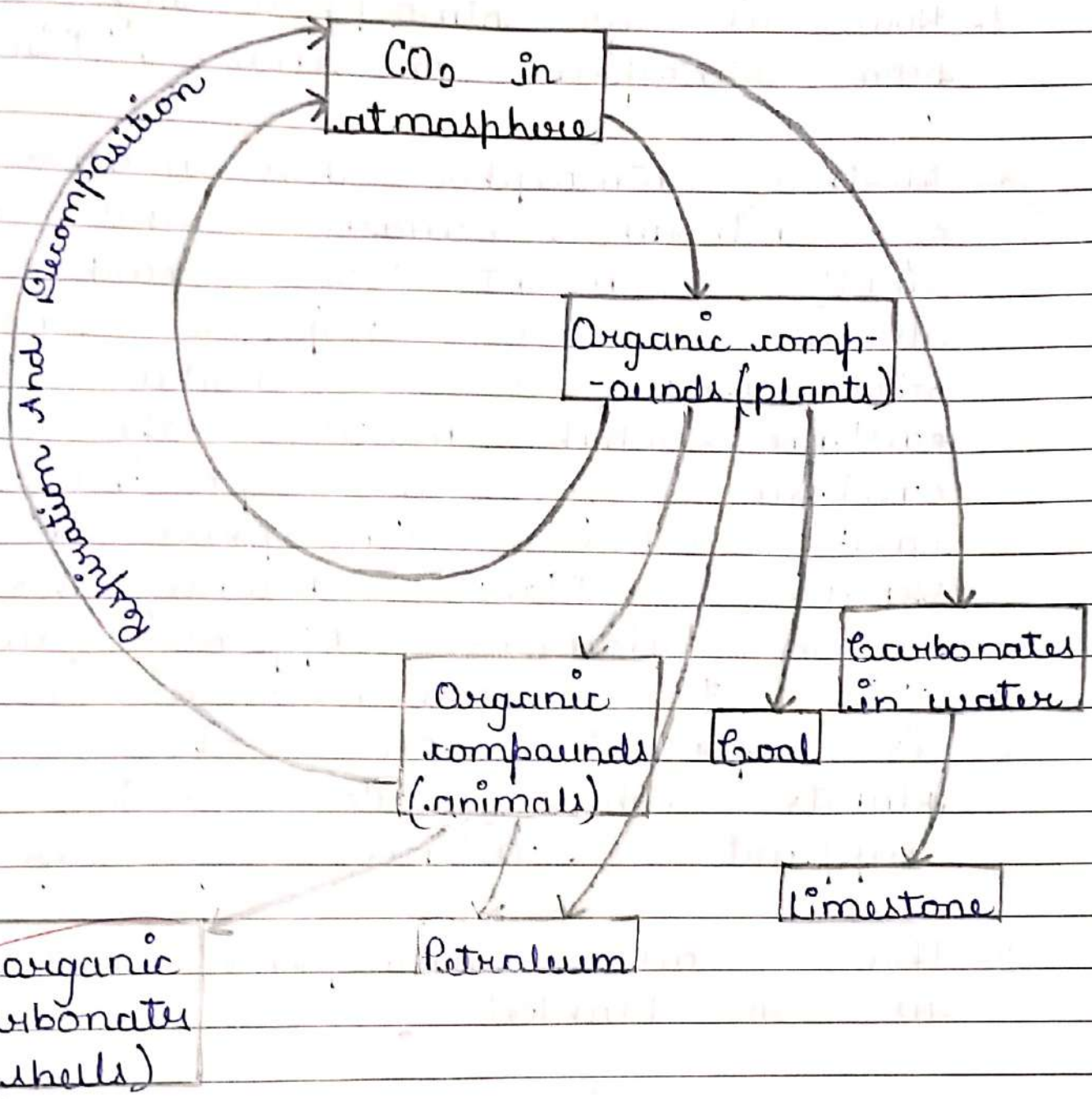


Nitrogen cycle.

Q. Draw a oxygen cycle.



Q. Draw a carbon cycle.



Carbon Cycle.

Q. Answer the ques.

1. How is our atmosphere different from atmosphere on Venus & Mars?

A. Earth's atmosphere has mixture of nitrogen, oxygen and a small amount of carbon dioxide, water vapours and other gases which make the existence. which makes the existence of life possible on earth while atmosphere on Venus & Mars mainly has carbon dioxide. Approximately 95% - 97% carbon - dioxide is present on these planets which do not support existence of life.

2. How does atmosphere act as a blanket?

A. Atmosphere is a mixture of various gases along with water vapours & submerged particles. It surrounds the earth & separates it from outer space. As a blanket stops interaction between body covered inside & atmosphere outside, in

1). It keeps the average temperature of the earth fairly constant during day time & during the course of whole year.

2). It prevents a sudden increase in temperature during day time.

3). It slow down the escape of heat from surface of earth into outer space during night time.

difference in temperature & pressure arises & to maintain equilibrium ways of pressure moves which we feel and name as wind.

4. How are clouds formed?

→ During day time, a large amount of water evaporates from various water bodies and of earth surface & through biological activities such as transpiration & respiration & mix up into the air. This causes the air in the atmosphere to heat up & since air is a bad conductor of heat, when this heated air rises it expands & cool, which results in condensation & formation of water droplets the presence of dust and other suspended particles in air also helps in cloud formation. The gathering of water droplets leads to formation of clouds.

5. List any 3 human activities that you think would lead to air pollution?

Ans. Three human activities leading to air pollution are —

1). Smoke from industrial & manufacturing activities etc..

2). Burning of fossil fuel for household & commercial purpose.

3). Spreading chemicals such as crop dusting, insect or pest killers etc..

6. Why do organisms need water?

Ans. Water is the major component of living organisms, some of living organisms has upto 90% of water of their body weight. It helps in performing most of the functions of our body like digestion, cell-sap and other content formation, Transportation of substance from one place to another inside body.

7. What is major source of fresh water in city / town / village where you live ?

Ans. River .

8. Do you know of any activity which may be polluting this water source ?

Ans. Dump from industrial activities household work for various purpose in fresh water sources are main activities which causes pollution. Air pollution which generates acid rain and spread submerged dust is also responsible for polluting water resources.

9. What is soil erosion ?

Ans. The blowing away or washing away of land surface by wind or water is known as soil erosion.

10. What are methods of preventing or reducing soil erosion ?

Ans. The methods of preventing or reducing soil erosion are —

1). Plantation of trees & plants.

2). Prevention of deforestation.

3). Prevent excessive grazing.

11. What are different states in which water found during water cycle?

Ans. Water is found in three different states during the water cycle —

1). Solid (Snow, Ice).
2). Liquid water (Ground water, River water etc).
3). Gaseous state (water vapours).

12. Name 2 biologically important compounds that contain both oxygen & nitrogen.

Ans. Two biological important compounds that contain both oxygen & nitrogen are —

1). Amino acids

2). Deoxyribonucleic acid (DNA) and Ribonucleic acid (RNA).

13. List 3 human activities which would lead to an increase in carbon dioxide content of air.

Ans. Three human activities are

1). Burning of fuels in various process like heating, cooking, transportation and industry.

2). Human enduged forest fire.

3). The process of deforestration includes the cutting down of trees. This decreases the uptake of carbon dioxide for photosynthesis. Result, the content of carbon dioxide increases.

14. What is greenhouse effect.

Ans. Some gases like carbon dioxide, methane, nitrus oxide present the escape of heat from earth surface by trapping it. This increases the average temperat

of earth. This is called greenhouse effect.

15. What are 2 forms of oxygen found in atmosphere ?

A. The two forms of oxygen found in atmosphere are —

1). Diatomic molecular ~~form~~ (O2 / Oxygen)

2). Triatomic molecular form (O3 / Ozone)

16. Why is atmosphere essential for life ?

A. The atmosphere is essential for life because it keeps the average temperature of earth fairly constant during day time. It also prevents a sudden increase in temperature during day time. It also slow down the escape of heat from the surface of earth into outer space during night time.

1). Most biological activities (reactions) occur when substance are dissolved in water. Thus, all cellular process need water as a medium to take place.

2). Transportation of biological substance needs water as a medium.

---

18. How are living organisms dependent on soil? Are organism that live in water totally independent of soil as a resource?

Ans. All most all living organisms are dependent on soil. Some depends directly, while some depends indirectly. Plants need soil for getting support as well as nutrition to prepare their food.

On the other hand, organisms depend on plants for food & other substance that are essential for life. Herbivorous depend directly upon plants & carnivorous depend upon animals, which inturn depend upon plants

for food. This makes them depend on soil indirectly. Organisms that live in water are not totally independent on soil as a resource. These organisms depend on aquatic plants for food and other substance. These aquatic plants required some minerals. These minerals are carried to water bodies from soil by rivers, rain water etc. Without the supply of minerals from the soil to water bodies it is impossible to imagine aquatic life.

19. You have seen weather reports on television & in newspapers. How do you think we are able to predict weather.

Ans. The meteorological department of the government collect data on the elements of weather such as maximum and minimum temperature, maximum & minimum humidity, rainfall, wind speed etc. They are able to study these elements using various instruments. The maximum & minimum

temperature of ... measured by thermometer. Know as the Maximum - Minimum thermometer. Rainfall is measured by an instrument known as rain guage. Wind speed is measured by Anemometer. There are various instruments used to measure humidity.

Q. We know that many human activities lead to increasing levels of pollution of air, water - levels & soil. Do you think that isolating these activities to specific & limited areas would help in reducing pollution?

A. Yes, isolating human activities to specific areas would help in reducing level of pollution. For example, setting up of industries in isolated region will control pollution to some extent. The pollution caused by these industries will not contaminate water resources, agricultural land, fertile land etc.

Q1. Write a note on how forests influence quality of our air, soil & water resources.

Ans. Forests influence the quality of our air, soil and water resources in various ways. Some of them are -

1). Forest balance percentage of carbon dioxide & oxygen in atmosphere. The increasing amount of carbon dioxide caused by human activities is balanced by a larger intake of carbon dioxide by plants during process of photosynthesis. Simultaneously, a large amount of oxygen is released.

2). Forest prevent soil erosion. Roots of plants bind the soil tightly in a way that

gas into air and condenses to form clouds. These clouds cause rainfall that recharge water bodies.

22. How is soil formed?

A. The process of soil formation is termed "Pedogenesis". Soil is formed mainly by the weathering of rocks through various physical, chemical & biological processes with the help of various factors such as the sun, water, wind and living organisms. It is made up of mineral particles, organic materials, air, water and living organisms. During day time, the rocks are heated up by solar rays. This causes the rocks to expand. During night time these rocks cool down & contracts. It causes weathering of rock and formation of soil.

23. Write a short note on global warming.

greenhouse

Ans. When concentration of gases increases (i.e. if CO_2 concentration crosses delicate proportion of 0.03 %), these trap excess radiation and increases temperature of earth too much that is increases the greenhouse effect, which is termed as global warming. i.e. Thus, global warming is main consequence of disturbance of greenhouse effect. Global Thus, warming has a drastic effect on climatic condition. It may cause melting of polar ice caps and glaciers which result in floods of low lying areas. Moreover global warming also increases the incidence of several infectious disease such as malaria, sleeping sickness, dengue, yellow fever etc.

24. Write a short note on acid rain.

Ans. The p^H of normal rainwater is 5.6 because of the dissolution of carbon dioxide from atmosphere which furnish H^+ ions to the rainwater.

$H_2O(l) + CO_2(g) \rightarrow H_2CO_3$

$H_2CO_3(aq) \Rightarrow H^+(aq) + HCO_3^-(aq)$

When the pH of rainwater drops below 5.6 because of the presence of certain acids it is called Acid Rain. The term "Acid Rain" was put forward by 'Robert Angus'. Oxides of nitrogen and sulphur released into the atmosphere from thermal power plant, industries & automobiles, are main sources of acid rain. These oxides on oxidation followed by hydrolysis (that is reaction with water) give sulphuric acid and nitric acid that along with HCl are responsible for the acidity of rain. The oxidation reaction is catalysed by particulate matter present in the polluted atmosphere.

$2SO_2(g) + O_2(g) + H_2O(l) \rightarrow 2H_2SO_4(aq)$

$4NO_2(g) + O_2(g) + 2H_2O(l) \rightarrow 4HNO_3(aq)$

In acid rain, concentration of these acids follows the following order -

H_2SO_4 > HNO_3 > HCl

Sulphuric acid . Nitric acid Hydrochloric acid

Chapter - 10

Gravitation

Q. Meaning:-

1. Magnitude	size, greatness.	लंबाई, चौड़ा
2. Pressure	force.	दबाव।
3. Immersed	submerged.	डूबा हुआ।
4. Pursued	follow.	पिछा करना
5. Grasp	understand.	समझ लेना
6. Hydrometer	a measuring instrument for determining density of liquid	आद्रतामाप
7. Dimensions	a measurement of the length, width or height of something.	लंबाई, चौड़ाई ऊँचाई का मापन।
8. Elongation	increase.	वृद्धि।

Q. Que + Ans.

1 Q. State Archimede's principle and write its two applications.

1 A. Force exerted by liquid on wholly or partly immersed object is equal to the weight of the fluid displaced by the object.

Applications based on Archimede's principle are -

1). Designing of water transport vehicles.

2). Hydrometres used for determining the density of liquids.

a substance is the ratio of the density to that of water.

Relative Density = $\frac{\text{Density of a substance}}{\text{Density of water}}$

In S.I. Units, the density of water is (approximately) 1000 kg/m^3 or 1 g/cm^3.

3. State the universal law of gravitation.

Ans.

Object A
Mass - M

Object B
Mass - m

Suppose there are two objects having mass M and m respectively.
The distance between their centres is equal to d.
The force of

and $F \propto \frac{1}{d^2}$ — (2)

Joining equation 1 and 2, we get -

$$F \propto \frac{Mm}{d^2}$$

$$F = G \frac{Mm}{d^2} \quad \text{— (3)}$$

Where, G is the proportionality constant and called universal gravitation constant.

The expression (3) is called expression for universal law of gravitation.

The universal law of gravitation is represented by

$$F = \frac{G m_1 m_2}{r^2}$$

Where G is the universal gravitation constant even by

$$G = 6.67 \times 10^{-11} \ N m^2 kg^{-2}$$

4. Write the formula to find the magnitude of the gravitational force between the earth and an object on the surface of earth.

A. Let M be the mass of the earth and m be the mass of an object on its surface. And say R is the radius of the earth, then according to universal law of gravitation, the gravitational force (F) acting between the earth and object is given by relation:

$$F = \frac{G m_1 m_2}{r^2}$$

Or $$F = \frac{G M m}{R}$$

5. What do you mean by free fall?

A. Its a phenomenon of gravity. When an object falls from any height under the influence of gravitational force only, it is said to have a free fall.

In the case of free fall, no change in direction takes place but the magnitude of velocity changes because of acceleration.

6. What mean by acceleration due to

Ans. Change in velocity due to variation in height produces acceleration which is due to gravity in the object and is known as acceleration due to gravity denoted by letter g. The value of acceleration due to gravity is

$$g = 9.8 \text{ m/s}^2 .$$

7. What are differences between the mass of an object and weight ?

Ans.

	Mass	Weight
1).	Mass is a measurement of the amount of matter something has.	Weight is the measurement of pull of gravity on an object.
2).	Mass is a constant quantity.	Weight is not a constant quantity. It is different at different places.
3).	It is scalar quantity.	It is a vector quantity.
4).	Its S.I. Unit is kilogram (kg).	Its S.I. Unit is the same as the S.I. unit Newton (N) of force i.e.

8. Why is weight of an object on moon 1/6 its weight on the earth.

A. The mass of moon is 1/100 times and its radius 1/4 times that of earth. As a result, the gravitational attraction on moon is about 1/6 when compare to earth. Hence, the weight of an object on moon is 1/6 its weight on earth.

9. Why is it difficult to hold a school bag having a strap made of a thin and strong string?

A. It is difficult to hold a school bag having a thin strap because the pressure on the shoulders is quite large. This is because the pressure is inversely proportional to the surface area on which the force act. The smaller is the surface area; the larger will be the pressure on the surface. In the case of a thin strap,

the contact surface area is very small hence the pressure exerted on the shoulder is very large.

10. What do you mean by buoyancy?

Ans. The upward force exerted by a liquid on an object that is immersed in it is known as Buoyancy.

11. Why does an object float or sink when placed on the surface of water?

Ans. The object float or sink when placed on the surface of water has following reasons -

1). An object sinks in water if its density is greater than that of water.

2). An object floats in water if its density is less than that of water.

12. You find your mass to be 42 kg on a weighing machine. Is your mass more or less than 42 kg?

A. When we weigh any body, an upward force acts on it. This upward force is buoyant force. As a result, the body gets pushed slightly upward causing the weighing machine to show a reading less than the actual value.

---

13. You have a bag of cotton and an iron bar, each indicating a mass of 100 kg. when measured on a weighing machine. In reality, one is heavier than other. Can you say which one is heavier & why?

A. The cotton bag is heavier than iron bar. The cotton bag experiences larger upthrust of air than iron bar. So, the weighing machine indicates a smaller mass for cotton bag than its actual mass.

---

14. How does the force of gravitat between two objects change whe distance between them is reduce

A. According to universal law of gravitation, the gravitational force of attraction between any two object of mass (M), (m) is proportional to the product of their masses and inversely proportional to the square of distance (r) between them. So, force (F) is given by

$$F = G\frac{M \times m}{r^2}$$

Now, when distance (r) is reduced to half than force between two masses becomes -

$$F = G\frac{M \times m}{\left(\frac{r}{2}\right)^2}$$

$$\text{or } F' = 4F$$

Hence, if the distance is reduced to half, than gravitational force becomes 4 times larger than the previous value.

heavy object should fall faster than a light object?

A. All objects fall on ground with constant acceleration, called acceleration due to gravity. It is constant and does not depend upon the mass of an object i.e. stone, heavy objects do not fall faster than the light objects.

10. What is magnitude of gravitational force between the earth and 1kg object on its surface? (Mass of earth is 6×10^{24} kg and radius of earth is 6.4×10^6 m)?

A. Given that,

Mass of body m = 1 kg.
Mass of Earth M = 6×10^{24} kg.
Radius of Earth R = 6.4×10^6 m.

Now, magnitude of gravitational force F between earth & body can be given as

$F = G\frac{Mm}{R^2} = \frac{6.67 \times 10 \times 6 \times 10 \times 1}{}$

$= \frac{6.67 \times 6 \times 10}{6.4 \times 6.4} = 9.8$ N (approx).

17. The earth and moon are attracted to each other by gravitational force. Does earth attract the moon with a force that is greater or smaller or same as force with which moon attracts the earth? Why?

A. According to the universal law of gravitation, two object attract each other with equal force, but in opposite direction. The earth attracts the moon with an equal force with which the moon attracts the earth.

18. If the moon attracts the earth, why does earth not move towards moon?

A. The earth and the moon experience equal gravitational forces from each other however mass of earth is much larger than mass of moon. Hence, it accelerates at a rate

reason, the earth does not move towards moon.

19. What happens to force between two objects, if

i) mass of one object is doubled?

A. From universal law of gravitation, force exerted on an object of mass m by earth is given by

$$F = G \frac{M \times m}{R^2} \quad - (E.1)$$

when mass of the object say m is doubled then

$$F = G \frac{M \times 2m}{R^2}$$

$$= 2F$$

So, as the mass of any one of the object is doubled the force is also doubled.

A. The force F is inversely proportional to the distance between the objects. So, if distance between two objects is doubled, then gravitational force of attraction between them is reduced to 1/4th of its original value. Similarly if distance between two objects is tripled, the gravitational force of attraction becomes 1/9th of its original value.

iii). the masses of both objects are doubled?

A. Again, from universal law of gravitation, from equation 1 'F' is directly proportional to product of both masses. So, if both the masses are doubled then gravitational force of attraction becomes 4 times the original value.

20. 25. What is the importance of universal law of gravitation?

A. Universal law of gravitation is important because it tells

us about :

1). The force that is responsible for binding us to earth.

2). The motion of moon around the earth.

3). The motion of planets around the sun.

4). The tides formed by rising & falling of water level in the ocean are due to the gravitational force exerted by both sun and Moon on earth.

Q1. What is acceleration of free fall?

A. Acceleration of free fall is the acceleration produced when a body falls under the influence of the force of gravitation of the earth alone. It is denoted by "g" and its value on the surface of earth is $9.8\ m/s^2$

Q. What do we call the

gravitational force between earth and an object ?

A. Gravitational force between the earth and an object is known as the weight of the object.

23. Why will a sheet of paper falls slower than one that is crumpled into a ball ?

A. When a sheet of paper is crumpled into a ball, then its density increases hence resistance to its motion through the air decreases and it falls faster than the sheet of paper.

24. Gravitational force on the surface of moon is only 1/6 as strong as gravitational force on earth. What is weight in newtons of a 10 kg object on moon and on the earth ?

A. Weight of an object on the moon = 1/6 x weight of an object on the earth.

Weight = Mass x Acceleration

Acceleration due to gravity, $g = 9.8\ m/s^2$.

Therefore, weight of a 10 kg object on the earth =
10×9.8
$= 98\ N$

And weight of same object on the moon = 1.6×98
$= 16.3\ N$

25. Calculate force of gravitation between earth and sun, given that the mass of the earth = 6×10^{24} kg. and of the sun = 2×10^{30} kg. The average distance between the two is 1.5×10^{11} m.

Ans. According to ques.

M = Mass of sun = 2×10^{30} kg.
m = Mass of earth = 6×10^{24} kg.
R = Average distance btw. the earth & sun = 1.5×10^{11} m.

From universal law of gravitation.

$$F = G\frac{M \times m}{r^2}$$

Therefore, putting all the values given in equation we get:

$$F = \frac{6.67 \times 10^{-11} \times 2 \times 10^{30} \times 6 \times 10^{24}}{1.5 \times 10^{11} \times 1.5 \times 10^{11}}$$

26. A ball thrown up vertically returns to the thrower after 6 s. Find

a). the velocity with which it was thrown up.

A. Time of ascend is equal to the time of descend. The ball takes a total of 6 seconds for its upward & downward journey. Hence, it has taken 3 sec to attempt maximum hight.

Final velocity of ball at the maximum height, $v = 0$

Acceleration due of gravity, $g = -9.$ m

Equation of motion, $v = u + gt$

$$0 = u + (-9.8)(3)$$
$$0 = u + (-29.4)$$
$$u = 29.4 \ ms^{-1}$$

Hence, the ball was thrown upward with velocity of $29.4 \ ms^{-1}$.

b). maximum height it reaches, and

A. Let the maximum height by the ball 'h'.

Final velocity, $v = 0$

Acceleration due to gravity, $g = -9.8\ m/s^2$

From equation of motion,

$$s = ut + \frac{1}{2} gt^2$$

$$s = 29.1 \times 3 + \frac{1}{2} \times (-9.8)(3)^2$$

$$88.2 + \frac{1}{2} \times -88.2 - 44.1$$

$$= 1.11 \text{ m.}$$

---

c). its position after 1 s.

A. Ball attains the maximum height after 1 sec. of throw is given by distance travelled by its downward journey in

$$1s - 3s = 1s$$

Equation of motion,

$$s = ut + \frac{1}{2} gt^2$$

$$s = (0)(1) + \frac{1}{2}(-9.8)$$

$$s = \frac{-9.8}{2}$$

$$s = -1.9 \text{ m.}$$

29.1 × 3 = 88.2

−9.8 × 9 = −88.2

88.2 − 44.1 = 44.1

27. In what direction does the buoyant force of object immersed in a liquid act

A. An object immersed in a liquid experiences buoyant force in the upward direction.

28. Why does a block of plast released under water come up to surface of water ?

A. For an object immersed in water, two forces act on it.

Gravitational force which tends to pull object in downward direction.

Buoyand force that pushes the object in upward direction. Here, in this case buoyand force is greater than gravitional pull on the plastic block. This is the reason the plastic block comes up to the surface of water as soon as it is realeased under-water.

29. The volume of 50 g of a substance is 20 cm^3. If the density of water is 1 gcm^{-3}, will the substance float or sink ?

Ans. If the density of an object is more than density of liquid then it sinks in the liquid. On the other hand if density of an object is less than the density of liquid, then it close on the surface of the liquid.

Here,

Density of the substance = $\frac{\text{Mass of the substance}}{\text{Volume of the substance}}$

$= \frac{50}{20} = 2.5\ gcm^{-3}$.

The density of substance is more than the density of water ($1\ gcm^{-3}$).

Hence, the substance will sink in water.

30. The volume of a 500 g sealed packet is 350 cm^3. Will the packet float or sink in water if the density of water is 1 gcm^{-3}? What will be the mass of the water displaced by this packet?

Ans. Density of 500 g sealed packet:

$$= \frac{\text{Mass of the packet}}{\text{Volume of the packet}}$$

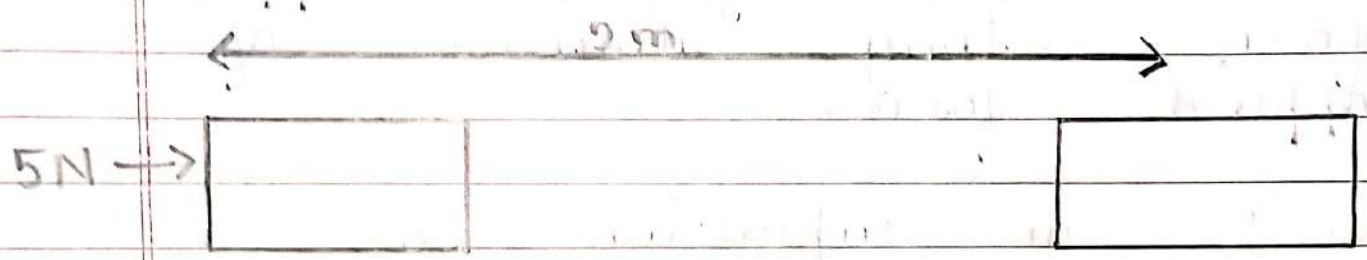
$$= \frac{500}{350} = 1.428 \ gcm^{-3}.$$

Density of the substance is more than the density of water ($1 \ gcm^{-3}$). Hence, it will sink in water. The mass of water displaced by the packet is ~~not~~ equal to the volume of the packet that is 350 g.

Chapter - 11

Work And Energy

1. A force of 7 N acts on an object. The displacement is, say 8 m, in direction of force. Let us take it that force acts on object through displacement. What is work done in this case?



A. The work done W on the body by the force is given by

Work done = Force x Displacement

$$W = F \times s$$

Given,

$$F = 7 \text{ N}$$

$$s = 8 \text{ m}.$$

Hence, work done, $W = 7 \times 8$

$$= 56 \text{ Nm}$$

$$= 56 \text{ J}$$

2. When do we say that work is done ?

Ans. We can say a work is done whenever the conditions given below are satisfied -

1). A force is applied over body.

2). A displacement of the body is caused by the applied force along direction of applied force.

3. Write an expression for work done ?

Ans. When a force 'F' displaces a body by a distance 'd' in direction of applied force then work done 'W' is given by

Work Done = Force x Displacement

$W = F \times s$

provided with force of 1 N that displaces it through a distance of 1 m in direction of applied force.

5. A pair of bullocks exerts a force of 140 N on a plough. The field being ploughed is 15 m long. How much work is done in ploughing the length of the field?

Ans. Here,

Applied Force, F = 140 N
Displacement, d = 15 m.

We know,

Work done is given by the expression

Work Done = Force x Displacement
W = F x S
W = 140 x 15
W = 2100 J.

Hence, 2100 J. of work is done in ploughing the length of the field.

6. What is kinetic energy of an object ? Derive its expression ?

Ans. The energy attained or generate in a body due to its action or motion is called Kinetic Energy. Every object which possesses motion contain a kinetic energy. A body uses kinetic energy to do work. Kinetic energy can be used for any work to be performed. Kinetic energy is useful to gene other forms of energy too. It can be expressed in following way -

As we know that

From II nd eq. of motion

$v^2 - u^2 = 2as$

$\frac{v^2 - u^2}{2a} = s$ — (1)

Work = Force × Displacement

$= F \times s$ — (2)

Force = mass × acceleration

$F = ma$ — (3)

On putting value of F and s in eq. (1)

$$W = ma \times \frac{v^2 - u^2}{2a}$$

$$W = m \times \frac{v^2 - u^2}{2}$$

$$W = \frac{1}{2} m (v^2 - u^2)$$

[For the object in motion the initial velocity $u = 0$]

$$W = \frac{1}{2} mv^2$$

or $$E_K = \frac{1}{2} mv^2$$

Q. The kinetic energy of an object of mass, m moving with a velocity of 5 ms^{-1} is 25 J. What will be its kinetic energy when its velocity is doubled? What will be its kinetic energy when its velocity is increased three times?

A. Given,
Kinetic Energy of object = 25 J

Putting the values in formula.

Kinetic Energy, $E_K = \frac{1}{2} mv^2$

$$m = \frac{2 \times KE}{v^2}$$

$$= \frac{2 \times 25}{5^2}$$

$$= \frac{2 \times 25}{25}$$

$$m = 2 \text{ kg}.$$

Condition 1st → If velocity is doubled, $v = 2 \times 5 = 10 m$

Kinetic energy $= \frac{1}{2} mv^2$

$= \frac{1}{2} \times 2 \times 10^2$

$= \frac{1}{2} \times 2 \times 100$

$= 100$ ~~ms~~ J

Condition 2nd → If velocity is tripled, $v = 3 \times 5 = 15 m$

Kinetic Energy $= \frac{1}{2} mv^2$

$= \frac{1}{2} \times 2 \times 15^2$

$= \frac{1}{2} \times 2 \times 225$

$= 225$ J.

8. what is power ?

Ans. Work done is calculated by amount of power consumption. Power can be understood by term efficiency of an object to consume or generate energy.

So, power is the rate of doing work or the rate of transfer of energy. If W is the amount of work done or the rate of transfer of energy. If it is in time t, then power is given by the expression

$$\text{Power} = \frac{\text{Work}}{\text{Time}}$$

or

$$= \frac{\text{Energy}}{\text{Time}}$$

or

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

It is calculated in "Watt" (W).

Hence, a body is set to have power of 1 watt of its work is equal to 1 J in 1 second.

$$1 \text{ Watt} = \frac{1 \text{ J}}{1 \text{ s}}$$

When efficiency of an operator is changed with time average power is calculated. The average power of an object is defined as total work done by it in the total time taken.

$$\text{Average power} = \frac{\text{Total Time taken}}{\text{Total work done}}$$

---

10. A lamp consumes 1000 J of electrical energy in 10 s. What is its power.

Ans. As we know that,

$$\text{Power} = \frac{\text{Work}}{\text{Time}}$$

Given,

Work Done = Energy consumed by lamp = 1000 J

11. An object thrown at a certain angle to the ground moves in a curved path and falls back to the ground. The initial and final points of path of object lie on same horizontal line what is work done by force of gravity on object?

A. Gravitational forces are proportional to 'h' which is vertical displacement & work done by force of gravity is considered only if vertical displacement occurs.

Vertical displacement is given as the difference in initial & final positions or heights of objects which is 0.

$W = mgh$

where, h = vertical displacement = 0

Therefore, work done $W = mg \times 0$
$= 0$ J.

Therefore, the work done by gravity on the given object is 0 J.

12. A battery lights a bulb. Describe the energy changes involved in the process.

Ans. When a battery lights a bulb, then chemical energy of battery is converted into electrical energy. When the bulb receives electrical energy then it converts it into light & heat energy. Hence, the transformation of energy is follows -

Chemical Energy → Electrical Energy
Light Energy → Heat Energy.

13. Certain force acting on a 20 kg mass changes its velocity from 5 ms^{-1}

A. Kinetic energy is given by expression, $E_K = 1/2\ mv^2$ where, E_K is kinetic energy of object moving with a velocity v.

Kinetic Energy when the object was moving with velocity $5\ ms^{-1}$.

$$E_K = 1/2\ mv^2$$
$$= 1/2 \times 20 \times 5^2$$
$$= 10 \times 25$$
$$= 250\ J.$$

Kinetic energy when the object was moving with velocity $2\ ms^{-1}$

$$E_K = 1/2\ mv^2$$
$$= 1/2 \times 20 \times 2^2$$
$$= 14\ J.$$

14. The potential energy of a freely falling object decreases progressively. Does this violate law of conservation of energy? Why?

A. No, in freely falling object only potential energy decreases progressively, but at same time kinetic energy increases and total of both remai

equal to initial energy.

Total Energy = Potential Energy + Kinetic Energy.

So, this process does not violate the law of conservation of energy. During this process, total mechanical energy of body remains equal.

15. What are various energy transformations that occur when you are riding a bicycle?

Ans. When we ride a bicycle, the chemical energy of muscles of rider's body gets transferred into heat energy & kinetic energy of bicycle. Heat energy is changed to physical energy. Kinetic energy provid a velocity to bicycle. The transformation can be shown a

Muscular Energy → Kinetic Energy + Heat Energy.

During the transformation, the Total energy remains conserved

16. Does the transfer of energy when you push a huge rock with all your might and fail to move it? Where is the energy you spend going?

A. When we push a huge rock, there is no transfer of muscular energy to stationary rock. Here, the energy is completely spent doing work against friction between ground & rock.

17 What is work done by force of gravity on a satellite moving round the earth? Justify your answer.

A. Work is done whenever the two given conditions are satisfied.

1/. A ~~body~~ force acts on the body.
2/. There is a displacement of of the body by the application of force in or opposite to direction of force.

If the direction of force is perpendicular to displacement then work done is zero.

When a satellite moves around earth, then direction of force of gravity on the satellite is perpendicular to its displacement. Hence, work done on satellite by earth is zero.

18. A person holds a bundle of hay over his head for 30 m & gets tired. Has he done some work or not? Justify your answer.

Ans. When a person holds a bundle of hay over his head, then there is no displacement in the bundle of hay. And since displacement of the body by the application of force is required to prove that work is done, no work is done here.

Here, force of gravity is acting on the bundle, but the person is not applying not any force on it. Hence, in absence of force

work done by the person on bundle is zero.

---

19. An electric heater is rated 1500 watt. How much energy does it use in 10 hours?

Ans. The energy consumed by an electric heater can be attained with the help of the expression

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

Where, Power rating of the heater

$$P = 1500 \text{ W} = 1.5 \text{ kW}$$

Time for which the heater has operated, $T = 10$ hrs.

Work done = Energy consumed by heat

Therefore, Energy consumed $= P \times t$

$= 1.5 \times 10$

$= 15$ kWh.

Hence, the energy consumed by the heater in 10 hr is 15 kWh.

---

20. Calculate work required to be done to stop a car of 1500 kg. moving at a velocity of 60 km/h.

A. $E_K = \frac{1}{2} mv^2$

Here, Mass of car, $m = 1500$ kg.
& Velocity of car, $v = 60$ km/h.

Therefore, $E_K = \frac{1}{2} \times 1500 \times (60)^2$

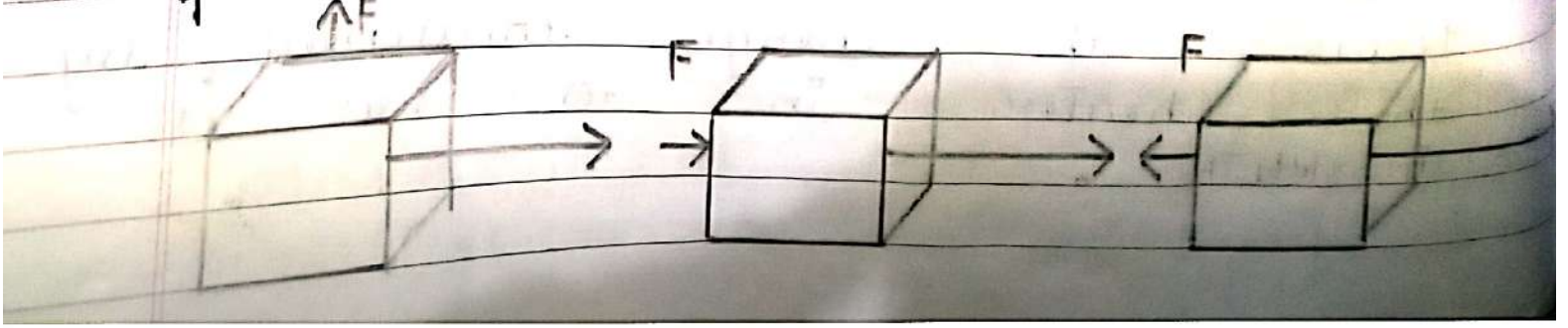
Velocity of car $= 60 \times \frac{5}{18}$ ms^{-1}

$$E_K = \frac{1}{2} \times 1500 \times \left(60 \times \frac{5}{18}\right)^2$$

$$= 20.3 \times 10^4 \text{ J.}$$

---

21. In each of the following a force, F is acting on an object of mass, m. The direction of displacement is from west to east shown by long arrow. Observe diagrams carefully & state whether work done by force is negative, positive or zero.



A. Case I → Here, the direction of force acting on a block is perpendicular to the displacement. Therefore work done will be 0.

Case II → Here the direction of force acting on the block is in the direction of displacement. Therefore work done will be positive.

Case III → Here, the direction of force acting on the block is opposite to the direction of displacement. Therefore, work done will be negative.

Q9. Soni says that the acceleration in an object could be zero even when several forces are acting on it. Do you agree with her? why?

A. When all the forces cancel out each other, acceleration in an object will be zero when several forces are acting on it and is called a Uniformly moving object. The net force acting

on the object is zero. Hence, the acceleration of the object is zero. Hence, Soni is right.

---

03. Find energy in KW h consumed in 10 hours by four devices of power 500 W each.

Ans. We know,

$$\text{Power} = \frac{w}{t}$$

Given,

Power of device (P) = 500 W
= 0.50 kW

Total time, t = 10 h

Since,

Work Done = Energy consumed by device

Therefore,

Energy consume = Power x Time
= 0.50 x 10
= 5 KW h

Hence, the energy consumed by four equal rating

= 4 x 5 KWh
= 20 KWh
= 20 Units

---

24. A freely falling object eventually stops on reaching the ground. What happens to its kinetic energy ?

A. As the object hits the ground its kinetic energy gets converted into heat energy and sound energy. Sometime it also deform the ground and itself depending of the nature of the ground and the amount of kinetic energy of the object. Freely falling object towards the ground feels following changes :

Its potential energy decreases and kinetic energy increases.

When the object touches the ground all its potential energy gets converted into kinitic energy.

---

25. An object of mass 40 kg is raised to a height of 5 m above ground. What is

its potential energy ? If the object is allowed to fall, find its kinetic energy when it is half way down ?

A. Gravitational potential energy is given by the expression

$$W = mgh$$

where, h = vertical displacement =

m = mass of object = 40 kg.

g = acceleration due to gravity = 9.8 m/s

$$W = 40 \times 5 \times 9.8$$
$$= 1960 \text{ J.}$$

At half way down, the potential energy of the object will be $\frac{1960}{2}$

$$= 980 \text{ J.}$$

At this point the object h an equal amount of potential and kinetic energy. Th is due to the law of conservation of energy. Hence, a way down, the kinetic energy of object will be 980 J.

[illegible]

Chapter 15

Improvement in Food Resources

Q. Meanings

1. Yield	to produce crops	उत्पादन।
2. Breed	to produce young ones, particular variety of an animal.	प्रजनन करना।
3. Interprise	business	व्यापार।
4. Pasturage	land for grazing.	चरागाह।
5. Mariculture	cultivation of fish or other marine life	सागरीय कृषि।

6.	Dwarf	smaller in size	बौना
7.	Livestock	animals that are kept on farm.	मवेशी
8.	Lactation	feeding milk to young ones, breast-feeding.	दुग्धस्त्रावण

Q. Answer and ques.

1. What do we get from cereals, pulses, fruits and vegetables?

A. We get many nutrients like carbohydrates from cereals, protins from pulses, fruits and vegetables give us lot of vitamins & minerals.

2. How do biotic and abiotic factor affect crop production?

A. Biotic factors like pests, insects etc reduce crop production. Pests harm crops by feeding over them. Weeds also reduce

crop productivity by competing with main crop for nutrients & light. Abiotic factors like wind, rain, temperature etc. impact overall crop production. For ex:, droughts and floods almost completely destroy whole crop of a particular area.

3. What are desirable agronomic characteristics for crop improvement ?

Ans. The desirable agronomic characteristics for crop improvement are as follows —

1. Tallness and profuse

branching in any fodder crops.

3). Dwarf characteristics in cereals.

4. What are macro nutrients & why are called macro-nutrients ?

A. Macro-nutrients are those nutrients which are required in large quantities for growth and development of plants. Since they are required in large quantities they are called macro-nutrients. The 6 macro-nutrients required by plants are nitrogen, phosphorus

potassium, calcium, magnesium and sulphur.

5. How do plants get nutrients

A. Plants consume nutrients from air, water and soil. Soil is one of the important sources of nutrients. Plants get 13 nutrients from soil. The remaining 3 nutrients (carbon, oxygen & hydrogen) are obtained from air and water.

substances which increase soil fertility by enriching soil with organic matter and nutrients as it is prepared by decomposition of animal excreta & plant waste.

On other hand fertilizers are mostly artificially developed inorganic compounds whose excessive use is harmful to ecosystem components and soil fertility. Hence, fertilizers are considered good only for short term use.

7. Why should preventive measures & biological control methods be preferred for protecting crops ?

Preventive measures and biological control method should be preferred for protecting crops because excessive use of chemicals leads to environmental problems. Biological methods harm neither crops nor environment.

8. What factors may be responsible for losses of grains during storage?

Ans. Factors causing loss of grains during storage are as follows -

Biotic factors → Insects, rodents, fungi, mites and bacteria etc.

improving cattle breeds and why ?

A. Cross breeding is commonly used for improving cattle breeds. Cross breeding between two good varieties of cattle will produce a new improved variety. For ex, the cross between foreign breeds such as jersey, brown, Swiss and Indian breeds such as Red Sindhi, Sahiwal produces a new variety

both breeds.

10. Discuss the implication of statement :
"It is interesting to note that poultry is India's most efficient converter of low fibre food stuff (which is unfit for human consumption) into highly nutritious animal protein food" ?

A. Poultry in India is the most efficient converter of low fibre food stuff in nutritious animal protein food. In poultry farming, domestic fowls are raised to

produce eggs and chicken. For this, the fowls are given animal feeds in form of roughage, which mainly consists of fibres. This by feeding animals a fibre rich diet, the poultry gives highly nutritious food in form of eggs & chicken.

11. What management practises are common in dairy & poultry farming?

A. Common management practises in dairy & poultry farming are as follows:

1) Proper shelter facilities and their regular cleaning.

2) Some basic hygienic conditions such as clean water, nutritious food etc. ~~or~~

3) Animals are kept in spacious, airy and ventilated places.

4) Prevention and cure of diseases at right time is ensured.

12) What are difference between broilers and layers?

1. B layers are meant for egg production, whereas broilers are meant for poultry meat. Nutritional, environmental and housing conditions required by broilers are different from those required by egg layers. A broiler chicken for their proper growth, required vitamin rich supplements specially Vitamin A and E. Also, their diet includes protein rich food and enough fat. They also require extra care & maintenance To increase their survival rate in comparision to egg layers.

13. How are fish obtained

A. Fish can be obtained by 2 ways —

1) Capture Fishing ⇒ It is process of obtaining fish from natural resources.

2) Culture Fishery ⇒ It is practise of farming fishes. Farming can be done in both fresh water ecosystem (which includes riverwater, pondwater) and marine ecosystem.

Ans The advantages of composite fish culture are as follows:

1) Fish can be grown in crop fields especially paddy.

2) Intensive fish farming is possible. Because plenty of water is available during crop seasons.

3) In this system, both local & imported fish species can be cultivated.

---

15. What are desirable characters of bee varieties suitable for honey production?

A. Bee varieties having the following desirable characters are suitable for honey production are :

1) They should yield high quantity of honey.

2) They should not sting much.

3) They should stay in the bee-hive for long duration.

4) They should breed very well.

16. What is pasturage & how is it related to honey production?

A. Pasturage is the availa-bility of flowers from which bees collect nectar and pollen. It is related to production of honey as it determines taste and quantity of honey.

17. Explain 1 method of crop production ensures high yield ?

A. Inter-croping method ensures high yield of crop production. It is a practise of growing two or more crops simultaneously in same field in rows. In inter-cropping, definite row pattern are followed such

as one row of main crop is followed by two rows of inter-crop.

In inter-cropping, there is a greater utilisation of the inter-shared area, light, nutrient water and air. As a result, productivity per unit area is increased.

18. Why are manure and fertilisers used in fields?

A. Manures & fertilizers are used in fields to enrich the soil with the required nutrients. Manure helps in enriching soil with organic matter and nutrients. This improves the fertility

and structure of the soil. On the other hand, fertilisers ensure a healthy growth and development in plants. They are a good source of nitrogen, phosphorus and potassium. To get an optimum yield, it is instructed to use a balanced combination of manures and fertilisers in soil.

19. What are advantages of inter-cropping & crop rotation?

A. Inter-cropping and crop-rotation, both are used to get maximum

benefit on limited land
Inter - cropping helps in
preventing pests and
diseases to spread
throughout the field.
It also increases
soil fertility, whereas
crop - rotation prevents
soil depletion, increases
soil fertility and
reduces soil erosion.
Both of these methods
reduce need for fertilizer
They also help in
controlling weeds and
the growth of
pathogens and pests
in crops.

20. What is genetic manipula
-tion? How is it useful
for agricultural practises?

Ans. Genetic Manipulation is a process where the gene for a particular character is introduced inside the chromosome of a cell. When the gene for a particular character is introduced in a plant cell, a transgenic plant is produced. These transgenic plant exhibit characters governed by the newly introduced gene.

Genetic Manipulation is useful in developing varieties with higher yield, good quality, biotic and abiotic resistance, short maturity period, wider adaptability and desirable agronomic

2). How do storage grain losses occur ?

A. There are many biotic and abiotic factors that harm stored grains and result in degradation, poor germinability, discolouration etc. which leads to storage grain losses.

Biotic factors like insects or pests cause direct damage by feeding on seeds. They also deteriorate and contaminate the grain, making it unfit for further

consumption.

Abiotic factors such as Temperature, light, moisture etc also affect storage food. They decrease the germinating ability of seeds and make them unfit for future use by farmers. Unpredictable occurance of droughts and floods also causes destruction of crops.

22. How do good animal husbandry practises benifit farmers.

A. Cattle farming is one of the method of animal husbandry that is most benificial for farmers.

Better breeds of draught animals can be produced. Such draught animals are engaged in agricultural fields for labour such as carting, irrigation, tilling etc.

23. What are benefits of cattle farming.

A. Benefits of cattle farming are as follows:

1) Good quality & quantity of dairy products can be produced.

2) Draught labour animals can be raised for agricultural work.

3/o New breed of animals that are resistant to diseases can be raised by crossing two breeds with desired traits.

2Ao For increasing production, what is common in poultry, fisheries and bee-keeping?

Ans. Proper management techniques are common factors for increasing production in poultry, fisheries and bee-keeping. Regular cleaning of farms is of importance. Also, maintenance of Temperature & prevention and cure of diseases in farming is also

required to increase growth of animals.

25. How do you differentiate between capture fishing, mariculture and aquaculture.

Ans. 1) Capture fishing is the method to obtain fishes from natural resources like rivers, ponds, waterfalls etc.

2) Mariculture is the culture of marine fishes for commercial use.

3) Aqua culture involves the production of aquatic animals that are of high economic

value such as prawns, lobsters, fishes, crabs etc.

Chapter - 12

Sound

Q. Meanings -

1. Amplitude	the maximum extend of a vibrating or oscillating on measured from the position of equilibrium.	आयाम
2. Reverberation	prolongation of sound.	प्रतिध्वनि
3. Echo	sound caused by reflection of sound waves from a surface back to listener	गूँज

Frequency	the rate at which something occur at a particular period of time.
Vibration	an instance of vibrating.
Prolong-ation	transmission of sound in a particular direc or through a medium.

Date: 16/01/20 Page no: 30

Q. Answer the ques.

1. How does sound produced by a vibrating object in a medium reach your ear?

A. When an object vibrates it allows the particles of medium around it to vibrate. It exerts force on the adjacent particles and continue oscillating in all directions and one of it, hit our ear's medium which creates sound. The process continues.

2. Explain how sound is produced by your school bell.

A. When the bell rings, it continues to move forward and backward which creates vibration and simultaneously a series of compressions and rarefactions which produce a very loud sound.

3. Why are sound waves called mechanical wave?

A. Sound waves need medium to propagate therefore, they are called mechanical waves. Sound cannot travel

4. Which wave property determines (a) pitch (b) loudness.

Ans (a) Amplitude determines the pitch of a sound wave.

(b) Frequency determines the loudness of a sound wave.

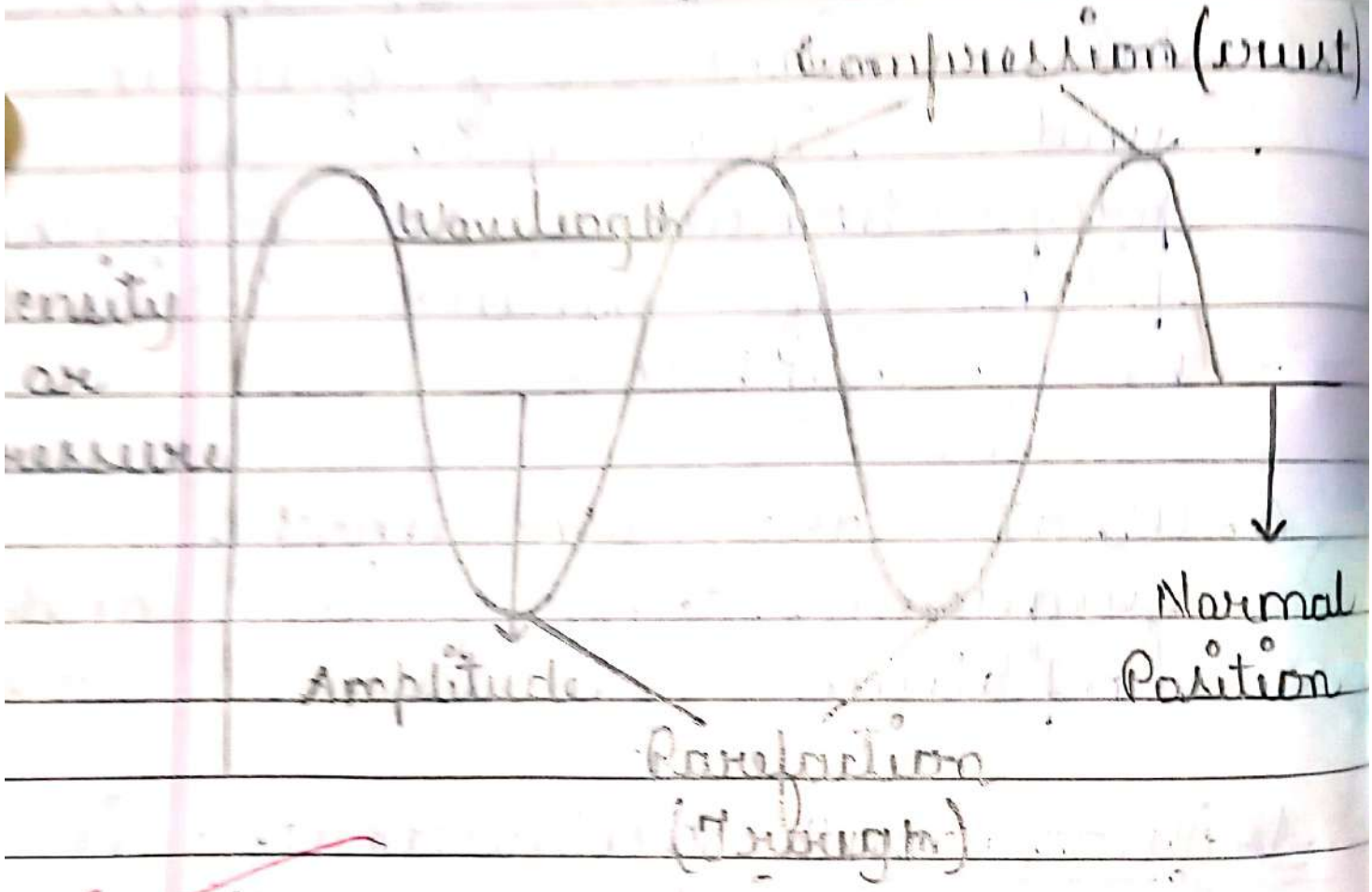
Guitar has a higher pitch than car horn because sound produced by strings of guitar has higher frequency and since pitch is proportional to frequency pitch of guitar will be higher.

What are wavelength, frequency, time period and amplitude of sound wave?

1) Wavelength => Wavelength is the length between two consecutive peaks. Or the distance between two successive crests or trough is known as wavelength.

Date 16/01 Page no. 91

Greek letter 'lambda' = λ



2) Frequency = The number of sound waves produced in unit time is called the Frequency of sound waves. It is measured in seconds.

Frequency is denoted by Greek letter 'ν'. The SI unit of frequency is 'Hertz'.

Time Period → Time taken in production of one complete wave is called time period. The time period of sound wave is represented by letter 'T'. The SI unit of time period is second.

Relation between time period & frequency -

Say, sound wave is produced by a source in time 'T' second.

Frequency = 1 T

Frequency = 1 time period

$\nu = \frac{1}{T}$

Here, ν = frequency and
T = time period.

1) Amplitude ⇒ Amplitude of a wave is magnitude of maximum disturbance on either side of the normal position or mean value in a medium. Amplitude is denoted by letter 'A'. The S.I. unit of amplitude is meter.

5) Velocity ⇒ Distance covered by sound waves

Distance = lambda and
time taken = T

∴ Velocity = $\frac{\lambda}{T}$

S.I. unit of λ is meter (m) and S.I. unit of time is second (s)

Therefore, S.I. unit of velocity = m/s.

7. How are wavelength and frequency of a sound wave related to its speed ?

Ans. Speed, wavelength and frequency of a sound wave are related as follows -

Speed (v) = wavelength (λ) x frequency (ν)

$$v = \lambda \times \nu$$

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8. Calculate the wavelength of a sound wave whose frequency is 220 Hz and speed is 440 m/s in a given medium.

$v = 440$ m/s

Putting the equation,

Speed = Wavelength × Frequency

$440 = \lambda \times 220$

$\frac{440}{220} = \lambda$

$\lambda = 2$ m.

Wavelength = 2 m.

Q. A person is listening to a tone of 500 Hz sitting at a distance of 150 m. from source of the sound. What is the time interval between successive compressions from the source?

Sol. Given,

Frequency = 500 Hz.

Distance = 150 m.

As we know that,

$$\text{Time Period} = \frac{1}{\text{Frequency}}$$

$$= \frac{1}{500}$$

= 0.02 s.

10. Distinguish between loudness & intensity of sound.

Ans. Intensity derives loudness of a sound. These both qualities of sound are proportional to each other.

The amount of sound passing through a unit area per second represents intensity of a sound wave.

While loudness is the response of the ear to the sound (amount received to pinna). The loudness of a sound is defined by its amplitude. The

amplitude of a sound decides its intensity, which in turn is perceived by the ear as loudness.

11. In which of three media air, water or iron does sound travel the fastest at a particular temperature?

Ans. Sound travels fastest in solid medium (here iron) than in liquids (water) and it is slowest in gases (air). Therefore, for a given temperature sound travels as follows (decreasing order):
Iron > Water > Air

12. An echo was heard after 3 s. What is distance of reflecting surface from the source, given that the speed of sound is 342 ms^{-1} ?

Ans. Given,

Speed = 340 ms^{-1}

Time (T) = 3 s

As we know that,

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

342×3

$= 1026$ m.

Condition → In fixed time interval, sound has to travel a distance that is twice distance of reflecting surface and the source.

Hence, the distance of the reflecting surface from source $= \frac{1026}{2}$ m.

$= 513$ m.

13. Why are the ceilings of concert halls shaved ?

A. Ceilings of concert halls are curved to -

1) Enhance loudness and echo of sound created.

2) Sound after reflection (from the walls) spreads uniformly in all directions.

14. What is the audible range of the average human ear ?

A. The audible range of an average human ear is between 20 Hz to 20000 Hz.

15. What is range of frequencies associated with ?

15. a) Infrasound ⇒ Frequencies less than 20 Hz.

b) Ultrasound ⇒ Frequencies more than 20000 Hz.

16. A submarine emits a sonar pulse, which returns from an underwater cliff in 1.02 s. If the speed of sound in salt water is 1531 m/s, how far away is the cliff?

A. Given,

Time taken by the sonar pulse to return, $t = 1.02$ s.

Speed of sound in salt water; $v = 1531$ m/s.

x Time taken

= 1531 x 1.02

= 1561.62 m.

Distance travelled by sonar pulse during its transmission & reception in water =

= 2 x Actual Distance

= 2 x d

= 2d

Annual Distance, d = Distance of cliff from submarine

= 1561.62 / 2 = 780.31

17. What is sound and how is it produced ?

A. Sound is a form of energy which is received at our ear pinna and gives the sensation of hearing. It is vibration which is produced from original point to listener.

18. Why is sound wave called a longitudnal wave

A. Sound wave is called longitudnal wave because air particles vibrates parallel to direction of propagation of sound wave, it is produced

by compressions and rarefactions in the air.

19. Which characteristics of sound helps you to identify your friend by his voice which sitting with others in a dark room?

A. The quality of pitch & loudness of sound enables us to identify our friend by his voice.

Pitch ⇒ The way our brain interprets the frequency of an emitted sound is called Pitch.

20. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why?

Ans. Speed difference is main reason of this happening. The speed of sound (344 m/s) is very less than speed of light (3×10^8 m/s). A flash is seen before we hear a thunder because sound of thunder takes more time to reach the earth as compared to light.

21. Give two practical applications of reflection of sound waves?

A. Two practical applications of reflection of sound waves are as follows –

1) Reflection of sound is used to measure the distance and speed of underwater objects. This method is known as SONAR.

2) Working of a stethoscope is also based on reflection of sound. In a stethoscope, the sound of patient's heart beat reaches the doctor's ear by multiple reflection of sound.

22. What is reverberation? How can it be reduced?

A. The repeated multiple reflections of sound in any big enclosed space is known as Reverberation.

The reverberation can be reduced by covering the ceiling and walls of the enclosed space with sound absorbing materials such as fiber board etc.

23. Explain how human ear works.

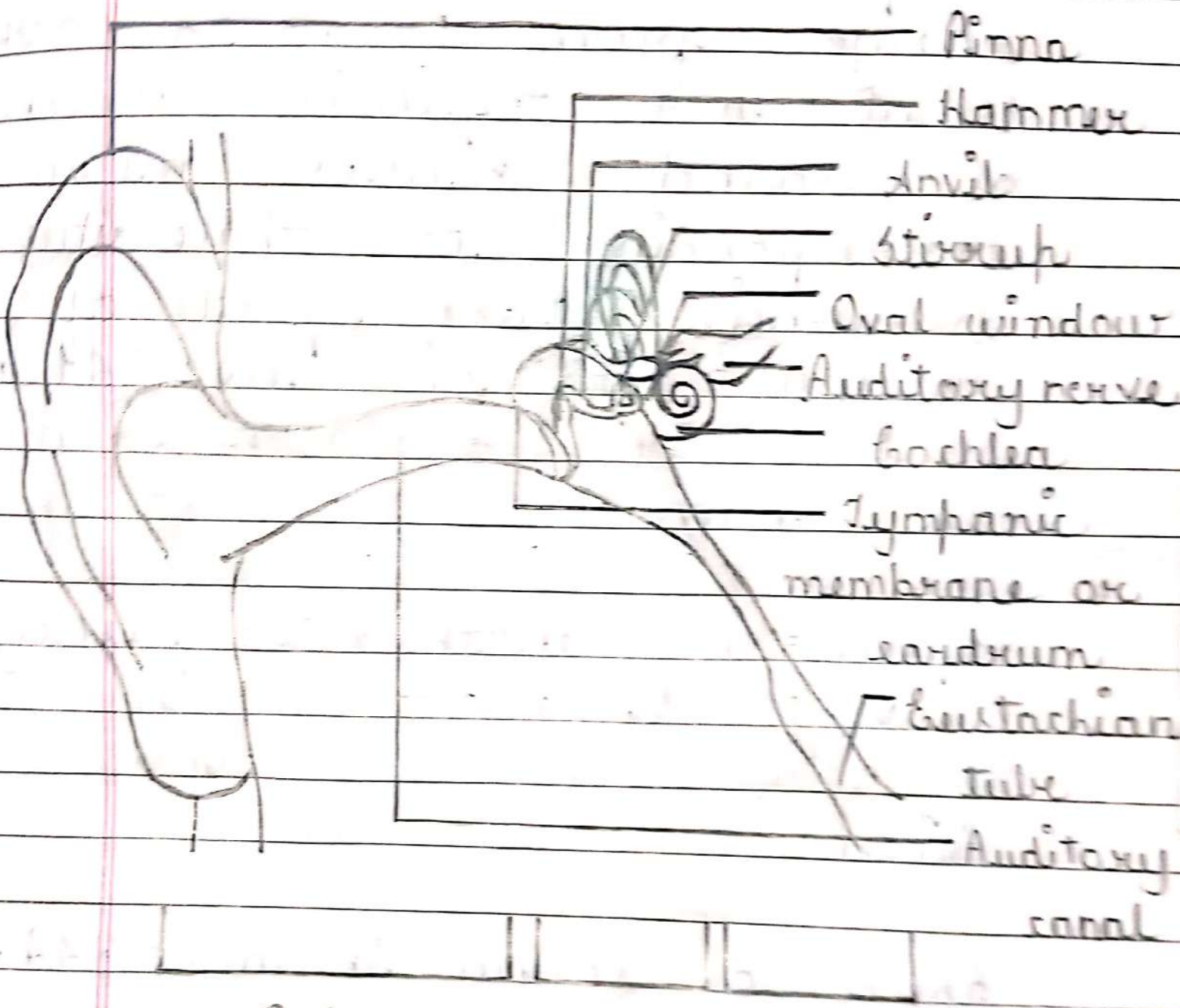
A. The human ear consists of three parts i.e.

the outer ear, middle ear and inner ear.

1) Outer Ear :- The outer ear is termed as 'Pinna'. It collects the sound from surrounding & directs it towards auditory canal.

2) Middle Ear :- It is at the auditory canal where there is a thin membrane called ear drum or tympanic membrane. The sound waves set this membrane to vibrate. these vibrations are amplified by three small bones — Hammer, Anvil and Stirrup.

Inner Ear ⇒ When vibration reach cochlea in the inner ear and are converted into electrical signals which are sent to the brain by the auditory nerve, the brain interprets them as sound.



Auditory Parts Of Human Ear

24. A person has a hearing range from 20 Hz to 20 KHz. What are typical wavelength of sound waves in air corresponding to these two frequencies? Take speed of sound in air as 344 ms^{-1}

A. We know,

Speed = Wavelength x Frequency

$v = \lambda \times \nu$

Given,

Speed of sound in air = 344 m/s

(i) ν = 20 Hz.

$= \frac{344}{20} = 17.2$ m.

(ii) $v = 20000$ Hz.

$= \frac{344}{20000} = 0.172$ m.

Hence for humans the wavelength range for hearing is 17.2 to 0.172 m.

5. Two children are at opposite ends of an aluminium rod. One strikes the end of rod with a stone. Find ratio of times taken by sound wave in air and in aluminium to reach second child?

Velocity of sound in air = 346 m/s

aluminium = 6420 m/s.

Let length of rod be l.

Let Time Taken for sound in air, $t_1 = \frac{l}{\text{Velocity}}$ in air

Time taken for sound wave in aluminium, $t_2 = \frac{l}{\text{Velocity}}$ in aluminium

Therefore, $\frac{t_1}{t_2} = \frac{\text{velocity in aluminium}}{\text{Velocity in air}}$

$= \frac{6420}{346} = 18.55$

of "sound" is "100 Hz. How many times does it vibrate in a minute?

Frequency = 20 Hz.

This means source of sound vibrates 100 times in 1 second.

Therefore, number of vibrations in 1 minute i.e. in 60 seconds = 100 × 60 = 6000 times.

Ans. Yes, sound waves also follow the same laws of reflection as light waves do because -

1). Angle of incidence of sound is always equal to that of angle of reflection of sound waves.

2). The direction in which sound is incident, the direction in which sound is reflected and normal all lie in the same plane.

28. When a sound is reflected from a distant object, an echo is produced. Let distance between the

it will not be heard.

1. A stone is dropped from top of tower 500 m high into a pond of water at the base of the tower. When is the splash heard at the top? Given $g = 10\ ms^{-2}$ and speed of sound $340\ ms^{-1}$

Height of the tower, $s = 500$ m

Velocity of sound, $v = 340$ m/s

Acceleration due to gravity, $g = 10$ m/s

Initial velocity of stone, $u =$

Time taken by the stone to fall to the base of the tower t_1.

According to the second equation of motion

$$s = ut_1 + \frac{1}{2} g t_1^2$$

$$500 = 0 \times t_1 + \frac{1}{2} \times 10 \times t_1^2$$

$$t_1^2 = 100$$

$$t_1 = 10 \text{ s}$$

Now, time taken by the sound to reach the top from the base of the tower, $t_2 = \frac{500}{340} = 1.47$ s.

Therefore the splash heard at the top from the base of the tower

When $t = t_1 + t_2$

$= 10 + 1.47 = 11.47$ s.

A sound wave travels at a speed of 339 ms^{-1}. If its wavelength is 15 cm, what is the frequency of the wave? Will it be audible?

Speed of sound, $v = 339$ m/s

Wavelength of sound, $\lambda = 15$ cm
$= 0.015$ m

Speed of sound = Wavelength x Frequency.

$$v = \lambda \times \nu$$

$$\nu = \frac{\lambda}{v}$$

The frequency range of audible sound for humans lies between 20 hz to 20000 Hz. Since frequency of the given sound is more than 20,000 Hz. It is not audible.

3. What is loudness of sound? What factors does it depend on?

A. The effect produced in brain by sound of different frequencies is called loudness of sound.

loudness depends on the amplitude of vibration. In fact, loudness is proportional to square

of amplitude of vibrations

32. Explain how bats use ultrasound to catch a prey ?

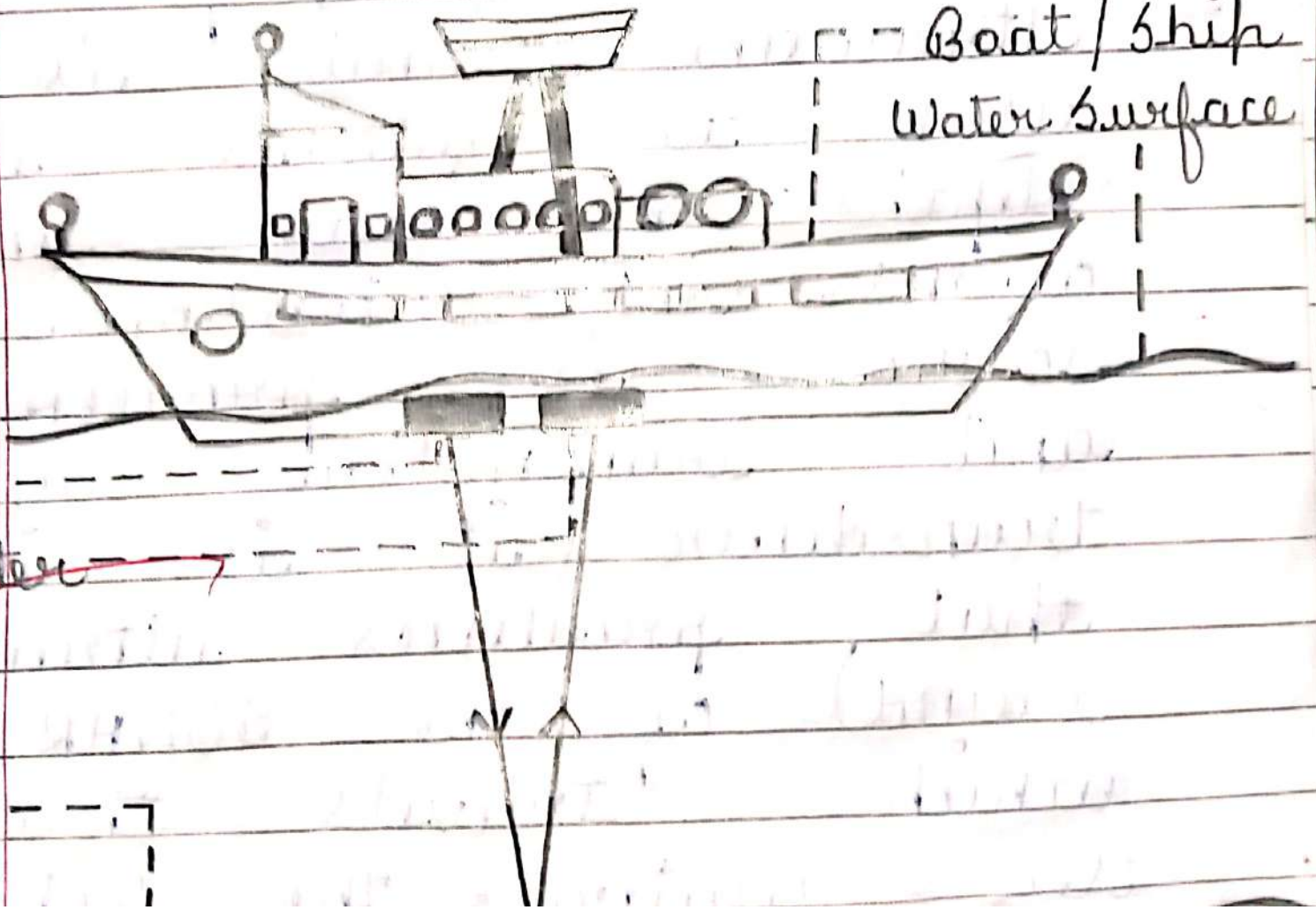
Ans. Bats produce high pitched ultrasonic squeaks. These high pitched squeaks are reflected by objects such as preys & return to the bat's ear. This allows a bat to know distance of his prey.

33. How is ultrasound used for cleaning ?

Ans. Objects to be cleaned are put in a cleaning solution and ultrasonic sound waves are

produced through that solution. The high frequency of ultra sound waves detaches dirt from object.

Explain working and application of a sonar.



SONAR stands for sound navigation and ranging. It is a device used to measure the depth direction and speed of under water object such as submarines and ship wreacks and with the help of ultrasound and is also used to measure the depth of seas and oceans. An ultrasonic sound is produced and transmitted by

is detected and recorded by the detector, which is converted into electrical signals. The distance (d) of the under water object is calculated from the time (t) taken by the echo to return with speed (v) is give by $2d = v \times t$.

A sonar device on a submarine sends out a signal and receives an echo 5 s later. Calculate the speed of sound in water if distance of the object from the submarine is 3625 m.

Given,

Time taken to hear the echo, $t = 5\ s$.

Distance of the object from the submarine, $d = 3625\ m$.

Total distance Travelled by the sonar waves during the transmission and reception in wate

$= 2d$

Using formula,

Velocity of sound in wate

$$v = \frac{2d}{t}$$

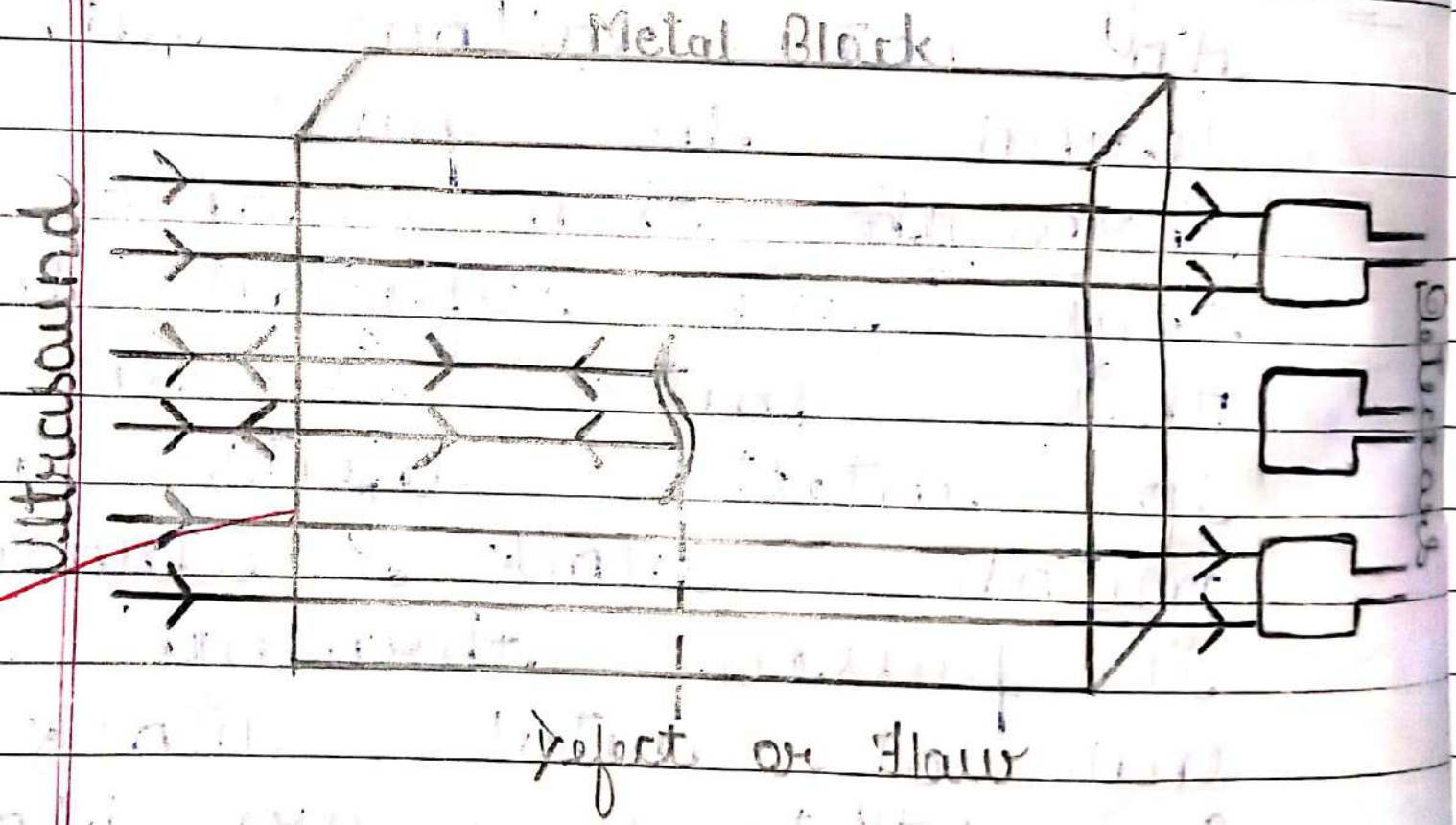
$$= \frac{2 \times 3625}{5}$$

$= 1450\ ms^{-1}$.

36. Explain how defects in a metal block can be detected using ultrasound.

A. Defects in metal block do not allow ultra sound to pass through them and they are reflected back. This fact is used to detect defects in metal block. Ultrasound is passed through one end of metal block & detectors are placed on the other end. The defective part of the metal block does not allow ultrasound to

pass through it. As a result, it will not be detected by the detector. Hence, defects in metal blocks can be detected using ultrasound.



Metals

Q. Meanings.

1. Fragile	easily broken
2. Opaque	not clear
3. Pungent	sharp
4. Corrosion	to make rusting.
5. Silos	air tight chamber
6. Furnace	chamber for melting metals.
7. Shrinking	tendency to diminish in size.

Q. Answer the ques.

1. Explain meaning of ductility and malleability.

A. Malleability ⇒ Substances that can be beaten into thin sheets are called malleables.

Ex. Most of the metals are malleable in natu

Ductility ⇒ Substances that can be drawn into thin wire are called ductile.

Ex. Most of the metals are ductile.

2. Why do ionic compoun have high melting poin

A. Ionic compounds have h melting & boiling points because ionic compounds are formed by attraction of two opposite ions and a considerable amount of energy is required to break thi strong interionic attraction

3. Define following terms -

1) Minerals.

A. Most of elements occur in nature as in combine state as minerals. The chemical composition of minerals is fixed.

2] Ore.

A. Minerals from which metals can be extracted profitably are known as Ores.

3] Gangue.

A. The impurities (sand, soil etc) present in the ore are called Gangue.

Q. Name 2 metals which are found in free state.

A. The metals at the bottom of the reactivity series are mostly found in free state.

Example. Gold, Silver and Platinum.

5. What chemical process is used for obtaining a metal from its oxide?

A. The chemical process used for obtaining a metal from its oxides is Reduction. In this process, metal oxide are reduced by using suitable reducing agents such as carbon or by highly reactive metals to displace metals from their oxides.

Ex. Zinc oxide is reduced to metallic zinc by heating with carbon.

$$ZnO(s) + C(s) \rightarrow Zn(s) + CO(g)$$

Zinc Oxide — Carbon — Zinc Metal — Carbon monoxide

Magnese dioxide is reduced to magnese by treating it with aluminium powder In this case, aluminium displaces magnese from its oxide.

$$3MnO_2(s) + 4Al(s) \rightarrow 3Mn(l) + 2Al_2O_3(l) + \downarrow heat$$

Magnese dioxide — Aluminium ~~oxide~~ — Aluminium oxide

Oxides of more reactive metals are reduced by Electrolysis

6. Which metal do not corrod easily ?

1. More reactive a metal is, more likely it is to be

8. What are amphoteric oxides? Give 2 ex. of amphoteric oxides.

A. Those oxides that behave as both acidic and basic oxides are called amphoteric oxides. These oxides react with both acids as well as bases to produce salt and water.

Ex. Aluminium oxide (Al_2O_3) and zinc oxide (ZnO)

9. Name two metals which will displace hydrogen from acids and two metals which will not?

A. Metals that are more reactive than hydrogen displace it forom dilute acid. Ex. Sodium and Potassium.

Metals that are less reactive than hydrogen do not displace it from dilute acid. Ex. Copper, Silver.

10. What is Galvanisation?

A. An iron article is coated with a layer of zinc metal, which prevents iron to come in contact with oxygen & moisture. Hence, rusting is prevented.

11. Differentiate btw. metal and non-metal on basis of their chemical properties.

A.

Metals	Non-Metals
1). Metals are electropositive in nature.	Non-metals are electronegative in nature.
2). They reach with oxygen to form basic oxide. $2Na_2 + O_2 \rightarrow 2Na_2O$	They react with oxygen to form acidic or neutral oxide. $C + O_2 \rightarrow CO_2$
3). These have ionic bonds.	These have co-valent bonds.

1. They act as reducing agent. (as they can easily loose electron.	They act as oxidizing agent (as they can gain electron)
$Na \rightarrow Na^+ + e^-$	$Cl + e^- \rightarrow Cl^-$
2. They react with salt solution of metals, depending upon their reactivity, displacement can occur.	These react with salt solution of non-metals
$CuSO_4 + Zn \rightarrow ZnSO_4 + Cu$	

Q. Answer the ques.

1. What are limitations of dobereiner's classification?

A. The limitations of Dobereiner's classification are as follows —

All known elements could not be classified into groups of triads on the basis of their properties.

2. Use Mendeleev's periodic table to predict formula for the oxides of following elements —
K, C, Al, Si, Ba

A. K is in the group I, therefore oxide will be K_2O

C is in group IV, therefore the oxide will be CO_2.

Al is in the group III, therefore the oxide will be Al_2O_3.

Si is in the group IV, therefore the oxide will be SiO_2.

Ba is in the group II, therefore the oxide will be BaO.

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3. How could modern periodic table remove various anamolous of Mendeleev's periodic table ?

Ans. Mendeleev was unable to give fixed position to hydrogen and isotopes in the periodic table. In Mendeleev's periodic table, increasing manner of atomic mass of element is not always regular from one to its next. It was believed that a more fundamental property than atomic mass could explain periodic properties in a better manner.

4. What property do all elements in same column of the periodic table as baron have in common?

A. All the elements in same column of the periodic table as Boron have the same number of valence electrons (3). Hence, they all have valency equal to 3.

5. Compare and contrast the arrangements of elements in Mendeleev's periodic table and modern periodic table?

A.

Mendeleev's Periodic Table	Modern Periodic Table
1). Elements are arranged in the increasing order of	Elements are arranged in the increasing order of

their atomic masses.	their atomic number.
2). There are total 7 groups (column) and 6 periods (rows).	There are a total of 18 groups and 7 periods.
3). The position of hydrogen could not be explained.	Hydrogen is placed above Alkali metals.

18/8/24

Completed

Date: 17/02/2090

4). No distinguishing of position for metals and non-metals.	Metals are present at the left hand side of the periodic table whereas non-metals are present at right hand side.