

SET - B

<p>GSEB Batch : 10th Std. Eng. Medium</p>	<p>MAHESH TUTORIALS SUBJECT : Science & Technology(011) First Preliminary Exam Model Answer Paper</p>	<p>Date: Marks : 100 Time: 3 Hrs.</p>
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PART - A

1. (a) Bucky ball
2. (b) 10 Å
3. (a) water
4. (a) 4 D
5. (c) Ciliary muscles
6. (d) Red
7. (c) 2 minute
8. (d) $I = \frac{Q}{t}$
9. (d) Thomson
10. (a) 3.6×10^6
11. (d) Coulomb
12. (a) DC current
13. (c) Electric motor
14. (c) Nichrome
15. (b) Chandra
16. (b) CO
17. (c) Meteors
18. (b) Jovian planets
19. (a) Water
20. (a) Gypsum
21. (c) Both a and b
22. (a) Acidic
23. (b) Impure
24. (a) Basic
25. (c) 24
26. (a) Methane
27. (c) Water
28. (b) Diprotic
29. (b) Ethene
30. (d) Butane and Ethene
31. (d) Acetylene
32. (c) Kerosene
33. (d) Fruity
34. (b) Sodium salt of long chain of sulphonates
35. (a) Nylon
36. (b) Alveoli
37. (d) Both (a) and (c)
38. (b) Cardiac muscles
39. (b) 10 lac
40. (a) How much excess water is there in the body
41. (c) Adrenaline
42. (c) Diabetes
43. (a) Carpel
44. (c) 28 to 32 days
45. (b) Meiotic division
46. (b) Cauliflower
47. (a) Chloride ion
48. (b) Decomposers
49. (b) 25%
50. (b) 88, 4



SECTION - A

Answer the following questions : [2 marks]

1. Due to lighter yet stronger mechanical properties of nanomaterials, they have found larger applications in security. 10
- ⇒ They are now used to construct light and strong battle tanks, space crafts, bridges, cranks, etc. ½
- ⇒ Weaving them into clothes to create bulletproof clothing is possible. ½
- ⇒ Since nanoparticles have size dependent melting point, they have found applications in industry and thermal security devices. ½
- ⇒ Large structure of carbon nanotubes are used for thermal management of electronic circuits. ½

OR

1. **Nanoscience** is the study of the fundamental principles of molecules and other systems whose at least one of the dimensions lie between 1nm to 100 nm range. 1
- ⇒ **Nanotechnology** is defined as building atom -by- atom or molecule by molecule structures that will be helpful in manufacturing devices and systems. 1

2. $R_1 = 5 \Omega$, $R_2 = 10 \Omega$, $R_3 = 30 \Omega$, $V = 12 V$
The resistors are connected in parallel.

Now,

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

$$\text{m} \frac{1}{R} = \frac{1}{5} + \frac{1}{10} + \frac{1}{30}$$

$$\text{m} \frac{1}{R} = \frac{6 + 3 + 1}{30}$$

$$\text{m} \frac{1}{R} = \frac{10}{30}$$

$$\text{m} \frac{1}{R} = \frac{1}{3}$$

$$\text{m} R = 3 \Omega$$

Now, $V = IR$

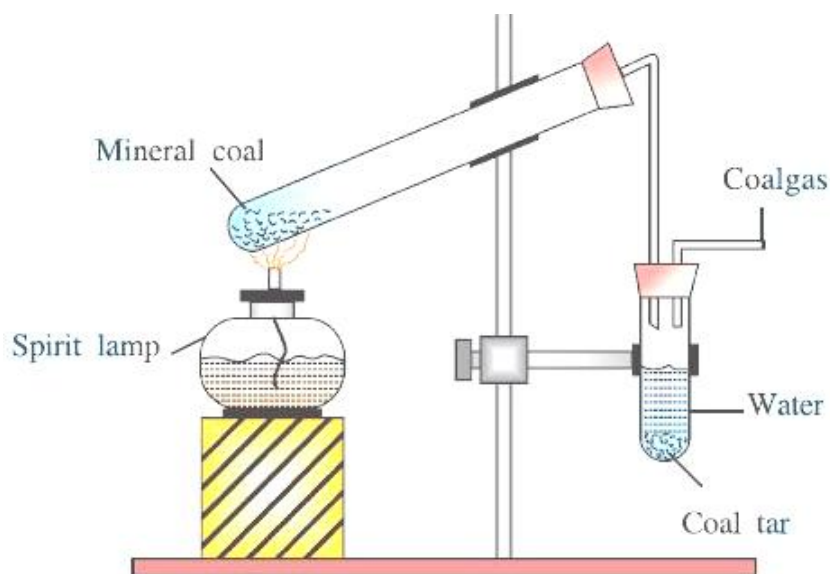
$$I = \frac{V}{R}$$

$$\text{m} I = \frac{12}{3}$$

$$\text{m} I = 4 \text{ A.}$$



- 3.



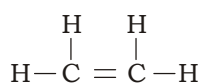
Destructive Distillation of Mineral Coal

½

- ⇒ Coal is heated in an iron retort at 1273 K. Volatile substances are separated due to this.
- ⇒ The hot gases are passed through the tubes cooled by keeping them in water. Hence, the substances which are soluble in water are dissolved in water and the other insoluble substances settle down in water.
- ⇒ Afterwards, these gases come out; they are purified and used for heat and energy. We know it as "coal gas".
- ⇒ The coal remained in the retort is known as coke. It is used for burning and in preparing steel from iron.
- ⇒ The black sticky liquid substance which is insoluble in water and settles down is called tar.
- ⇒ Take mineral coal in a hard glass test tube. Take some water in the second test tube.
- ⇒ Arrange the apparatus as shown in the figure.
- ⇒ The gas will come out through the tube connected with the upper part of the test tube.
- ⇒ The gas starts burning when a lighted match stick is brought near the end of this tube. This gas is coal gas.
- ⇒ The portion that is left out in the tube containing mineral coal is called coke.
- ⇒ The ammonia produced during the reaction is absorbed in water which can be tested with red litmus paper. It turns red litmus paper blue.

OR

3. In unsaturated hydrocarbons, the nearby any two carbon - carbon atoms are combined by a double bond (- C = C -) or triple bond (- C ≡ C -) i.e. there is double bond or triple bond because of sharing of two-two or three-three electrons of any two nearby carbon atoms viz. Ethene (C₂H₄), ethyne (C₂H₂) etc.

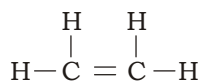


Ethene (Ethylene)

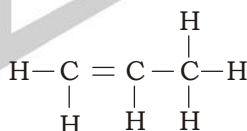


Ethyne (Acetylene)

- ⇒ The hydrocarbons in which any two nearby carbon atoms are combined by a double bond unsaturated hydrocarbons are called alkenes. viz ethene (C₂H₄) propene (C₃H₆), butene (C₄H₈), pentene (C₅H₁₀).



Ethene (Ethylene)



Propene (Propylene)

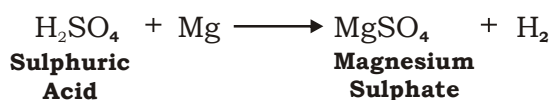
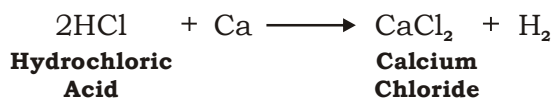
4. We can also get information regarding weather using satellite of INSAT series.
- ⇒ These satellites can take photographs of clouds, provide useful information about surface temperature of the oceans, temperature of various layers of atmosphere, humidity in the atmosphere, etc.
 - ⇒ They also provide forecast regarding monsoon or sudden climatic changes that can cause storms or hurricanes.

5.

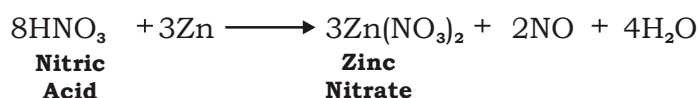
- I) Reaction of acid with metals:** By reaction of acid with metal, salt corresponding to metal and dihydrogen gas are produced.



Exmple :



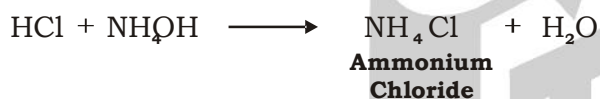
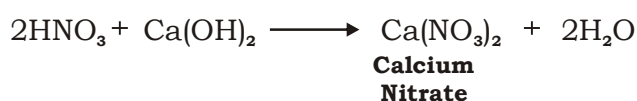
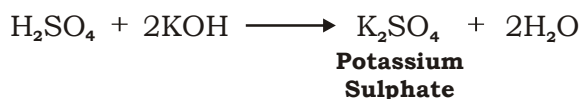
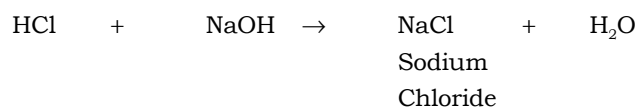
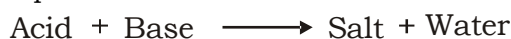
Nitric acid being oxidizing agent, by reaction with metal, water is produced instead of dihydrogen.



Generally, noble metals like Au, Ag and Pt do not react easily with acid.

II) Reaction of acid with base: Salt and water are formed by reaction of acid with base. This reaction is called neutralisation reaction.

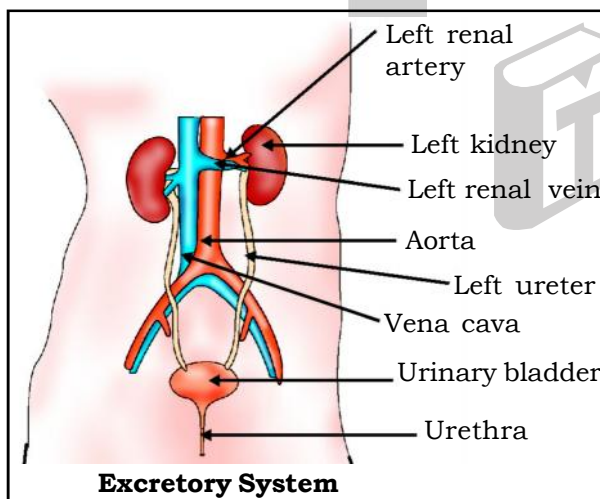
Example :



SECTION - B

Answer the following questions : [2 marks]

6.



- ⇒ Kidney is the main excretory organ of the human beings.
- ⇒ Pair of kidneys is located in the abdomen on the dorsal side, below the diaphragm.
- ⇒ Kidneys are bean shaped and reddish brown in colour.
- ⇒ Kidney is divided into two regions called cortex and medulla.
- ⇒ These regions consist of excretory units called nephrons.
- ⇒ Two excretory tubes known as ureters, one from each kidney opens into a urinary bladder.
- ⇒ The urinary bladder passes into a muscular tube called urethra.
- ⇒ Urethra opens out by a small opening known as urinary opening.

7.

No	Cerebrum	Cerebellum	
1	It is a major part of the forebrain.	It is a part of the hindbrain.	
2	It coordinates thoughts and various other senses.	It coordinates the functions of voluntary muscles and thereby maintains the body equilibrium.	½
3	It is the largest and most complex part of the brain.	It is a part lying behind the cerebrum, on the dorsal side beneath the pons.	½
4	It is divided into four lobes viz. frontal lobe, parietal lobe, temporal lobe and occipital lobe.	There are no surface lobes in cerebellum.	½
5	It is connected with thoughts, memory, reasoning and intellectual processes.	It is connected with balanced body movements.	½

8. Waste are classified into two major terms:

- (a) Solid and
(b) Liquid forms.

⇒ All the waste material produced by the various activities of man and animals are poisonous to some extent and can be divided into two major groups-

- (a) **Biodegradable Waste:-** The waste material which can be broken down by biological processes i.e. by the action of microorganisms into non-poisonous substances in nature is called as Biodegradable waste. Example vegetables, fruits, cow dung etc.
- (b) **Non-biodegradable Waste:-** The waste material which cannot be broken down by biological processes i.e. by the action of microorganism into non-poisonous substances is called non-biodegradable waste. Example plastic, polyethene, DDT, glass, metals.

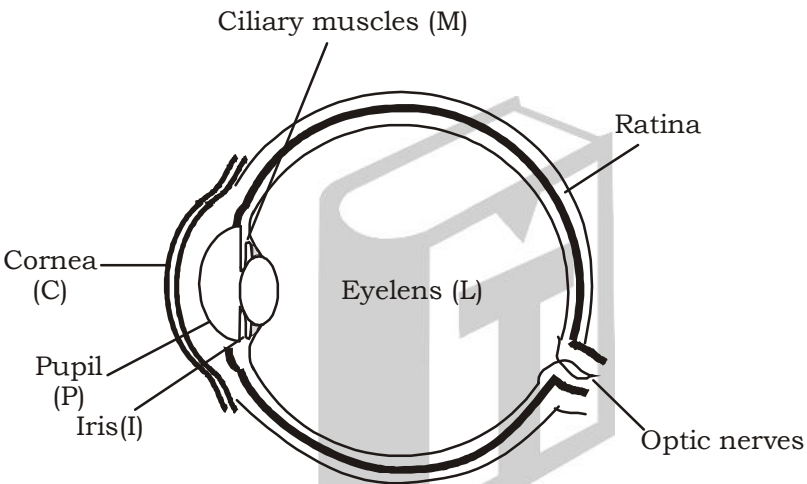
9.

No.	Homologous organs	Analogous organs	
1	The internal structure and fundamental origin of these organs are mostly similar.	The fundamental structure and origin of these organs are totally dissimilar.	½
2	Functionally these organs may be similar or dissimilar.	Functionally these organs are always similar.	½
3	The presence of these organs indicated common ancestors.	The presence of these organ does not indicate common ancestors.	½
4	The forelimbs of frog, lizard, bird and man are homologous organs.	The wings of butterfly, wing of birds and those of bat are analogous organs.	½

OR

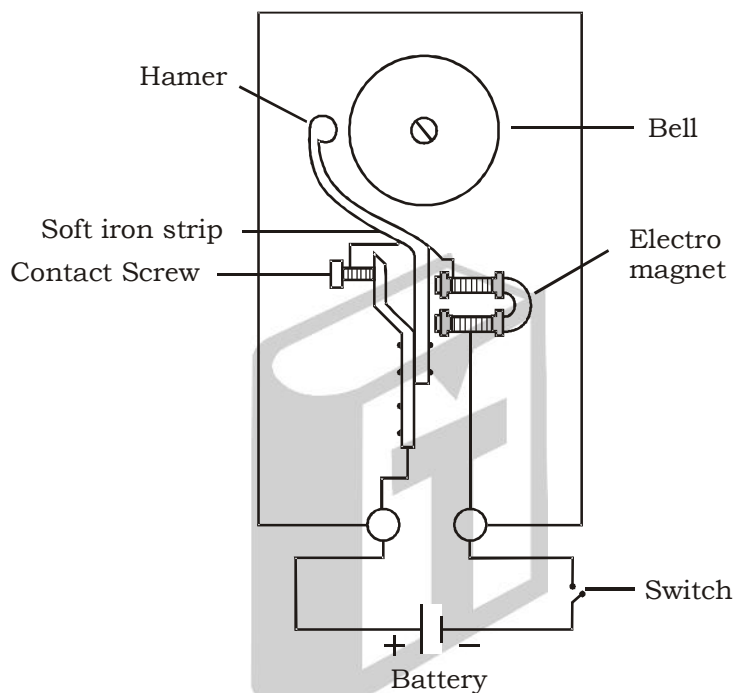
9. Species is a population of organism consisting of similar individuals which can breed together and produce fertile offspring.

- The process by which new species develop from the existing species is called speciation.
- When population of same species splits into two groups which gets separated from each other geographically by certain barriers like rivers, seas, mountains then new species are formed.
- Geographical isolation leads to reproductive isolation due to which there is no gene flow between two separated groups of population.
- Variation arises due to natural selection.
- Due to random change in gene frequency (genetic drift) individuals become different and they cannot reproduce with each other. Thus new species are formed.
- DNA changes, change in number of chromosomes, the germ cells of two isolated groups of population which cannot fuse with each other can lead to speciation.

<p>10. Those animals that are not domestic, those plants that cannot grow by agriculture and microorganisms are called as wildlife.</p> <p>⇒ Significance of wildlife :</p> <p>(1) Wildlife are economically beneficial.</p> <p>(2) It is also an important component of the food web of ecosystem. Therefore, it is helpful in maintaining the balance of the ecosystem.</p> <p>(3) The main importance of wildlife is success of the gene bank. In future, these will be very useful.</p> <p>(4) Men use them for developing many varieties of plants and animals in agriculture, animal husbandry, fishery, etc.</p>		<p>½</p> <p>½</p> <p>½</p> <p>½</p>
SECTION - C		
Answer the following questions : [3 marks]		
<p>11. The human eye is the best natural optical instrument whose construction can be compared with the camera.</p> <p>⇒ A simple sketch of human eye along with labeling of its main parts is as shown in the figure.</p>		<p>15</p> <p>½</p> <p>½</p>
<p>⇒ The light rays coming from the object first enter the eye through cornea. A muscular diaphragm behind the cornea is known as an "iris" which can control the amount of light that enters the eye.</p> <p>⇒ An aperture of an eye behind the cornea at the center of iris is known as pupil whose size can be controlled by iris. Pupil controls the amount of light that enters the eye by changing its size.</p> <p>⇒ After passing through the pupil the light rays are incident on a jelly like elastic material known as an eyelens.</p> <p>⇒ The muscular structures which hold the eyelens in its position are known as ciliary muscles. They change the focal length of an eyelens by changing its thickness.</p> <p>⇒ Position at which image is formed due to refraction of light by eyelens is called "retina". When light rays fall on retina, the light sensitive cells generate electrical signals. The signals are sent to the brain through the optic nerves where image of an object is interpreted.</p>		<p>1</p> <p>½</p> <p>½</p>
<p>12. It is comparatively easier to produce.</p> <p>⇒ The production is relatively cheaper.</p> <p>⇒ It can be transmitted over longer distances without much loss of energy.</p> <p>⇒ The AC voltage can be increased or decreased without loss of electricity.</p> <p>⇒ The production is difficult and expensive.</p> <p>⇒ There is lot of loss of electricity in transmitting it over a large distance.</p> <p>⇒ One cannot control the desired DC voltage/current without having loss of electricity.</p>		<p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p>
OR		
<p>12. The electric bell works on the principle of an electromagnet. Electric bell is made up of an electromagnet, bell (metallic cup), a soft iron strip and a contact screw. Bell is a cup shaped device made up of a metal.</p> <p>⇒ A soft iron strip works as a small hammer. The construction of an electric bell is</p>		<p>½</p>

shown in the following figure.

- ⇒ When the circuit is switched on, an electric current returns in the battery after passing through an electromagnet, a soft iron strip and a contact screw. 1/2
- ⇒ While passing a current through an electromagnet it acts as a magnet and attracts an iron strip. 1/2
- ⇒ As iron strip (hammer) being elastic, it strikes with the bell. 1/2
- ⇒ Simultaneously its contact with a contact screw is broken and current flowing through electro magnet stops. The iron strip comes in contact with the screw by obtaining an original position and again the electric current passes through an electromagnet. 1/2
- ⇒ This phenomenon occurs many times in a second and a hammer strikes many times with the bell, as a result the bell rings. The bell rings till the circuit is switched off. 1/2

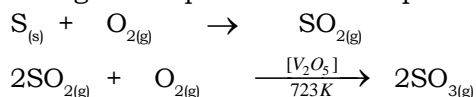


Electric bell

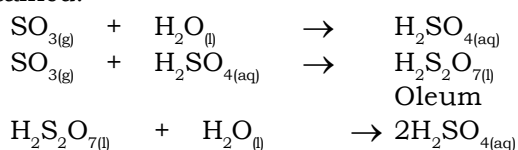
- ⇒ Electric bell is used in school, home, telephone, security system, fire alarm etc. 1

13. Sulphuric acid is produced by contact process. 1/2

- ⇒ In this process sulphur is burnt in air so that sulphur dioxide gas is formed. 1/2
- ⇒ Sulphur dioxide gas with excess air is passed over Vanadium Pentoxide (V_2O_5) solid catalyst at 723 K so that sulphur trioxide gas is formed. 1/2
- ⇒ For this reaction platinum catalyst was used but it became useless due to catalytic poisoning. In its place vanadium pentoxide is used. 1/2



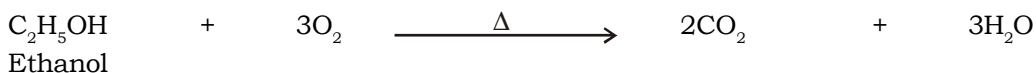
- ⇒ When sulphur trioxide is dissolved in water it forms sulphuric acid with very corrosive fumes but if sulphur trioxide gas is absorbed in concentrated sulphuric acid, fuming viscous liquid is formed. 1/2
- ⇒ It is called fuming sulphuric acid or oleum ($H_2S_2O_7$). 1/2
- ⇒ Oleum is diluted with water and sulphuric acid of desired concentration can be obtained. 1/2



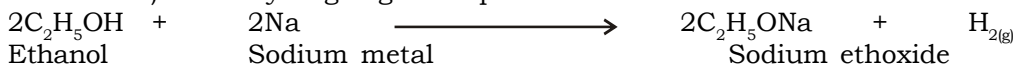
14. Pure ethanol is colourless. 1/2

- ⇒ Its boiling point is 351 K and it is highly soluble in water. 1/2

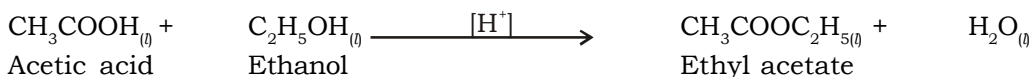
⇒ Ethanol is a very combustible liquid. It burns rapidly with a blue flame when combusted and produces carbon dioxide and water by combustion. ½



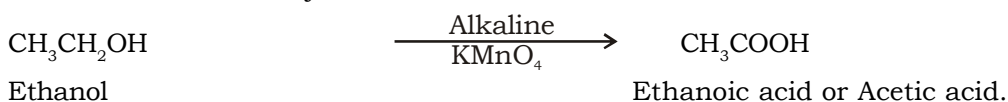
⇒ When ethanol reacts with sodium metal sodium ethoxide (which is generally known as alcocide) and dihydrogen gas are produced. ½



⇒ Ethanol on reaction with acetic acid in presence of acid gives ethyl acetate which has sweet fruit smell. This reaction is called esterification reaction. ½



⇒ Acetic acid is formed by oxidation of ethanol. ½



OR

14. For nomenclature of carboxylic acid compounds, the longest hydrocarbon chain with carboxylic acid group is selected and last alphabet 'e' is removed from the corresponding hydrocarbon and 'oic acid' suffix is added. Example: Methane-Methanoic acid and Ethane-Ethanoic acid. 1

⇒ Common and IUPAC names of some carboxylic acids are given in table.

Alkane		Carboxylic acid		
Molecular formula	Common name	Molecular formula	Common Name	IUPAC Name
CH ₄	Methane	HCOOH	Formic acid	Methanoic acid
C ₂ H ₆	Ethane	CH ₃ COOH	Acetic acid	Ethanoic acid or Acetic acid
C ₃ H ₈	Propane	CH ₃ CH ₂ COOH	Propanoic acid	Propanoic acid

⇒ Carboxylic acids having general formula $\begin{matrix} \text{R}' \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{HO} \end{matrix}$ obtained by substitution of any one of the R or R' group present in general formula $\begin{matrix} \text{R}' \\ \diagdown \\ \text{C}=\text{O} \\ \diagup \\ \text{R} \end{matrix}$ by -OH group. 1

15.

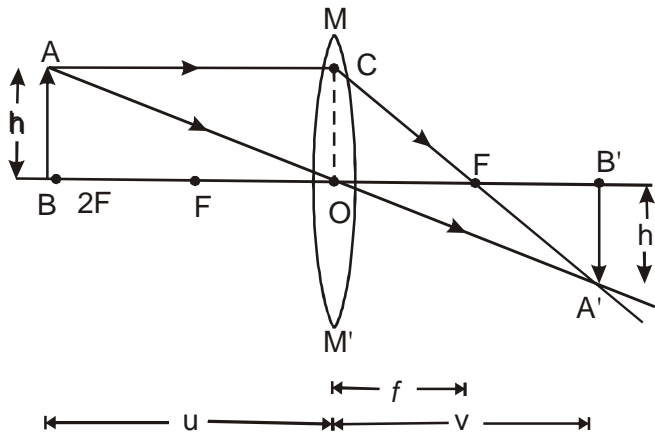
No.	Vasectomy	Tubectomy
1.	As compared to tubectomy, vasectomy is a easy surgical treatment.	As compared to vasectomy, tubectomy is complicated surgical method.
2.	In male, both vas deference are cut and then cut ends are tied up.	In female, both oviduct are cut and then cut ends are tied up.
3.	This prevents entry of sperms in urinogenital passage (urethra).	This prevents contact of sperm and ovum in the oviduct.

SECTION - D

Answer the following questions : [5 marks]

16.

15



lens formula

Figure shows a convex lens MM' and an object AB of height h placed in front of the lens. Image $A'B'$ formed by lens is real, inverted and diminished in size.

⇒ According to the Cartesian sign convention.

⇒ Object distance = $OB = -u$

Image distance = $OB' = +v$

Focal length = $OF = +f$

⇒ It is clear from the figure that the right angled ΔABO and $\Delta A'B'O$ are similar triangles.

$$\therefore \frac{AB}{A'B'} = \frac{OB}{OB'} = -\frac{u}{v} \quad \dots\dots (1)$$

Now, the right angled ΔOCF and $\Delta B'A'F$ are similar triangles.

$$\therefore \frac{OD}{A'B'} = \frac{OF}{FB'}$$

$$\therefore \frac{AB}{A'B'} = \frac{OF}{FB'} \quad (\because AB = OC) \quad (OC = AB \text{ as they are opposite sides of rectangle } \square ABOC)$$

$$\therefore \frac{AB}{A'B'} = \frac{OF}{OB' - OF}$$

$$\frac{AB}{A'B'} = \frac{f}{v - f} \quad \dots\dots\dots (2)$$

⇒ On comparing equation (1) and (2), we have.

$$\therefore -\frac{u}{v} = \frac{f}{v - f}$$

$$\therefore -u(v - f) = vf$$

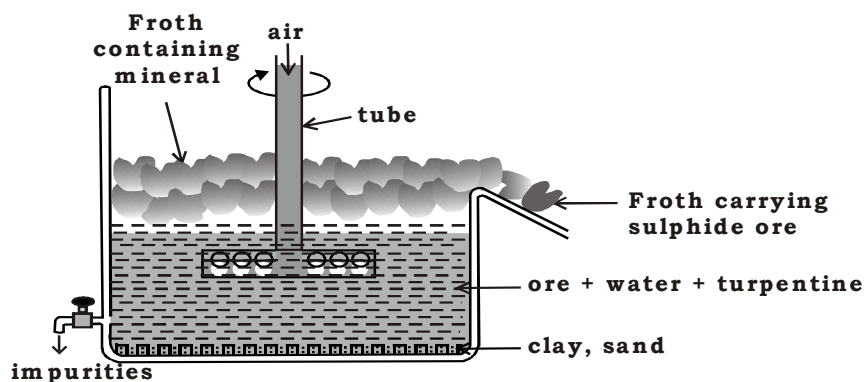
$$\therefore -uv + uf = vf$$

Dividing each term by uvf

$$-\frac{1}{f} + \frac{1}{v} = \frac{1}{u}$$

$$\therefore \frac{1}{v} - \frac{1}{u} = \frac{1}{f}$$

This equation is known as lens formula.



Froth floatation method

⇒ The Froth floatation process is commonly used to concentrate the sulphide ores (like copper, zinc and lead sulphide ore).

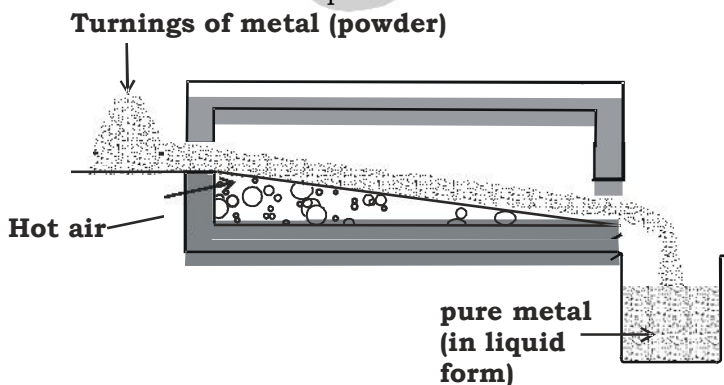
Process :

- ⇒ Powder of ore is mixed with water & pine oil in a big vessel.
- ⇒ Sulphide particles of ore stick to the turpentine by wetting while particles of clay and sand do not get wetted with turpentine.
- ⇒ Air is blown with pressure in this liquid mixture through a tube.
- ⇒ Froth is formed near sulphide particles and it comes up at surface.
- ⇒ Heavy particles of clay, sand etc get wetted with water and settle down.
- ⇒ Foam containing sulphide particles is taken to another container and washed with water.

OR

17. This method is used for refining of metals having low melting point i.e. metals like tin, lead etc. which melt easily.

- ⇒ In this method, a furnace having a slope is used.
- ⇒ The temperature of this furnace is kept slightly higher than the melting point of the metal.
- ⇒ When impure metal is passed on the slope, the metal in it is melted and collected in the vessel kept below.
- ⇒ The melting points of impurities are higher and so do not melt at this temperature and found in solid form on the slope.



Purification of metal by liquifaction method

18. The exchange of gas which takes place in the leaves of a plant.

(a) During daytime -

- ⇒ In leaves during daytime, when photosynthesis occurs, O_2 diffuses out and CO_2 diffuses in.
- ⇒ This in and out of gases occurs by diffusion.
- ⇒ The stomatal pore present on the surface of leaves regulates and facilitates the gaseous exchange.

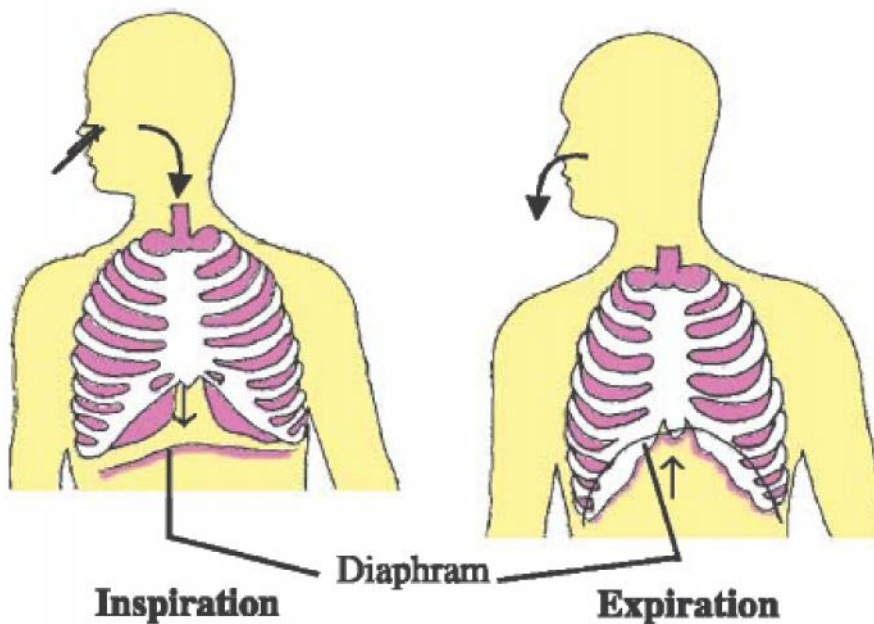
(b) During night time -

- ⇒ During night time no photosynthesis occurs in any part of plant.

- ⇒ So vice versa movement of gases occurs.
- ⇒ That is O_2 from air goes inside the leaves and CO_2 diffuses out.
- ⇒ This process also occurs by diffusion process.
- ⇒ In this gaseous exchange also the stomatal pore is involved.

OR

18. (i) Intake of air into lungs is called as inhalation. ½
- (ii) When the diaphragm and the muscles attached to the ribs contract, the volume inside the thoracic cavity increases. ½
- (iii) This decreases air pressure in the lungs and so oxygen rich air from the atmosphere rushes into the lungs, through the nostrils. ½
- (iv) The oxygen rich air enters the alveolar sacs of the lungs where gaseous exchange takes place. ½
- (v) When diaphragm relaxes, the volume decreases and the pressure in the lungs increases. ½
- (vi) As a result the carbon dioxide containing air is pushed out of the lungs. ½
- (vii) The air containing the carbon dioxide is pushed out which is termed as exhalation. ½



~~~~~ All the Best ~~~~~

½  
½  
½  
½

½  
½  
½  
½  
½  
½

2