

IDEAL MATHS COACHING CENTRE,

192-PWD Road,

NAGERCOIL.**9843322969****SCIENCE BIOLOGY LESSON 5. A REPRESENTATIVE STUDY OF MAMMALS****CLASS: X****PART – A**

1. Select important characteristic features of mammals

- (i) four-chambered heart (ii) fore-limbs and hind limbs
(iii) milk-producing glands (iv) post anal tail

2. Carnivorous animals use these teeth to tear flesh.

- (i) incisors **(ii) canines** (iii) premolars (iv) molars

3. The Henle's loop of nephron is mainly responsible for reabsorption of water in the kidney. Which of the following has a long loop of Henle in its nephrons to conserve water?

- (i) polar bear **(ii) camel** (iii) frog (iv) whale

4. Which blood cells of mammals are concerned with immunity?

- (i) Young Erythrocytes **(ii) Leucocytes**
 (iii) Thrombocytes (iv) Matured Erythrocytes

5. You were given two unlabeled slides with blood smears of an amphibian and a mammal. You would differentiate the blood samples by observing the _____.

- (i) colour **(ii) nature of RBC's**
 (iii) nature of WBC's (iv) contents of plasma

6. For the digestion of cellulose, an enzyme called cellulase is required. Some mammals lodge cellulose producing bacteria in their digestive system by offering them food and shelter. These mammals are mostly _____.

- (i) Herbivores** (ii) Carnivores (iii) Omnivores (iv) Sanguivores

7. Forelimbs of mammals have a common basic structure or pattern, but are different in their usage/function in different animals. They can be called _____.

- (i) Homologous organs** (ii) Analogous organs
 (iii) Vestigial organs (iv) Rudimentary organs

8. Sensitive whiskers are found in _____.

- (i) Bat (ii) Elephant (iii) Deer **(iv) Cat**

9. The tusks of elephants are modified _____.

Answer: **Incisors**

10. Pick out an animal which has a four-chambered stomach.

- (i) Elephant (ii) Dolphin **(iii) Deer** (iv) Kangaroo

11. Normal body temperature of man is _____.

- (i) 98.4 – 98.6°F** (ii) 96.6 – 96.8°F
 (iii) 94.4 – 98.6°F (iv) 98.4 – 99.6°F

12. Mitral valve is found between _____.

- (i) Right auricle and right ventricle**
(ii) Left auricle and left ventricle
 (iii) Right ventricle and pulmonary artery
 (iv) Left ventricle and aorta

13. Assertion (A) : Mammalian heart is called myogenic heart.

Reason (R) : Heartbeat is regulated by a specialized muscle bundle (pacemaker) in mammals.

- (i) Both 'A' and 'R' are true and 'R' explains 'A'**
 (ii) Both 'A' and 'R' are true but 'R' doesn't explain 'A'
 (iii) 'A' is true but 'R' is false.
 (iv) 'A' is false but 'R' is true.

14. One of the following groups contains a non-mammalian animal.

Pick up the group.

- (i) dolphin, walrus, porcupine, rabbit, bat
 (ii) elephant, pig, horse, donkey, monkey
 (iii) antelope, deer, cow, buffalo, black buck
(iv) dog, cat, crocodile, lion, tiger

Explanation: Crocodile is the only reptile in the group and the rest of them are mammals.

15. The epidermis of mammals contains _____.

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(i) hair, bristle, quills

(ii) hair, nails, claws

(iii) hair, bristles, horns

(iv) hair, nails, scales

16. Based on relationship, fill up:

Whale: Flippers: Bat; _____

Answer: Wing – like structure called **Patagium**

17. Fill in the blank.

RBC: Carrier of oxygen; WBC: _____

Answer: **Producers of antibodies** which resist the germs and thereby gives immunity.

18. Based on modifications, make the pairs:

incisor: tusks of elephant; _____: quills of porcupine

Answer: Epidermal hairs

PART – B**1. Mention the two unique characteristics of mammals.**

Answer: Two unique characteristics of mammals:

(i) Epidermal hairs (ii) Milk producing glands

2. Give two example each: (i) ruminating mammals**(ii) marine mammals.**

Answer:

(i) Ruminating mammals: Cows, buffaloes, antelopes, goats deer.

(ii) Marine animals: Whales, dolphins

3. What type of dentition is seen in mammals? What are elephant tusks?Answer: Mammals have heterodont dentition with different types of teeth that are highly specialized to match specific eating habits.Elephant's tusks are the modifications of incisors and they are used in defending themselves.**4. Mention any four adaptations seen in the camel so that it can live successfully in deserts.**

Answer:

- The skin of the camel is doubly thick to resist water loss.
- The skin contains water-storing osmotic cells to conserve waste.
- The thick bushy eye brows cover the eyes to protect them from sand storms.
- The nostrils can be closed during desert storms to prevent the entry of sand particles.

5. What is echo location? Give an example.

Answer: As a bat flies, it emits a rapid series of extremely high pitched clicking sound waves which bounce off objects or flying insects and the bat hears the echo.

- Thus the nocturnal bat can fly without crashing into things and also capture their prey. This kind of adaptation in bats is known as echo location.

6. Mention the various valves and their location in the human heart.

Valves	Location
Bicuspid valve or Mitral valve	At the left auricle-ventricular aperture
Tricuspid valve	At the right auricular ventricular aperture
Aortic valve	At the base of Aorta
Semilunar valve	At the base of the pulmonary artery.

7. Write any four differences between arteries and veins in mammals

S.	Arteries	Veins
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1.	Arteries are the blood vessels which carry blood from the heart to all parts of the body.	Veins are the blood vessels which carry blood from all parts of the body back to the heart.
2.	All arteries except pulmonary arteries transport oxygenated blood.	All veins except pulmonary veins transport deoxygenated blood.
3.	Arteries have thick walls to withstand the pressure of blood emerging from the heart.	Veins have thin walls because the blood flowing through them does not exert high pressure.
4.	Arteries have no valves.	Veins have valves which prevent backward flow of blood.
5.	The aorta (biggest artery) branches into arteries which branch into arterioles which branch into fine tubes called meta arterioles which end up in tiny capillaries.	The capillaries reunite to form small venules which rejoin to big veins and open into the superior vena cava and inferior vena cava.

8. Name the three important blood proteins seen in plasma. Add a note on their functions.

Answer: The plasma proteins are (1) Globulins (2) Fibrinogens and (3) Albumins

Functions:

- (1) Globulins (Immunoglobulin's) are protein antibodies that provide immunity to various diseases.
- (2) Fibrinogens are essential for the clotting of the blood.
- (3) Albumins contribute most to the osmotic pressure (maintain water balance).

9. Which blood cells are without nuclei? What is the advantage of this condition?

Answer: Red Blood Cells (RBCs) are without nuclei because they are fully packed with the respiratory pigment called haemoglobin.

Advantage: Since the space occupied by the nucleus is taken up by the haemoglobin molecules. RBCs can carry the maximum amount of oxygen.

10. Name the protein and the blood-cells responsible for the clotting of blood.

Answer:

- Fibrinogen present in plasma is responsible for the clotting of blood.
- Platelets (which are irregular broken pieces of certain giant cells of the bone marrow) are concerned with blood clotting to prevent blood loss.

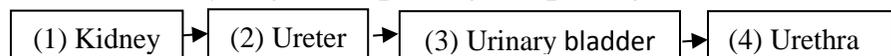
11.(i) What are the structural and functional units of kidney?

(ii) Arrange the organs of the human excretory system in the correct order, based on the passage of urine.

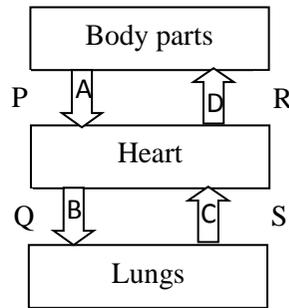
Ureter, Urethra, Kidney, Urinary bladder

Answer:

- (i) Nephrons are the structural and functional, units of kidney.
- (ii) Excretory organs depicting the passage of urine are



12. Observe the following flow-chart depicting blood-circulation in mammals.



Pick out the correct blood vessels A,B,C,D from the following:

(i) Pulmonary veins (ii) Vena cava (iii) Pulmonary artery (iv) Aorta

Amount the P,Q,R and S samples, identify the correct match from the following

- (a) P & Q = Oxygenated and R & S = Deoxygenated
 (b) P & Q = Deoxygenated and R & S = Oxygenated
 (c) All are Oxygenated
 (d) All are Deoxygenated

Answers:

Blood vessels

- (i) Pulmonary veins – (B) (ii) Vena cava – (A)
 (iii) Pulmonary artery – (C) (iv) Aorta – (D)

Correctly matched pair

- (b) (P & Q – Deoxygenated) and (R & S – Oxygenated).

13. Study the following passage:

Most of the vertebrates have jaws with teeth. The mode of arrangement of teeth on the jaws is called dentition.

The various types of teeth seen in mammals are incisors(I) canines (C) Premolars (P) and molars (M). They are used for biting, tearing, chewing and grinding respectively.

Canines, the tearing teeth are well-developed in carnivores and ill-developed or absent in herbivores.

Now answer the following questions:

(i) In frogs, all the teeth in the upper jaw look alike, whereas in human beings they are different. The type of dentition in man can be called _____.

(ii) The dental formula of a mammal is written as ICPM = 2023/1023. The teeth missing in it are _____.

- (a) incisors (b) canines (c) premolars (d) molars

Answer:

- (i) Heterodont
 (ii) Canines

14. Fill up the empty boxes with suitable answers with respect to the valves of a mammalian heart.

Valves	Location	Function
Bicuspid valve or Mitral valve		Prevents the backward flow of blood from left ventricle to left auricle
	At the right auricular ventricular aperture	Regulates the flow of blood from right auricle to right ventricle
Aortic valve	At the base of Aorta	
Semilunar valve		Regulates the flow of blood from right

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ventricle to pulmonary artery

Answer:

Valves	Location	Function
Bicuspid valve or Mitral valve	At the left auricle-ventricular aperture	Prevents the backward flow of blood from left ventricle to left article
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Aortic valve	At the base of Aorta	Regulates the flow of blood from the left ventricle into the aorta
Semilunar valve	At the base of the pulmonary artery.	Regulates the flow of blood from right ventricle to pulmonary artery

15. Any change in the lifestyle, the food habits and the body form of an organism in order to make it comfortable in the environment / habitat, is called adaptation. Identify the suitable given below against each mammal.

- (i) Conservation of body heat in large marine mammals like whale (Jaws are modified into baleen plates / Forelimbs are modified into flippers / Fat is deposited in subcutaneous tissue).
- (ii) Locating food source by bats-(Forelimbs are modified into wings / Hanging upside down using legs / Production of sounds and detection of the echo)

Answer:

(i) Fat is deposited in subcutaneous tissue

(ii) Production of sounds and detection of the echo.

16. The Master chemists of our body are the kidneys. Justify.

(i) Kidneys filter all chemicals in the body.

(ii) Kidneys maintain the chemical composition of blood.

(iii) Kidneys eliminate all chemicals absorbed by the body.

(iv) Kidneys store the chemicals accumulated in the body.

Answer: Kidneys maintain the chemical composition of blood.

Justification:

The principal excretory organs of human body are the kidneys.

Kidneys remove the metabolic waste products such as urea, uric acid, creatinine, etc from the body and thereby maintain water balance and levels of minerals.

17. The polar bears have thick skin coat and woolly fur, the ballen whales have ballen plates. Give reasons

(i) The polar bears have thick skin coats and woolly fur to bear the biting cold of the polar regions.

(ii) The jaws of the whales are modified into ballen plates to sieve the water and trap the minute planktonic

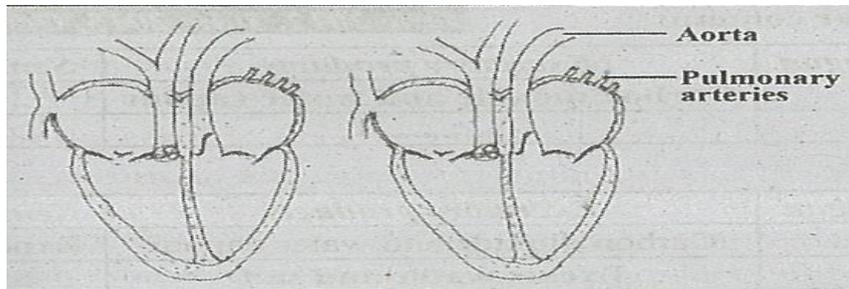
18. The diagram shows that internal structure of the human heart. Label the following parts.

(a) The blood vessel that carries blood to the lungs

Pulmonary artery carries deoxygenated blood into the two lungs.

(b) The blood vessel that carries blood to the different parts of the body.

Aorta carries the oxygenated blood to the different parts of the body.



Excretory organ	Excretory products	Sent out as
Lungs	Carbon dioxide and water vapour
Skin	Sweat

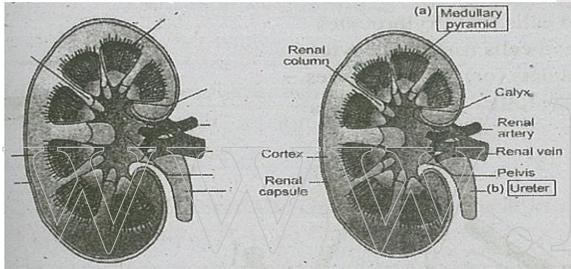
Answer:

Excretory organ	Excretory products	Sent out as
Lungs	Carbon dioxide and water vapour	Expired air
Skin	Excess water and salt	Sweat

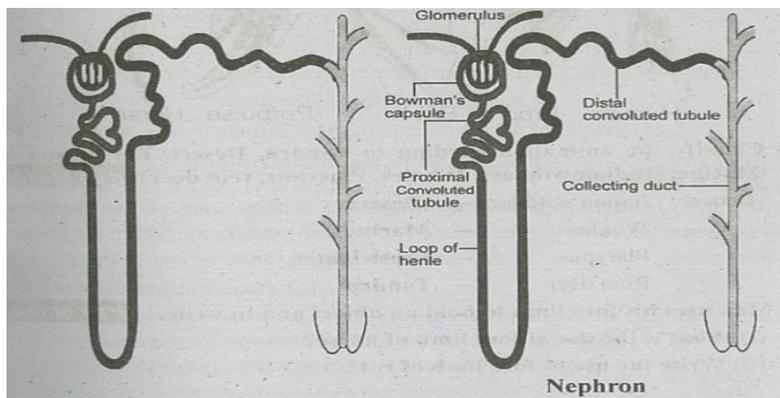
19. Draw the given diagram of L.S. of kidney and label the following parts:

(a) Medullary Pyramid.

(b) Ureter.



20. Copy the diagram and label and four parts with heading.



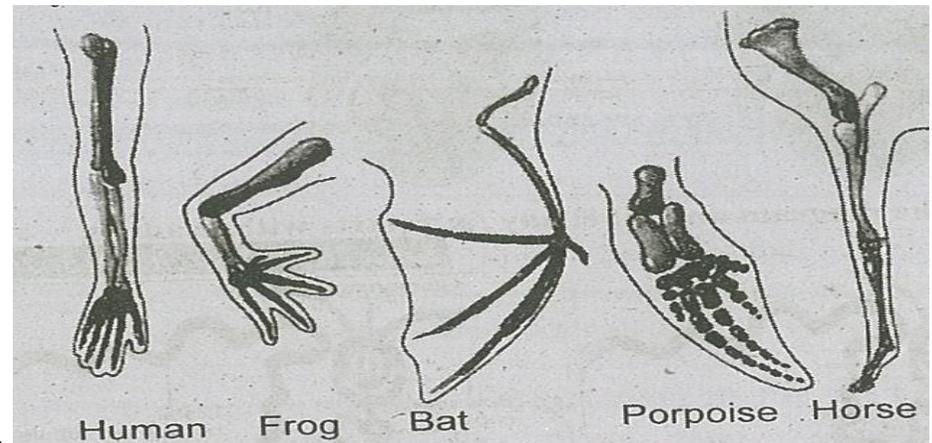
21. Fill the tabular column:

22. What are the four compositions of circulatory system of man?

The four main composition of blood are,

- (i) Plasma
- (ii) Red blood cells (or) Erythrocytes
- (iii) White blood cells (or) Leucocytes
- (iv) Blood platelets (or) Thrombocytes.

23. Identify the forelimbs of vertebrates:



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24. Classify the animals according to Tundra, Desert, Fresh water and Marine. (Indian wild ass, Whales, Platypus, rein deer)

Answer: Indian wild ass - Desert

Whales - Marine

Platypus - Fresh water

Rein deer - Tundra

25. Man uses his fore limb to hold an object and to write.

(i) What is the use of fore limb of horse?

(ii) Write the use of fore limb of rat?

Answer: i) A horse uses its fore limb to gallop.

ii) A rat or bandicoot uses its fore limb to make holes in the ground to live.

26. Spot the error in the given statement and correct it.

The closure of auriculo ventricular valve of the heart produce "dubb" sound, opening of such valve produce "lubb" sound.

Answer: The closure of auriculo ventricular valve of the heart produce "lubb" sound, opening of such valve produce "dubb" sound.

27. Fill up the blanks

(a) The heart beat of a normal human is ___ times in a minute.

(b) _____ are the only mammals capable of powered flight. (Bat, Kangaroo)

Answer:

(a) The heart beat of a normal human is 72 times in a minute.

(b) Bats are the only mammals capable of powered flight.

28. In order to transport substances from one part of the body to the other, the circulatory system has evolved.

(a) Who discovered the circulation of Blood in man?

Answer: William Harvey.

(b) How many chambers are there in the human heart?

Answer: Four chambers.

29. What is called Parental care?

Any investment of effort by the parent to take care of the young ones in order to increase the chance of survival of the offspring and hence increase the reproductive success is called parental care.

30. What is called sexual imprinting and courtship signals?

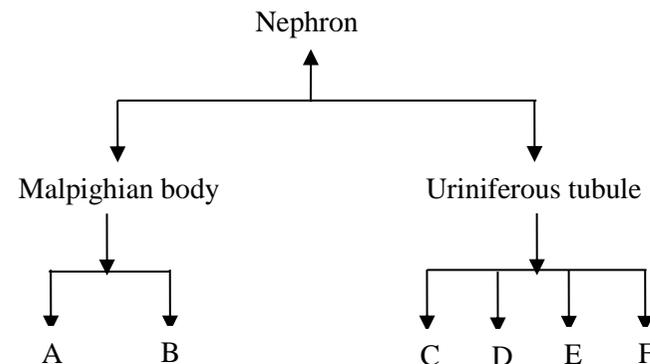
Sexual imprinting is a process in which an individual learns to direct its sexual behavior at a member of its own species. During the courtship, animals produce signals to communicate with potential mates and with other members of their own sex. A character exhibited by one sex to attract the other sex is called courtship signaling.

31. What is called cross fostering?

Answer: At times, we find the young one of a species raised by a parent of another species (e.g the chick of a cuckoo bird is fed by a crow in its nest). This behavioural pattern is called cross fostering.

PART – C

1. Observe the chart depicting the structure of a nephron.



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(i) Mention the structures A to F (ii) Explain the main function of a nephron.

Answer:

A–Glomerulus

B–Bowman's capsule

C–Proximal Convolved tubule

D-Loop of Henle

E-Distal Convolved Tubule

F-Collecting duct

(ii) Functions of nephron

- The glomerulus filters the plasma of the blood.
- The filtrate consisting of both nitrogenous wastes (urea, uric acid, creatinine etc.) and useful substances (glucose, amino acids, water, salts, etc) is collected by the Bowman's capsule.
- As the filtrate passes through the uriniferous tubule, the useful substances are reabsorbed into the blood capillaries which surround the tubule.
- Only the waste products like urea, unwanted salts and excess water which are left behind in the tubule becomes the urine.
- The urine is emptied into the collecting duct from where it reaches the ureter and then the urinary bladder. Once the bladder is filled, it is passed out through the urethra.
- Thus nephrons maintain the chemical composition of the blood.

2. What is adaptation? Mention the adaptations found in the following mammals.

Answer: Definition: Adaptation can be defined as the characteristics (structural, functional and behavioural) of an organism which make it fit to its environment or particular way of life.

Adaptations in the following animals

(a) Whales:

- In marine mammals like whales, dolphins, the limbs are modified into flippers which are used as oars to swim in water.
- The jaws of the whales are modified into baleen plates to sieve the water and trap minute planktonic organisms called krill

(b) Polar bears:

- They have thick skin and wooly fur so as to withstand cold weather in the polar regions.

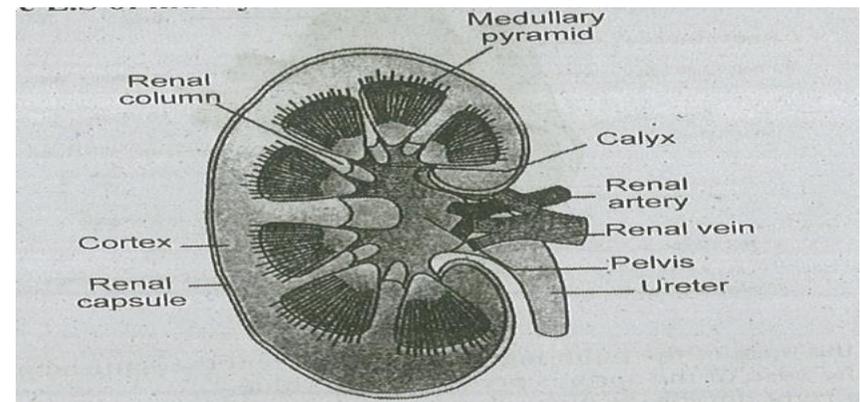
(c) Kangaroo:

- Marsupials, like Kangaroo, have developed abdominal pouches to bear young ones.

(d) Herbivorous mammals:

Herbivores eat only the cellulose – rich plants and in order to digest such food, they have developed a mutual partnership with bacteria that have cellulose – splitting enzymes (cellulose)

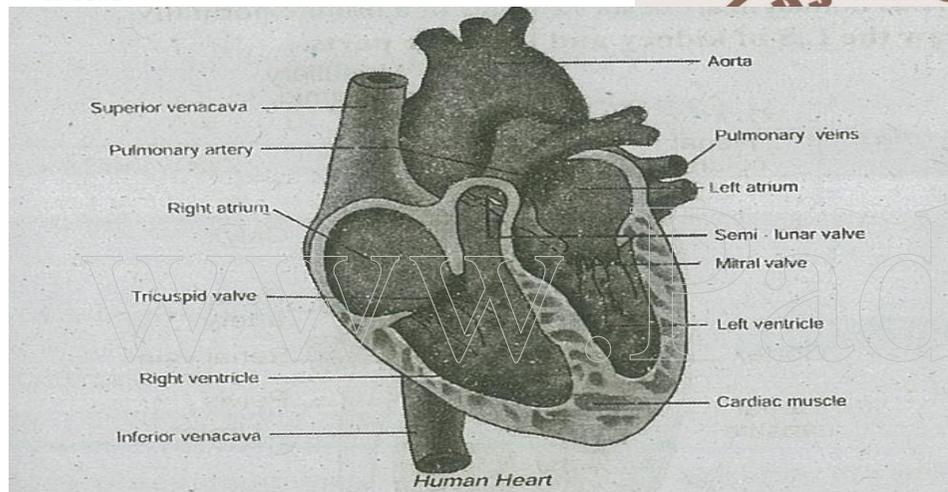
3. Draw the L.S of kidney and label the parts.



4. With a suitable diagram, describe the structure and functions of the human heart.

Structure of human heart:

- The human heart is a hollow fibrous organ made up of cardiac muscle. It is covered by a double walled Pericardium
- The partitions (septa) divide the heart into four chambers namely left auricle and left ventricle, right auricle and right ventricle.



- The tricuspid valve lies in the right auriculo – ventricular aperture and the bicuspid valve lies in the left auriculo – ventricular aperture.
- At the base of the pulmonary artery is present the semi-lunar valve and at the base of the aorta is present aortic valve.
- The right auricle receives deoxygenated blood from the body through superior and inferior venacavae.
- The right ventricle delivers the deoxygenated blood to lungs through pulmonary artery.

- The left auricle receives oxygenated blood from lungs through pulmonary veins.
- The left ventricle delivers oxygenated blood to all parts of the body through aorta.

Function of human heart.

- The contraction phase of the cardiac muscle is called systole and the relaxation phase is called diastole.
- While the right auricle is filled with deoxygenated blood and the left auricle is filled with oxygenated blood, they are in auricular diastole.
- When the auricles contract (auricular systole) the blood is pushed into ventricles through the tricuspid and bicuspid valves respectively leading to ventricular relaxation (Ventricular diastole)
- Then the ventricles push the blood into the aorta and the pulmonary artery respectively by their contraction (ventricular systole)

Heart beat:

- The closure of the valves of the heart produces two different sounds such as “lubb” and “dub”
- The closure of bicuspid and tricuspid valves causes “lubb” sound.
- The closure of semilunar valve causes “dubb” sound.
- Thus human heart beats 72 times in a minute normally.

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1. In monotropa the special type of root which absorbs nourishment is the _____

- (i) Haustoria (ii) Mycorrhizal root
(iii) Clinging root (iv) Adventitious root

Answer: (ii) Mycorrhizal root

2. The product obtained in the anaerobic respiration of yeast is

- (i) Lactic acid (ii) Pyruvic acid
(iii) Ethanol (iv) Acetic acid

Answer: (iii) Ethanol

3. The roots of a coconut tree are seen growing far from the plant. Such a kind of movement of root for want of water is _____.

- (i) Phototropism (ii) Geotropism
(iii) Chemotropism (iv) Hydrotropism

Answer: (iv) Hydrotropism

4. The xylem in the plants is responsible for _____.

- (i) Transport of water (ii) Transport of food
(iii) Transport of amino acids (iv) Transport of oxygen

Answer: (i) Transport of water

5. The autotrophic nutrition requires

- (i) CO₂ and water (ii) Chlorophyll II
(iii) Sunlight (iv) all the above

Answer: (iv) all the above

6. Leaf pores/stomata help in _____.

- (i) intake of CO₂ during photosynthesis
(ii) release of O₂ during photosynthesis

(iii) release of water vapour during transpiration

(iv) All of these

Answer: (iv) All of these

7. _____ of green plants are called factories of food production.

- (i) Mitochondria (ii) Chloroplasts
(iii) Endoplasmic reticulum (iv) Nucleus

Answer: (ii) Chloroplasts

8. The special root – like structure of plant parasites in cuscuta and viscum are called _____.

- (i) Rhizoids (ii) Haustoria
(iii) Hyphae (iv) Stolons

Answer: (ii) Haustoria

9. Pick out the odd one: The parts of the alimentary canal are

- (i) Pharynx (ii) mouth
(iii) buccal cavity (iv) pancreas

Answer: (iv) pancreas

Reason: Pancreas is an accessory digestive gland, where as others are parts of alimentary canal.

10. Mammal's main excretory product is

- (i) Ammonia (ii) Uric acid
(iii) Urea (iv) Sodium

Answer: (iii) Urea

11. The process in which metabolic wastes are removed is _____.

- (i) Conduction (ii) Excretion

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(iii) Respiration

(iv) all the these

Answer: (ii) Excretion

12. The pollentubes grow towards ovule. This is

(i) Phototropism

(ii) Chemotropism

(iii) Hydrotropism

(iv) Geotropism

Answer: (iii) Chemotropism

PART – B

1. Name the types of vascular tissues in the plant stem which are labelled as A and B

a) Name A and B

b) What are the materials transported through A?

c) What are the materials transported through B?

d) How do the materials in A move upwards to leaves?

Answer:

(a) 'A' is Xylem tissue. 'B' is Phloem tissue.

(b) Xylem transports water and minerals dissolved in it.

(c) Phloem transports soluble products of photosynthesis, aminoacids, sucrose and other materials.

(d) The materials in Xylem move upwards to leaves by root pressure and transpiration.

2. What is nutrition? What type of nutrition is seen in green plants and the majority of animals?

Answer: Nutrition: Nutrition is one of the life processes by which the organisms obtain their energy through consumption of food.

Types of Nutrition:

(i) Autotrophic Nutrition: Most of the plants can synthesize their own food materials by photosynthesis. Such a mode of nutrition is called autotrophic nutrition.

(ii) Heterotrophic Nutrition: Majority of the animals and a few plants (which lack chlorophyll) adopt heterotrophic mode of nutrition namely parasitic, saprophytic, symbiotic etc.

3. Match the methods of nutrition of special organs with suitable examples:

Autotrophs	Mycorrhiza	Cuscutta
Parasites	Chlorophyll II	Monotropa
Saprophytes	Haustoria	Hibiscus

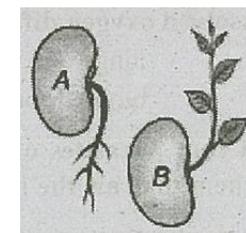
Answer:

Autotrophs	Chlorophyll II	Hibiscus
Parasites	Haustoria	Cuscutta
Saprophytes	Mycorrhiza	Monotropa

4. Observe the diagram:

(i) Mention the type of movements shown in figure A and B.

(ii) How does this movement differ from the movement of mimosa?



and

differ

Answer:

(i) A-Geotropism, B-Phototropism

(ii)

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S. No.	Movement of 'A' and 'B'	Movement of Mimosa
1.	Movement 'A' is geotropism in which the root of plant grows towards the direction of gravitational force and Movement 'B' is phototropism in which the stem of plant grows towards the direction of light.	The folding movement of leaves of Mimosa is a non-directional movement in response to touch (Thigmonasty).
2.	Geotropism and phototropism are growth dependent.	Movement of Mimosa is independent of growth
3.	These movements are slow responses of the plants to stimuli.	This movement is an immediate response to stimulus.

6. Sugar is converted into alcohol. In the above reaction what kind of process takes place? Which micro-organism is involved?

Answer:

- (i) Fermentation (Anaerobic respiration)
- (ii) Yeast.

7. In human beings, air enters into the body through _____ and moves into _____. In fishes, water enters into the body through _____ and the dissolved oxygen diffuses into _____.

Answer: Nostrils, lungs.
Mouth, blood through gills.

8. Give two examples of root parasites of plants. Mention the special structures present in them to draw the nutrients from the host plant.

Answer: Examples of parasitic plants are Cuscuta and Viscum.

Parasitic mode of nutrition.

These parasitic plants have some special roots called haustoria which penetrate the host plant and absorb food from the phloem and water and minerals from the xylem.

9. What are saprophytes? Give two examples.

Answer: Some organisms (which lack chlorophyll in them) obtain their nutrients from non-living organic matters. They are called saprophytes. Many Fungi and Bacteria are saprophytes.

5. In the process of anaerobic respiration, _____ is a 6 carbon compound which gets converted into _____ carbon compound called lactic acid.

Answer: In the process of anaerobic respiration, Glucose is a 6 carbon compound which gets converted into 3 – carbon compound called lactic acid.

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10. What is the length of the alimentary canal in human beings?

List out the parts of the gastro – intestinal tract in the correct sequential order based on the passage of food.

Answer:

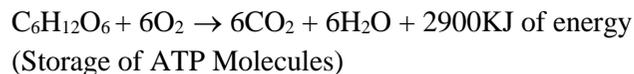
- The gastro-intestinal tract (alimentary canal) is a long muscular tube of about 9 metres in length.
- It starts from the mouth and ends in the anus. The mouth, buccal cavity, pharynx, oesophagus, stomach, small intestine, large intestine, rectum and anus are the parts of the alimentary canal.

11. What is respiration? Give a balanced equation for aerobic respiration.

Answer: Respiration is a life process of acquiring oxygen by breathing (in animals) and by diffusion (in plants & lower animals) following by utilization of its for oxidizing food materials into simple molecules with the release of energy.

The energy thus released is stored in ATP molecules.

The overall reaction of respiration



12. A fish taken out of water can not survive for a long time. Why?

- Fishes take in water through their mouth and force it through gills where the dissolved oxygen is taken up by the blood.
- If a fish is taken out of the water, it cannot survive because its gills are best suited to use only the dissolved

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oxygen in water but not atmospheric oxygen as terrestrial animals do.

13. What are ammonotelic and ureotelic animals? Give examples.

Answer: Ammonotelic animals: Animals which excrete ammonia as an excretory product are called ammonotelic organisms. e.g., fish tadpole.

Ureotelic animals: Animals which excrete urea as an excretory product are called ureotelic animals. e.g. Mammals.

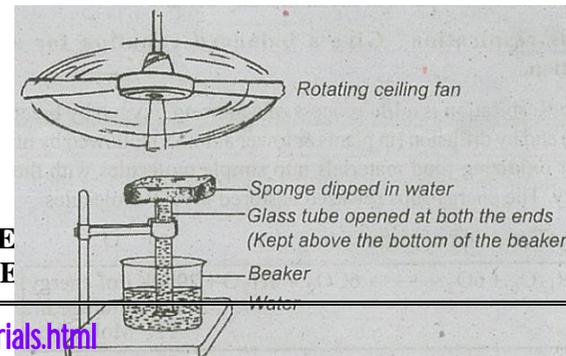
14. Describe the change that occurs in a touch-me-not plant when it is touched?

Answer:

- The folding effect of touch-me-not plant is caused by a change in the turgidity of the leaflets brought about by the movement of water into and out of the parenchymatous cells of the pulvinus (or) swollen leaf base.
- Though there is neither nervous tissue nor muscle tissue, all the leaflets fold in response to touch. As soon as the stimulus is communicated, the cells change the shape by changing the amount of water in them resulting in shrinking.

15. Study the following model with which the transpiration mechanism

in



plants can be demonstrated

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With which structure of the plant do the compare each of the following?

(i) Sponge (ii) Glass tube filled with water.

Answer: The structures depict the model of transpiration.

(i) Sponge – Leaf of the plant.

(ii) Glass tube filled with water – The xylem tissue of the stem.

16. Why should we eat?

All living organism ranging from minute bacteria to large elephants, plants and humans, require energy for growth, movement and reproduction. Since food contains a number of nutrients needed for supplying energy and for building up, new body tissues, repairing damaged tissues and sustained chemical reactions, we should eat food.

17. In coelenterates and sponges the excreta diffuse out through the _____.

In Annelids, special kidneys called _____ are evolved to collect excreta from the coelomic cavity.

(i) Cell membrane

(ii) Nephridia

18. Assertion (A): Green plants do not possess chloroplasts.

Reason (R): Chloroplasts do not carry out photosynthesis

(a) A is correct R is correct

(b) A is correct R is wrong

(c) A is wrong R is correct

(d) A is wrong R is wrong

Answer: (d) A is wrong R is wrong

19. Assertion (A): Chemotropism is the movement of plant parts towards the direction of chemicals.

Reason (R) The roots grow towards soil.

(1) A is correct R is not giving correct reasoning.

(2) A is correct R is wrong

(3) A is wrong R is wrong

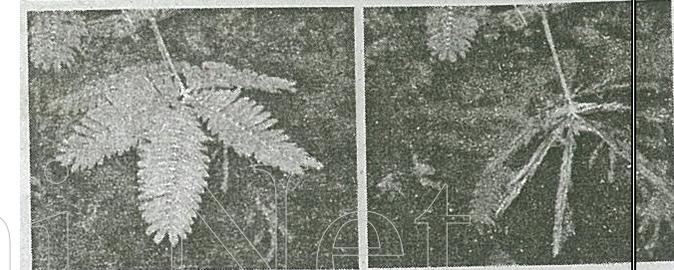
(4) A is relevant and R is correct.

Answer: (1) A is correct R is not giving correct reasoning.

20. Is the pressure created in xylem enough to conduct water in tall trees. Give reasons.

Answer: No. The root pressure created in Xylem is not enough to conduct water in tall trees.

Reason: Plants use another process called transpiration in which the evaporation of water molecules from the cells of leaves creates a suction which pulls water from the xylem cells of roots.



Sensitive Plant (Touch-me-not plant)

PART – C

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1. Describe the various movements of plants giving suitable examples.

Answer: Plants show two different types of movements.

- (i) Movements independent of growth
(Immediate response to stimulus)
- (ii) Movement dependent on growth
(slow response to stimulus)
- (i) Movement independent of growth

- The folding effect of touch-me-not plant is caused by a change in the turgidity of the leaflets brought about by the movement of water into and out of the parenchymatous cells of the pulvinus (or) swollen leaf base.
- Though there is neither nervous tissue nor muscle tissue, all the leaflets fold in response to touch. As soon as the stimulus is communicated, the cells change the shape by changing the amount of water in them resulting in shrinking.

- (ii) Movement dependent on growth

More commonly, plants respond to stimuli slowly by growing in a particular direction. Since this growth is directional, it appears as if the plant is moving.

Phototropism: Phototropism is the growth of the stem towards the direction of sunlight.

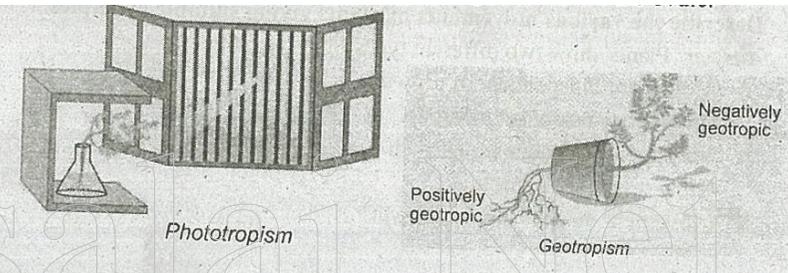
Geotropism: Geotropism is the growth of roots towards the direction of gravitational force.

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Roots cannot grow towards sunlight and stem cannot grow towards gravitational force.

Hydrotropism: The roots of very huge trees grow towards the availability of water source. e.g. The roots of the coconut tree are seen growing towards the water source.

Chemotropism: This is the movement of plant parts in the direction of chemicals. e.g. The pollen tubes grow towards the ovule.



2. Describe the various methods of excretion in animals.

Answer: Excretion in animals

- In unicellular protozoans, the excreta is discharged through the contractile vacuoles, which are formed by the absorption of water and other excreta.
- In coelenterates and sponges, the excreta diffuses out through the cell membrane.
- In flat worms and round worms, the excretory tubes develop, for transporting the excreta to the exterior.
- In annelids, special kidneys called nephridia are evolved to collect excreta from the coelomic cavity.
- In vertebrates, an elaborate well-defined excretory system has been developed with kidneys and excretory

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tubes. The kidney of vertebrates consists of nephrons which filter the blood and form the urine. Large amounts of ammonia is found in fish excreta. They are called ammonotelic animals. The birds are called uricotelic animals as their excretory substance is composed mostly of uric acids. In mammals, urea is the main excretory product. So they are called ureotelic animals.

Nephron

Each Nephron consists of a filtering apparatus called glomerulus and uriniferous tubules. The glomerulus filters the plasma part of the blood to form urine. The uriniferous tubules reabsorb the substances required in the body from that filtrate and the final urine product contains mostly water and nitrogenous waste products.

3. Compare the respiration in higher plants with the respiration in lower plants.

S. No.	Respiration in Higher Plants	Respiration in Lower Plants
1.	In higher plants, oxygen is utilized during respiration and it is known as Aerobic respiration.	In lower plants like yeast oxygen is not utilize, during respiration and it is known as Anaerobic respiration (or) fermentation.
2.	Aerobic respiration takes place in four stages: (1)	It takes places in two stages namely (1) Glycolysis and (2)

	Glycolysis, (2) Oxidative decarboxylation of pyruvic acid (3) Kreb's cycle, (4) Electron transport chain.	Alcoholic fermentation (or) lactic acid fermentation.
3.	Glucose molecule is completely oxidized in this.	Glucose molecules is not completely oxidized in this.
4.	At the end of respiration 38 ATP molecules are produced from each glucose molecule.	At the end of respiration only 2 ATP molecules are produced from each glucose molecule.
5.	Respiration takes place in cytoplasm and mitochondria.	Respiration takes place in cytoplasm only.

4. In the touch - me - not plant the leaves show movements. What type of movement have you observed? Discuss.

Answer:

Movement - independent of growth:

Immediate Response to Stimulus: This movement is sensitive to plants. Here, no growth is involved but the plant actually moves its leaves in response to touch. Yet there is neither nervous tissues nor muscle tissues involved. If we touch the touch-me-not plant at one point, all the leaflets

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show the folding movement. This indicates that the stimulus at one point is communicated. Unlike in animals, there is no specialized tissue in plants for transmitting the information. The folding effect of touch-me-not plant is caused by a change in the turgidity of the leaflets brought about by the movement of water into and out of the parenchymatous cells of the pulvinus or swollen leaf base.

5. Differentiate extra - cellular digestion from intra - cellular digestion. Which one is an advanced form?

S. No.	Intracellular digestion	Extra cellular digestion
1.	The mode of digestion in which the food is directly taken into the cell and is digested within the cell is called intracellular digestion.	The mode of digestion in which the food is digested outside the cell i.e. in the space or lumen of the alimentary canal is called extracellular digestion.
2.	It take place in unicellular animal cules like Amoeba, paramecium and in lower animals like sponges and colentrates.	It takes place in higher animals and human beings.
3.	It is a primitive form	It is an advanced form

	of digestion.	of digestion.
4.	It does not require an organized digestive system (Though an alimentary canal like structure is seen in sponges and coelenterates, digestion is intracellular).	It requires a well organized digestive system in which complex food is broken down into simple food molecules by the action of enzymes of the digestive glands.
5.	Amoeba produce pseudopodia to engulf the microorganisms (diatom) and paramecium swallow food by cytopharynx and digestion takes place inside the cell.	In higher animals and human beings, the food enters into the alimentary canal which consists of mouth, stomach, small intestine, large intestine, rectum, anus and digestive glands.

6. Differentiate aerobic respiration from anaerobic respiration. Mention the event that is common to both.

(i)

S. No.	Aerobic respiration	Anaerobic respiration
1.	In higher plants, oxygen is utilized during respiration	In lower plants like yeast oxygen is not utilized, during

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	and it is known as Aerobic respiration.	respiration and it is known as Anaerobic respiration (or) fermentation.
2.	Aerobic respiration takes place in four stages: (1) Glycolysis, (2) Oxidative decarboxylation of pyruvic acid (3) Krebs' cycle, (4) Electron transport chain.	It takes place in two stages namely (1) Glycolysis and (2) Alcoholic fermentation (or) lactic acid fermentation.
3.	Glucose molecule is completely oxidized in this.	Glucose molecules is not completely oxidised in this.
4.	At the end of respiration 38 ATP molecules are produced from each glucose molecule.	At the end of respiration only 2 ATP molecules are produced from each glucose molecule.
5.	Respiration takes place in cytoplasm and mitochondria.	Respiration takes place in cytoplasm only.

split into 2 molecules of pyruvic acid by a series of enzymatic reactions in cytoplasm.

7. Observe the given model that can be used to demonstrate the breathing mechanism in human beings.

Name the structures which can be compared to:

- (i) Lungs (ii) Diaphragm
(iii) Trachea (iv) Nostrils (Nose)

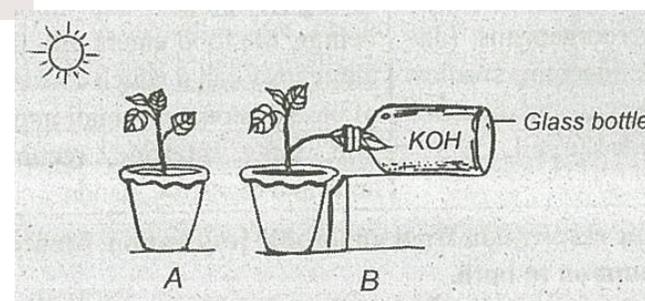
Answer:

The structure which can be compared model of respiratory system

- (i) Lungs – Balloons attached at the shaped tube.
(ii) Diaphragm – The membraneous tied at the base of the jar.
(iii) Trachea – The tube inserted into the jar.
(iv) Nostrils – The end of the tube which opens exterior.



8. Observe the following figures:



Both the plants 'A' and 'B'

were kept in sunlight after watering. The part of the leaf of plant 'B' which was inserted in the glass bottle containing KOH (Potassium hydroxide) did not turn blue in the iodine

- (ii) The event that is common for both Aerobic and Anaerobic Respiration is Glycolysis by which the glucose molecule is

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test/starch test, indicating the absence of starch. The part of the leaf outside the bottle turns blue in the said test. Photosynthesis didn't occur in that part of the leaf due to the non-availability of _____.

- (a) Sunlight (b) Chlorophyll II (c) CO₂ (d) Water

Answer: (c) CO₂ (Carbon-di-oxide)

(i) List out the factors which are available to the part of the leaf outside the bottle.

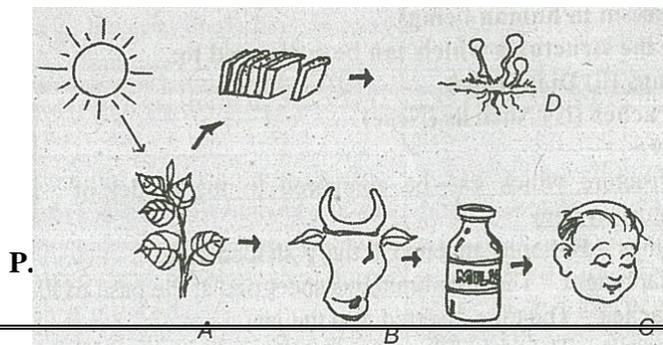
Answer: The factors available to the exposed parts of the leaf are

- (i) Sunlight (ii) Water (iii) CO₂ and (iv) Chlorophyll II

9. Look at the illustration depicting the food chain.

(a) The correct explanation of the organism is:

	A	B	C	D
(a)	Saprophyte	Heterotrophs	Autotrophs	Heterotrophs
(b)	Heterotrophs	Autotrophs	Saprophyte	Saprophyte
(c)	Autotrophs	Saprophyte	Autotrophs	Heterotrophs
(d)	Autotrophs	Heterotrophs	Heterotrophs	Saprophyte



(b) Why is 'A' called an autotroph?

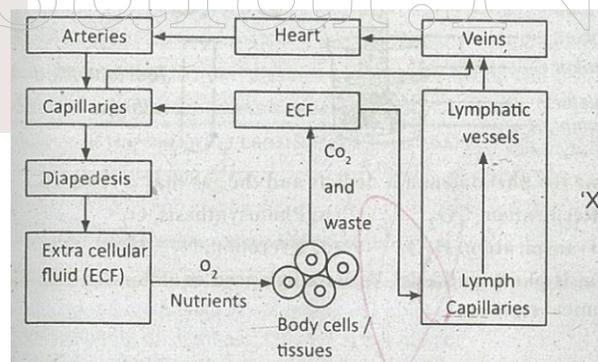
Answer:

(a) A – Autotroph, B – Heterotroph, C – Heterotroph, D – Saprophyte

(b) 'A' refers to green plant in the figure.

It is called as autotroph because it is capable of synthesizing its own food materials by the process of photosynthesis. The chlorophyll II molecules of the leaves trap the solar energy and convert it into stored form (food) of energy using the raw materials CO₂ and water and minerals dissolved in it.

10. Observe the following flow – chart:



(a) What is 'X' in this figure denote?

(b) In what way is it different from blood?

Answer:

(a) 'X' denotes lymphatic system.

S.	Blood	Lymph
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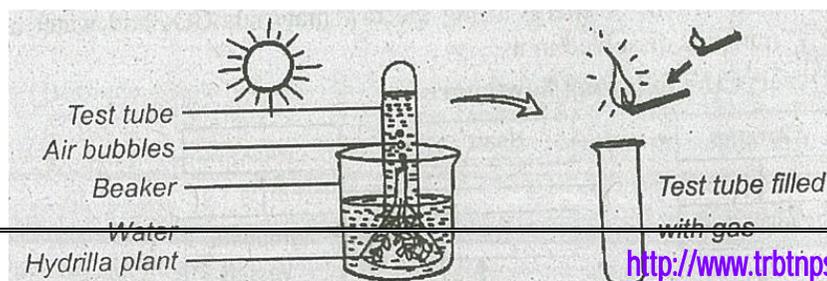
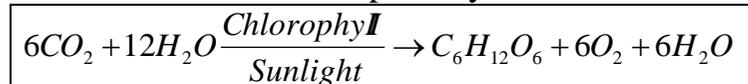
No.		
1.	Blood is red in colour due to the presence haemoglobin in erythrocytes.	Lymph is colourless as haemoglobin is absent.
2.	It consists of plasma, erythrocytes, leucocytes and platelets.	It consists of plasma and lymphocytes.
3.	Its plasma has more protein, calcium and phosphorus.	Its plasma has fewer proteins and less calcium and phosphorus.
4.	Blood is transported through blood vessels and blood capillaries.	Lymph is transported through lymph vessels and lymphatic capillaries.
5.	Blood transports respiratory gases (O ₂ and CO ₂) and nitrogenous wastes, nutrients hormones etc.	Lymph carries digested and absorbed fat from the intestines and drains the excess fluid in extra cellular spaces back into the blood.

11. Observe the following experiment:

- (i) Name the phenomenon it depicts and the gas that is released.
 (a) Respiration, CO₂ (b) Photosynthesis, O₂
 (c) Transpiration, H₂O (d) Excretion, N₂
- (ii) What is photosynthesis? Write a balanced equation for this bio-chemical reaction.

Answer:

- (i) (b) Photosynthesis, O₂
 (ii) Green plants are capable of synthesizing their own food materials by the process of photosynthesis. The chlorophyll molecules of the leaves trap the solar energy and convert it into stored form (food) of energy using the raw materials CO₂ and water and minerals dissolved in it. The overall reaction of photosynthesis.



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LESSON 7. CONSERVATION OF ENVIRONMENT

CLASS:X

1. Which of the following groups contain only bio-degradable items?

- (i) Grass, flowers and leaves (ii) Grass, wood and plastic
(iii) Fruit peels, cake and plastic (iv) Cake, wood and glass

Answer: (i) Grass, flowers and leaves

2. Which of the following constitutes a food chain

- (i) Grass, Wheat and Mango, (ii) Grass, goat and Human,
(iii) Goat, cow and elephant, (iv) Grass, fish and goat,

Answer: (ii) Grass, goat and Human

3. Which of the following are environmental friendly practices?

- (i) Carrying cloth bags for shopping
(ii) Switching off light and fans when not in use
(iii) Using public transport (iv) All the above

Answer: (iv) All the above

4. What is called as 'black gold'?

- (i) Hydrocarbons (ii) Coal (iii) Petroleum
(iv) Ether

Answer: (iii) Petroleum

5. Based on the food chain, pick the odd one out:

plants → grasshopper → frog → tiger → snake

Answer: tiger

6. Example for product of green chemistry is:

- i) plastic (ii) paper (iii) bioplastics (iv) halogen flame retardents

Answer: (iii) bioplastics

7. _____ is a green house gas which causes climate change and global warming.

- (i) Hydrogen, (ii) Oxygen, (iii) Nitrogen, (iv) Carbon di oxide

Answer: (iv) Carbon di oxide

8. The _____ form decomposers in the pond ecosystem.

- (i) plants (ii) bacteria (iii) frog (iv) phytoplanktons

Answer: (ii) bacteria

9. _____ is used in seeding colds.

- (i) Potassium iodide (ii) Calcium carbonate
(iii) Sulphur di oxide (iv) Ammonium phosphate

Answer: (i) Potassium iodide

10. An example for fossil fuel is:

- (i) Copper (ii) Iron (iii) Magnesium (iv) Coal

Answer: (iv) Coal

11. Air pollution is caused by transport exhaust fumes and emission of gases like SO₂, CO₂, NO₂ from industries. Similarly, water pollution is caused by _____.

- (i) sewage (ii) crop cultivation (iii) rain (iv) soil erosion

Answer: (i) sewage

12. If wild animals are killed, what difficulty would we face?

- (i) imbalance in nature (ii) decrease in fog rain
(iii) decrease in population (iv) increase in rain

Answer: (i) imbalance in nature

13. Water is an essential commodity for survival. What can we do to help increase water resources?

- (i) deforestation (ii) reducing the use of vehicles
(iii) the burning of the wastage (iv) afforestation

14. The tiger and the lion are carnivores. Likewise the elephant and the bison are _____. Answer: Herbivores.

15. Assertion (A): Coal and petroleum are called fossil fuels.

Reason (R): Fossil fuels are formed from the remains of dead organisms after millions of years.

- (i) Both 'A' and 'R' are true and 'R' explains 'A'.
(ii) Both 'A' and 'R' are true and but 'R' doesn't explain 'A'
(iii) Only 'A' is true but 'R' is false.
(iv) 'A' is false but 'R' is true.

Answer: (i) Both 'A' and 'R' are true and 'R' explains 'A'.

16. Compressed Natural Gas (CNG) is considered a better fuel than coal/petroleum, because _____.



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LESSON 7. CONSERVATION OF ENVIRONMENT

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Answer: CNG does not pollute the environment as it does not release harmful gases such as CO, SO₂, NO₂ etc. on burning

17. Now-a-days water bottles and lunch boxes are made from agricultural products like fruit pulp. These are called _____.

Answer: Products produced by Green Chemistry (e.g. Bioplastics)

18. _____ is the chief component of coal.

(Sulphur, Carbon, Hydrogen, Nitrogen)

Answer: Carbon

19. Which of the following are non-biodegradable?

(Aluminium cans, Hay, Dry twigs, Animal dung, Plastic waste)

Answer: Aluminium cans and Plastic waste are non-biodegradable.

PART – B

1. Classify the following into producers, consumers, decomposers.

(i) butterfly (ii) grass hopper (iii) calottes
(iv) snakes (v) shoe flower (vi) nitrobacteria

Answer:

Producers	Consumers	Decomposers
Shoe flower	<u>Primary consumer</u> Butterfly, Grass hopper <u>Secondary Consumer</u> Calottes <u>Tertiary Consumer</u> Snakes	Nitrobacteria

2. Living organisms adapt themselves according to their habitat.

Match the following:

a.	Fish	Wings
----	------	-------

b.	Came l	Hard skin
c.	Frog	Fins
d.	Birds	Hind limbs with web

Answer:

S. No.	Organisms	Adaptations
a.	Fish	Wings
b.	Camel	Hard skin
c.	Frog	Fins
d.	Birds	Hind limbs with web

3. Fill in the blanks

(i) Animals give out _____ through _____ respiration.

(ii) In the presence of sunlight, plants prepare _____.

Answer:

(i) Carbondioxide (CO₂)

(ii) Food Materials (Carbohydrates e.g. Starch)

4. Bacteria and fungi are responsible for the decay of dead plants and animals. Decaying matter is recycled to grow plants. What do we call this?

Answer: The chemical elements like Carbon, Nitrogen, Oxygen, Phosphorous, Sulphur etc are absorbed by the plants from the nutrient pool (Soil, air and water) and then they are transferred to animals. But, they are restored to the original nutrient pool by the decomposition of dead and decaying matter by bacteria and fungi. Thus, the circulation of chemical elements through biological and geological components of an ecosystem is known as Biogeo chemical cycle.

5. Fill in the blanks with suitable answers from those given in the brackets. (harmful, heavy metals, carbon dioxide, sulphur particles)

Generation of waste products which contain Mercury, Uranium, Thorium, Arsenic, and other _____ are _____ to human health

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LESSON 7. CONSERVATION OF ENVIRONMENT

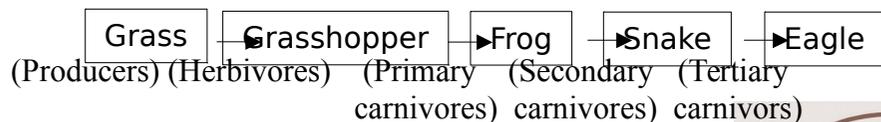
CLASS:X

and environment. _____ present in the coal will cause acid rain and the release of _____, a green house gas, causes climate change and global warming.

Answer: Heavy metals, harmful, sulphur particles, carbon-di-oxide.

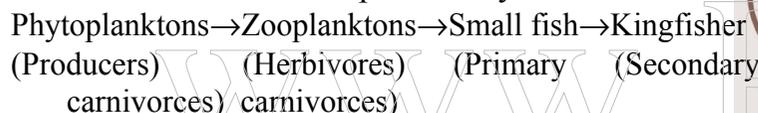
6. Depict a food chain by placing the following organisms in the correct trophic levels: (snake, grass, eagle, frog, grasshopper)

Answer: Food chain in a grassland ecosystem

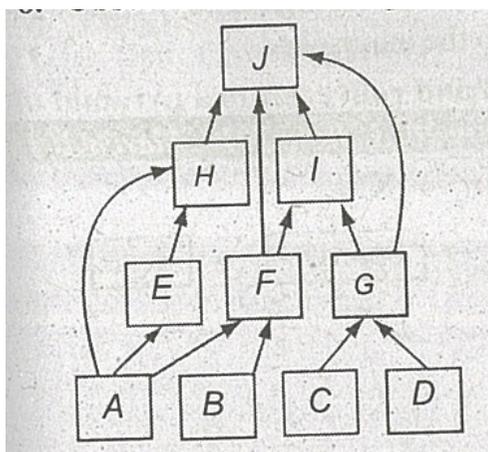


7. Show an aquatic food chain using the following organisms (Small fish, Phytoplanktons, Kingfisher, Zooplanktons)

Answer: Food chain in a pond ecosystem



8. Observe the following food web:



(i) Find out the wrong statement:

- (a) 'A' is a producer
 - (b) 'F' is a herbivore
 - (c) 'H' is an omnivore
 - (d) 'I' is a climax carnivore
- (ii) Find out how many food chains are present in the above food web.

Answer:

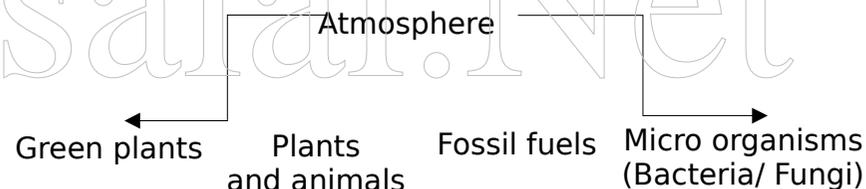
(i) 'I' is a climax carnivore - False

Correct statement: 'J' is the climax carnivore.

(ii) There are 10 food chains as mentioned below:

1. A → H → J
2. A → E → H → J
3. A → F → J
4. A → F → I → J
5. B → F → J
6. B → F → I → J
7. C → G → I → J
8. C → G → J
9. D → G → I → J
10. D → G → J

9. Observe the following Bio-geo chemical cycle.



(i) Mention the nutrient in the given cycle.

(ii) Write the activities from 'A' to 'D'.

Answer:

- (i) Carbon in the form of carbon dioxide.
- (ii) (A) Green plants fix the atmospheric CO₂ into food materials (Starch) by Photosynthesis.
- (B) Plants and animals release CO₂ into the atmosphere by Respiration.
- (C) During Combustion of fossil fuels, CO₂ is released into the atmosphere.

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SCIENCE

LESSON 7. CONSERVATION OF ENVIRONMENT

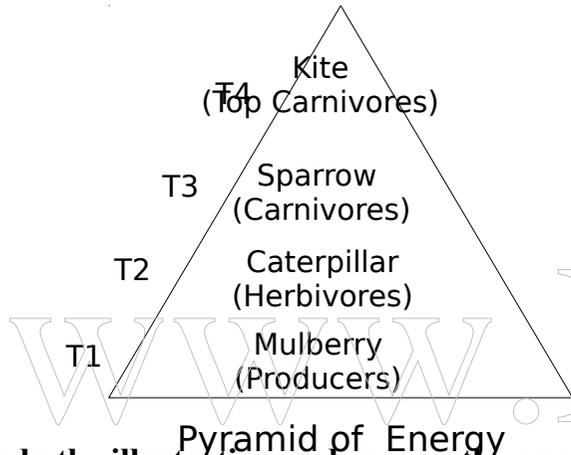
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(D) During Decomposition of dead and decaying matter by Bacteria and Fungi, CO₂ is released into the atmosphere.

10. Study the food chain below. Correct it and convert into a pyramid of energy. Mulberry → Sparrow → Caterpillar → Kite.

Answer:

Mulberry Caterpillar Sparrow Kite

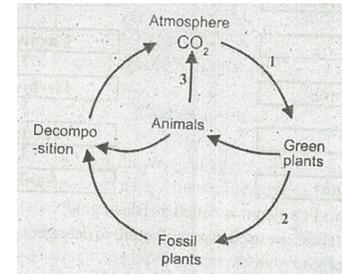


Reason: In an ecosystem, the flow of energy from one trophic level to next level is in a linear fashion and also it is unidirectional.

(ii) Bacteria and Fungi.

12. (i) Name the processes noted as No, 1 and 3.

(ii) Define process 1.



(i) Name the processes noted as No.1 and 3.

No.1 – Photosynthesis.

No.3 - Respiration

(ii) Define the process 1.

Photosynthesis is a process by which autotrophic plants prepare their food (starch) using CO₂ and H₂O in the presence of sunlight and chlorophyll II.

13. What will happen if all the grass is removed from the grass land eco system?

An ecosystem maintains the balance between the number of resources and the number of users. Disturbing any one factor could have a drastic impact upon the living conditions of other organisms that will result in an imbalance. So, if all the grass is removed from the grass land ecosystem there will be no food for herbivores which depend on grass and in turn carnivores will not be able to exist.

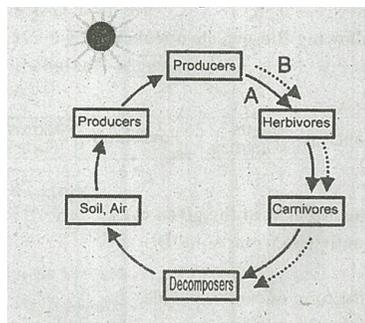
14. Name the plants which are used in the production of bio-plastic. Bio plastics made from plants including corn, potatoes, or other agricultural products.

15. Pick the odd one out:

(a) Plant, grasshopper, frog, tiger, snake.

11. Study the illustration and answer the questions:

(i) Which line (A or B) represents the flow of energy? Why do you say so? (ii) Give an example of a decomposer.



Answer:

(i) 'Line B' represents the flow of energy.

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Answer: Tiger

(b) **Anaimalai, Point Calimere, Vedanthangal, Mundanthurai**

Answer: Vedanthangal is exclusively a bird sanctuary.

16. **Complete the flow of energy is an Ecosystem.**

Answer:

Top carnivores

Top carnivores

Carnivores

Herbivores

Herbivores

Producer

Sunlight

Sunlight

17. **A. Assertion: Petroleum is called as Black gold.**

R. Reason: These are used in manufacture of detergents, fibres, polythene and other plastic substances.

a) A is correct, R is wrong b) A is correct, R is correct

c) A is wrong, R is correct d) A is wrong, R is wrong

Answer: (b) A is correct, R is correct

18. **a) Which one of the following is an autotroph. (Plants, Cat, Lion, Fish)** Answer: Plants

b) What are autotrophs?

Most of green plants are self-dependent, because they synthesize their own food materials by photosynthesis. Such mode of nutrition is described as autotrophic nutrition.

19. **Imagine reproduction will not happen in human for fifty years. Interpret your answer in one or two sentences.**

An ecosystem maintains the balance between the number of resources and the number of users. Therefore, there will be a great imbalance in the biosphere and there will be a great imbalance in the biosphere and there

will be a drastic decline in human population that may lead to even extinction in course of times if the situation does not become normal.

20. **Study the food chain.**

Paddy Mouse Snake Kite

If the PRODUCER HAS A STORED UP ENERGY OF 500 K CAL. How much of it goes to the organism at the third trophic level get from it?

Answer: Since the flow of energy in a food chain follows the 10% law, the third trophic level will get 5 K Cal of energy.

Paddy	Mouse	Suake	Kite
1 st trophic level	2 nd trophic level	3 rd trophic level	4 th trophic level
500 k.cal	50 k.cal	5 k.cal	0.5 k.cal

1st trophic level (producers) has a stored energy of 500 k.cal

1st trophic level (mouse) gets 10% of 500k.cal $= \frac{10}{100} \times 500 = 50 \text{ k.cal}$

3rd trophic level (snake) gets 10% of 50 k.cal $= \frac{10}{100} \times 50 = 5 \text{ k.cal}$

Extra Questions

21. **Define pollution.**

Any undesirable change in the physical, chemical or biological characteristics of air, land and water that affect human life adversely is called pollution.

22. **Define pollution.**

A substance released into the environment due to natural or human activity which affects adversely the environment is called pollutant. e.g. Sulphur-di-oxide, carbon-monoxide, lead, mercury, etc.

23. **Why is petroleum called as 'Black Gold'?**

Many useful substances such as detergents fibers (polyester, nylon, acrylic) polythene, plastic etc are manufactured from petroleum.

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Hydrogen gas (obtained from natural gas) is used in production of fertilizers. Due to its great commercial importance, petroleum is called as 'Black Gold'.

PART – C

1. Classify the following substances:

a) Wood, paper, plastic and grasses.

Bio-degradable: Wood, paper, grasses. Non bio-degradable: plastic.

b) Give detailed account on your classification, Classification of Wastes

	Bio-degradable waster	Non-bio- degradable waster
1.	Substances that are broken down by biological process (or) microbial action are called bio-degradable waste. e.g. wood, paper and leather. e.g. grass, flowers and leaves.	Substances that are not broken down by biological or microbial action are called non-bio-degradable waste. e.g. plastic substances and mineral wastes.
2.	They are broken down into harmless substances in nature in due course of time.	They can not be broken down into harmless substances in nature.
3.	Nutrients like carbon, hydrogen, oxygen, nitrogen, etc present in these wastes are returned to the nutrient pool.	Nutrients present in these wastes are not returned to the nutrient pool.
4.	Bio degradable wastes maintain ecological balance.	Non-biogradable wastes cause ecological imbalance.

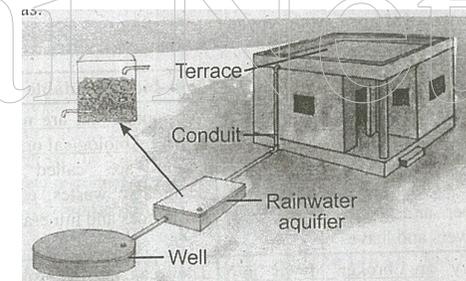
2. In your locality people are affected due to water scarcity. What measures will you take to deal with the problem of water scarcity?

(i). **Domestic conservation:** As an individual, every one can reduce the for lawns, home gardens, vehicle washing and using water conserving appliances.

(ii) **Desalination: (Reverse osmosis)** Desalination of ocean water is a technology that has great potential for increasing fresh water. Desalination is more expensive than most other sources of fresh water. In desalination, the common methods of evaporation and recondensation are involved.

(iii) **Dams, reservoirs and canals:** Dams and storage reservoirs tap runoff water in them and transfer the water from of excess to areas of deficit using canals and underground pipes.

(iv) **Rain water harvesting:** Rain water harvesting essentially means collecting rain from the roof of building or courtyards and storing it under ground for later use. The main idea in harvesting rain water is to check the run-off water. It is not only simple but also economically beneficial. It helps in meeting the increased demand for water, particularly in urban areas and prevent flooding of living areas.



(v) **Wetland**

conservation: It preserves natural water storage and acts as aquifer recharge zones.

3. We are surrounded by smoke. Is this situation good for our health. Give reason.

Answer: No. The smoke surrounded situation is not good for our health.

Reason: Burning of fuels like wood, cow-dung cake, coal and kerosene at home produces a lot of smoke. Exhaust gases from the motor vehicles and Industrial emission are the other sources of smoke.

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Ill-effects of smoke on human health

- (1) Smoke containing carbon monoxide (CO) can cause headache, tiredness, nausea, chest pain and even death due to oxygen starvation because CO has higher affinity to haemoglobin than O₂.
- (2) Smoke containing SO₂ and NO₂ gases can cause irritation of eyes, nose, throat and also aggravates asthma, bronchitis, lung cancer etc.
- (3) Smoke which contains soot particles and fly ash cause irritation of eyes and blurred vision.
- (4) Lead compounds released in smoke cause anaemia, convulsions, nervous and kidney problems etc.
- (5) Cigarette smoking releases smoke containing CO and Nicotine which are very harmful to even the passive inhalers around a smoker.

4. List out the harmful effects of burning coal.

Environmental effects of burning:

- (i) Generation of waste products which contain mercury, uranium, thorium, arsenic and other heavy metals, which are harmful to human health and environment.
- (ii) Sulphur particles present in the coal will cause acid rain.
- (iii) Interference with ground water and water table levels.
- (vi) Contamination of land and water bodies.
- (v) Dust pollution.
- (vi) Release of CO₂, a green house gas, which causes climate change and global warming.
- (vii) Coal is the largest contribution to the man-made increases of CO₂ in the air.

5. (a) What is global village?

- (i) A term that compares the world to a small village, where fast and modern communication allows news to reach quickly. The use of electronics for faster communication is a global village concept.

The term global village was coined by Marshall McLuhan.

(b) What is the use of global village?

- (i) Global village forces us to become more involved with people from countries around the world and be more aware of our global responsibilities.
- (ii) Web-connected computers enable people to link their web sites together. This reality has implication for forming new sociological structure within the context of culture.

(c) What are the technologies used in global village?

Global Electronic Village (GEV: Global electronic village is a term used to a village without without borders. It refers to connection people around the world technologically through Information Communication Iechnologies (ICTS).

Kshema Technologies have the distinction of being the first of GTV's companies to move into the campus of GV located 12 kms from Bangalore in the Bangaloor – Mysore Expressway.

6. (a) What is green chemistry?

Green chemistry is the design of chemical products and processes to reduce or eliminate the use and generation of hazardous substances. The concept of green chemistry was introduced in 1995.

(b) Write any tow principles of green chemistry.

- (i) It is better to prevent waste generation than to treat or clean up waste after it is generated.
- (ii) Wherever practicable, synthetic methodologies should be designed to use and generate substances that posses little or no toxicity to human health and the environment.
- (iii) Chemical products should be designed to preserve efficacy of function while reducing toxicity.

(c) Mention some of products produced by the process of green chemistry.

- (i) Lead free solders and other product alternatives to lead additives in paints and the development of cleaner batteries.

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(ii) Bio-plastics: Plastics made from plants including corn, potatoes or other agricultural products.

(iii) Flame resistant materials.

(iv) Halogen free flame retardants. e.g. silicon based materials can be used.

(d) New production methods:

(i) Greener reaction conditions for an old synthesis e.g. replacement of an organic solvent with water or the use of no solvent at all.

(ii) A greener synthesis for an old chemical (e.g. a synthesis which uses biomass rather than petrochemical feed stock or the use of catalytic rather than stoichiometric reagents.

(iii) The synthesis of a new compound that is less toxic but has the same desirable properties as an existing compound. (e.g. a new pesticide that is toxic only to target organisms and bio-degrades to environmentally benign substances)

7. (a) Write the methods adopted for the disposal of harmful waste.

(b) Explain the method of management of non-hazardous wastes- solid waste management.

Answer: (a) Disposal of harmful waste

(i) Land Fills: There are permanent storage facilities in secured lands for military related liquid and radioactive waste materials. High level radioactive wastes are stored in deep underground storage.

(ii) Deep well injection: It involves drilling a well into dry porous material below ground water. Hazardous waste liquids are pumped into the well. They are soaked into the porous material and made to remain isolated indefinitely.

(iii) Incineration: The burning of materials is called incineration. Hazardous bio-medical wastes are usually disposed off by means of incineration. Human anatomical wastes, microbiological and biotechnological waste etc., are called bio-medical wastes.

(b) Solid waste management (or) Management of non-hazardous waste

(i) **Reuse and recycling technique:** The separating out of materials such as rubber, glass, paper and scrap metal from refuse and reprocessing then for reuse is named as reclamation of waste or recycling.

(ii) **Paper:** (54% recovery) Can be repulped and reprocessed into recycled paper, cardboard and other products.

(iii) **Glass:** (20% recovery) Can be crushed, remelted and made into new containers or crushed used as a substitute for gravel or sand in construction materials such as concrete and asphalt, Food waste and yard waste (leaves, grass etc.) can be composted to produce humus soil conditioner.

8. Write about any five sanctuaries in Tamil nadu.

Sl. No.	Name	Location	Animals
1	Indira Gandhi Wildlife Sanctuary	Western Ghats.	Tiger, leopard, porcupine, nilgiris tahr, civet cat elephant, gaur, pangolin.
2	Kalakkadu Wildlife Sanctuary	Tirunelveli District.	Lion tailed macaque, sambar, sloth bear, gaur, flying squirrel.
3	Vedathangal Bird's Sanctuary	Kancheepuram District.	Cormorants, egrets, grey heron, open-billed stork, white bears shovellers, pintails, stets sandpipers.
4	Mudumalai Wildlife Sanctuary	The Nilgiris	Elephants, gaur, langur, tigers, leopards, sloth bear, sambhar, wildbear, jackal, porcupine, mangoose.
5	Gulf of Mannar marine National park.	Coast of Ramnad and Tuticorin district.	Coral reefs, dugong, turtles, dolphins, balanoglossus.

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9. Write about any five important national parks, wildlife sanctuaries are reserves. 3. Compressed natural gas used by natural gas vehicles

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Bandhipur National Park (If is a tiger reserve too)	Karnataka	Indian bison, chital, sloth bear, elephants
Corbett National park (India's first national park) (Tiger reserve too)	Uttaranchal	Tigers, chital, elephants, leopard, Jungle cat and sloth bear.
Gir National Park	Gujarat	Asiatic Lion
Kanha National park (Tiger reserve)	Madhya Pradesh	Deer Tiger, Wilddog, chital.
Manas wildlife sanctuary (Tiger reserve)	Assam	Hispid hare (rare), pygmy hog, golden langue, One horned Rhinocerus.
Sunderbans National Park (Tiger reserve)	West Bengal	Unique Royal Bengal Tigers.

10. (a) Write the environmental effects of oil spills and Tar Balls.

(b) What are the alternatives to petroleum based vehicle fuels.

Answer:

(a) Oil Spills

1. Crude oil (refined fuel) spills from tanker ship and accidents have damaged natural ecosystem.
2. Oil Spills at sea are generally causing more damage than those on land. This can kill sea birds, mammals, shellfish and other organisms, because of their lateral spreading on water surface.

Tar Balls

A tar ball is a blob of oil which has been weathered after floating on the ocean. Tar balls are aquatic pollutants in most of the seas.

(b) Alternatives to petroleum – based vehicle fuels.

1. Internal combustion engines (Biofuel or combustion by drogen)
2. Electricity (for e.g. all electric (or) hybrid vehicles), Compressed air or fuel cells (hydrogen fuel cells).

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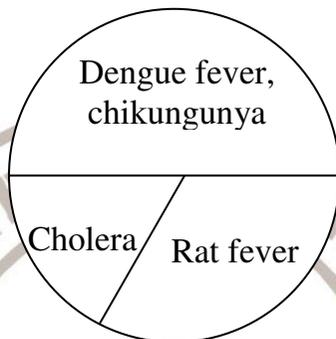
SCIENCE CHEMISTRY

LESSON 8 WASTE WATER MANAGEMENT

CLASS:X

- Safe toilet facilities
- Avoid buying contaminated food kept open.

2. The pie diagram represents a survey result of infectious diseases of a village during 2008-2009. Analyse it and answer the following:



- Which diseases affect the majority of the population?
- How are these diseases transmitted?
- Write any three measures to control the other two diseases.

Answer: (a) Dengue fever, Chikungunya

(b) These diseases are transmitted through insect vectors (mosquitoes) which breed in water collected in containers, tyres, tea cups, coconut shells etc.

(c) Measures to control cholera and rat fever.

- Vessels containing food and water should be kept closed and clean.
- Breeding sites of houseflies which are the insect vectors of cholera should be checked and arrested.

(iii) Rodents (Rats) population should be controlled as they are the vectors of rat fever.

3. Match the suitable renewable and non-renewable sources:

Sources	A	B	C
Renewable	Coal	Wind	Petroleum
Non-renewable	Hydrogen	Natural gas	Solar energy

Answer:

Sources	A	B	C
Renewable	Hydrogen	Natural gas	Solar energy
Non-renewable	Coal	Wind	Petroleum

4. Find the odd one out:

(i) bio-alcohol, green diesel, bio-ethers, petroleum

(ii) cholera, typhoid, scabies, dysentery

Answer: Petroleum: It is a fossil fuel where as the rest of them are biofuels.

Scabies: It is a water washed disease, but others are water borne disease.

5. A non-renewable resource is a natural resource, if it is replaced by natural process at a rate equal to or faster than its rate of consumption by humans.

Read this statement and say whether it is correct or incorrect. If it is incorrect, give the correct statement.

Answer: It is not correct. A renewable resource is a natural resource if it is replaced by natural process at a rate comparable or faster than its rate of consumption by humans.

6. Pick out the appliances that can conserve electric energy.

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Fluorescent bulbs, copper choke, solar water heater, electric water heater, tungsten bulbs, electronic choke.

Appliances to conserve the electric energy

- (i) Fluorescent bulbs
- (ii) Electronic choke
- (iii) Solar water heater

7. Assertion (A): All public places need not have adequate sanitation and hygiene facilities.

Reason (R): There is a greater risk of the spread of diseases such as Hepatitis A, Typhoid, diarrhoea, etc.,

- (a) A is right R is wrong
- (b) A is wrong R is right
- (c) R explains A
- (d) B does not explain A

Answer: (b) A is wrong R is right

8. Assertion (A): Alcohol is made by fermenting the sugar components of plant materials.

Reason (R): Bio-ethanol is widely used as a fuel for vehicles.

- (a) A is false statement R is correct
- (b) A is correct R is wrong
- (c) A is correct R is relevant
- (d) A and R statements nor relevant.

9. Read the following the statements and correct them.

- (i) Green diesel is a fossil fuel.

Answer: Green diesel is a bio fuel.

- (ii) Bio-ethanol is widely used in England and Spain

Answer: Bioethanol is widely used in USA and Brazil.

10. Any water that has been used in the home, with the exception of water in the toilet can be referred to as waste water. It is also referred as gray water. Suggest any two ways to reuse this water and state benefit out of it.

This water could be reused for a multitude of purposes, including

- 1. Watering yard and gardens,
- 2. Reduce strain in septic tanks,
- 3. Recharge ground water,
- 4. Encourage plant growth.

11. Consider the following statements:

Assertion (A): Bio-diesel is made from vegetable oil and animal fats.

Reason (R): It is also called as bio-ethanol

Now select your answers according to the coding scheme given below.

- A) Both (A) and (R) are correct
- B) (A) is correct, but (R) is wrong
- C) (A) is correct, and (R) is relevant
- D) (A) is wrong, but (R) is correct.

Answer: B) (A) is correct, but (R) is wrong

12. What are the benefits of household waste water recycling systems?

- (i) Less fresh water usage.
- (ii) Reduce strain in septic tanks.
- (iii) Recharge ground water

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(iv) Encourage plant growth

13. Write any four liquid bio-fuels used for transportation.

Bio fuels in liquid form are

(i) Bio alcohol.

(ii) Green diesel.

(iii) Bio diesel.

(iv) Bio ethers.

14. Correct the statements:

(a) Butane is the chief component of natural gas.

Answer: Methane is the chief component of natural gas.

(b) Coal, Petroleum and Natural gas are renewable resources.

Answer: Coal, Petroleum and Natural gas are non-renewable resources.

15. Name any four Bio-fuels

(i) Bio alcohol.

(ii) Bio diesel.

(iii) Bio ethers.

(iv) Bio gas.

16. Consider the following statements:

Assertion (A): Waste water is not used in agriculture.

Reason (R): It contains water minerals, nutrients and its disposal is often expensive.

Now select your answer according to the coding scheme given below:

(a) (A) is correct, but (R) is wrong.

(b) (A) is wrong, but (R) is correct.

(c) Both (A) and (B) are wrong.

(d) Both (A) and (B) are correct.

Answer: (A) is wrong, but (R) is correct.

17. Natural gas is a major feed stock for the production of Ammonia and fertilizer production. Mention some other user (any two only)

(i) Natural Gas is a major source of electricity generation through the use of gas turbines and steam turbines.

(ii) Natural gas is also use in the manufacture of fabrics, glass, steel, plastics, paint and other products.

18. Energy management should help the environment by reducing the use of natural resource without polluting environment for the future purpose.

(a) Discuss any two importance of energy management
Energy management is the process of monitoring controlling and conserving energy in a living home or in any organization.

(b) Write any two ways of saving energy at home

(i) By using compact fluorescent light bulbs (CFL) for standard incandescent bulbs.

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(ii) By using solar water heater instead of electric water heater.

19. Do not iron wet clothes. Give reasons.

Ironing wet clothes consumes more electrical energy, so as to dry out the water. Therefore, wet clothes should not be ironed to avoid wastage of electric power.

20. To interpret what happens in the given situation Hydrogen is found to be a good choice among the alternative fuel, why?

(i) Hydrogen can meet all the energy needs of human society, including power generation more efficiently and more economically.

(ii) Hydrogen is non-toxic, reasonably safe to handle, distribute and use as a fuel.

21. Spot the error in the given statements

(a) Primary treatment is used to remove dissolved and suspended biological matter.

Secondary treatment is used to remove dissolved and suspended biological matter.

(b) Butane is the Chief component of natural gas.

Methane is the Chief component of natural gas.

22. Hydrogen has the highest mass energy content explain.

The heat of combustion of hydrogen per unit weight is about 2.5 times that of hydro carbon fuel, 4.5 times that of ethanol and 6.0 times that of methanol. Its thermodynamic energy conversion efficiency of 30-35% is greater than that of gasoline (20-25%).

23. Find the odd one out.

a) Cold, Dengue fever, Brain fever, Cholera.

Answer: Cholera.

b) Coal, Petroleum, natural gas, solar energy.

Answer: Solar energy.

24. Which of the following is made from vegetable oil and animal fats.

Bio alcohol, Bio diesel, Bio gas

Biodiesel: Biodiesel is made from vegetable oil and animal fats. It is used as a fuel for vehicles in its pure form.

25. "Stagnation of waste water from residential house and industries causes variety of communicable diseases".

Arise questions related to the above statement.

(i) What causes different varieties of communicable disease?

(ii) Do you agree that stagnation of waste water from residential area and industries is one of the causes of communicable diseases?

26. Define Bioremediation.

Bioremediation can be defined as any process that is done in sewage treatment by the use of micro organisms, fungi or their enzymes to treat the contaminants. e.g. Nitrosomonas europaea can be used to treat sewage, freshwater, walls of buildings and on the surface of monuments especially in polluted areas where there is high levels of nitrogen compounds.

27. Define energy audit.

An energy audit is an inspection, survey and analysis on energy flows for energy conservation in a building, process or system. It is done to reduce the amount of energy input into the system without negatively affecting the output(s).

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28. What is Home energy audit?

A home energy audit is a service where the energy efficiency of a house is evaluated by a person using professional equipment (such as blower doors and infra-red cameras), with the aim to suggest the best ways to improve energy efficiency in heating and cooling the house.

29. Based on energy audit in schools write any two measures to reduce energy consumption.

- Substituting energy efficient, compact fluorescent light bulbs (CFL) for standard incandescent bulbs will save on average upto 6000 megawatts of electricity every year.
- Saving money on water usages, such as checking for leaks in the systems reducing water usage (especially hot water) and improving the efficiency of water delivery.

30. Write any four measure to conserve LPG.

1. Use moderate flame settings to conserve LPG.
2. Clean the burners to ensure blue flame.
3. Use pressure cooker as much as possible.
4. Use lids to cover the pans.

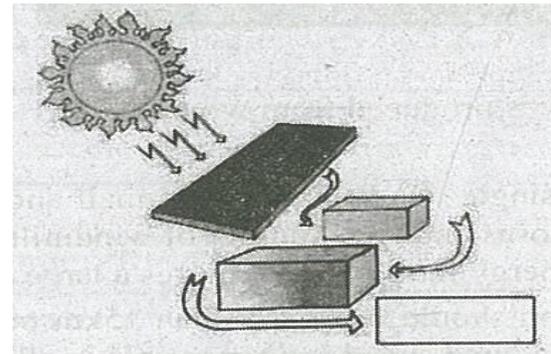
31. Write any four measures to conserve power while using washing machine.

1. Always wash only with full washing machine loads.
2. Use optimal quantity of water.
3. Use timer facility to save energy.
4. Use the correct amount of detergent.

SECTION - C

P. MURUGESAN MSc., MEd & E.MUTHUSAMY MSc.(Che), MSc.(Psy), MEd., MPhil
Whatsapp: 9940847892. ACTC TUITION CENTRE, 41/1- PWD ROAD, NAGERCOIL.

1. Observe the picture given blow and find out what type of energy is produced



(i) Identify whether this energy is conventional or nonconventional.

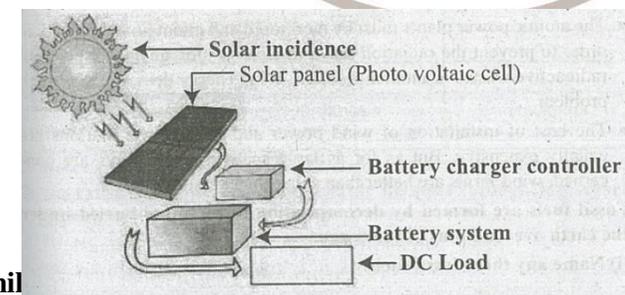
(ii) Draw the given diagram and label it with the parts given below:

(battery charger controller, solar incidence, DC load, battery system)

(iii) In the given picture, _____ energy is transformed into _____ energy.

Answer: (i) Solar energy is non – conventional

(ii)



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LESSON 8 WASTE WATER MANAGEMENT

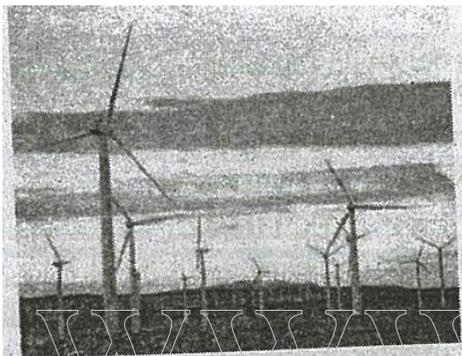
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(iii) (a) Solar (b) electrical

2. (i) What type of energy is produced in this picture?

(ii) What difficulties do we face in harnessing this energy? Explain.

(iii) Why do we say that this energy is better than solar energy and atomic energy?



Answer:

(i) Electrical energy is produced from wind energy.

(ii)

- The output of a single windmill is quite small and cannot be used for commercial purposes and so a number of windmills have to be created to form a wind energy farm which requires a large area of a land.

- The speed of wind should be higher than 15km per hour to rotate the turbine and such a wind speed is not possible in all seasons.

- Wind energy farms can be established only at those places where wind blows for most of the year.

- The setting up of wind energy farm is very expensive.

(iii)

- The cost of the fuel (wind) is negligible in wind energy as compared to the nuclear fuels such as Uranium, Plutonium etc.

- The atomic power plants must be monitored and maintained properly in order to prevent the radiation risk and also the storage and disposal of radioactive wastes is another problem. Wind energy does not have such problem.

- The cost of installation of wind power and solar power station are equally expensive. But as for as large scale establishments are concerned, wind farms are better than solar power stations.

3. Fossil fuels are formed by decomposition of bio-mass buried under the earth over millions of years ago.

(i) Name any three fossil fuels.

(ii) Which fuel is used in the production of fertilizers?

(iii) What is natural gas made up of?

Answer:

(i) Coal, petroleum and natural gas

(ii) Natural gas

(iii) The composition of natural gas is chiefly Methane (90%) with traces of ethane and propane.

4. Wind power is generated from uneven heating of the earth's surface by the sun and the hot core.

(i) Which country is called the country of winds?

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SCIENCE CHEMISTRY

LESSON 8 WASTE WATER MANAGEMENT

CLASS:X

(ii) Which country leads the world in harnessing wind energy?

(iii) In which district of Tamilnadu do we have wind energy farm?

(iv) In which of the following land forms will you be able to harness maximum amount of wind energy? (plains, canals, valleys)

Answer:

(i) Denmark

(ii) Germany

(iii) Kanyakumari

(iv) Plains

5. Match the following:

Water borne diseases	Water related diseases	Water based diseases
Typhoid	Dengue	Scabies
Malaria	Amoebiasis	Cholera
Filariasis	Lice	trachoma

Answer:

Water borne diseases	Water related diseases	Water based diseases
Typhoid	Dengue	Scabies
Cholera	Malaria	Lice
Amoebiasis	Filariasis (Elephantiasis)	trachoma

6. Water contaminated by human beings, chemical or industrial wastes can cause a variety of communicable diseases through ingestion or physical contact.

(i) Name any two diseases caused by polluted water.

(ii) Why do we drink boiled water?

(iii) How can you reuse waste in your houses?

Answer:

(i) Cholera, Amoebiasis, Cholera, Bacillary dysentery

(ii) The disease causing germs can be killed by boiling the water and so it is advisable to drink boiled water in order to prevent the water borne diseases.

(iii) Waste water is often referred to as grey water. Any water that has been used in the households, with the exception of water in the toilet can be referred to as waste water. Waste water could be reused for a multitude of purposes including.

1. Watering yards and gardens
2. Filtering septic tanks and
3. Irrigating fields

7. Water, a precious physical substance, is essential to all living organisms.

(i) Which is the largest water resource?

(ii) What are the various sources of water?

(iii) Which is the primary sources of water?

(iv) What are the ways by which you can raise the ground water level in your house?

Answer:

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(i) Ocean is the largest water resource.

(ii) Sources of water.

Oceans are the largest sources of salt water.

Fresh water sources:

(a) Rainfall is the primary source of fresh water.

(b) Glaciers found in mountains and polar region.

(c) Surface water such as rivers, lakes, streams and ponds.

- Freely flowing artesian well or spring.

(d) Ground water – The underground reservoir of fresh water percolated into the porous rocks are known as aquifers.

(iii) Rainfall is the primary source of water.

(iv) The ways to raise the ground water level.

- We can raise the ground water level in our house by installing Rain water Harvesting (RHW) system. It means collecting rain water from the roof of building or country yards and storing it under ground for later use. It helps to check the run off water and also helps to increase ground water level.

- We must allow percolation of rain water into the soil directly by not covering the open soil with concrete layer.

- Over exploitation of ground water should be prevented by proper conservation measures.

8. An energy audit is an inspection, survey and analysis of energy flow to ensure conservation in a building process or system.

(i) How will you measure consumption of electrical energy at home?

(ii) What are the benefits of implementing this method in your school?

Answer: A home energy audit is a service where the energy efficiency of a house is evaluated by a person using professional equipment (such as blower doors and infra-red cameras), with the aim to suggest the best ways to improve energy efficiency in heating and cooling the house.

(i) An energy audit of a home includes the following

- A record of characteristics of ceilings, floors, doors, windows and skylights for quantifying the thermal performance of building.
- An assessment of mechanical systems such as heating, ventilation, air condition and thermostat.
- A written report estimating energy consumption at given local criteria, thermostat settings roof overhang and solar orientation.
- The home owner's billing history showing the quantity of electricity, natural gas, fuel oil and other energy sources consumed over one or two year period.

(ii) Benefits of energy audit in school

- Substituting energy efficient, compact fluorescent light bulbs (CFL) for standard incandescent bulbs will save on average upto 6000 megawatts of electricity every year.

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- Saving money on water usages, such as checking for leaks in the systems, reducing water usages (especially hot water) and improving the efficiency of water delivery.
- Segregating papers, milk cartons (from the lunch room). Printer cartridges in the copy room etc. and sending them, for recycling centres can garner not only significant savings but benefit the environment.

9. We should manage the waste water in order to prevent water pollution and its harmful effects.

(i) What are the ways by which water gets contaminated?

(ii) How will you control water contamination in your house?

Answer:

(i) Water gets contaminated by the following ways.

- Sewage generated from residential, institutional, commercial and industrial establishments is led into nearby water bodies.
- Use of fertilizer and pesticides pollute water bodies during rains or through irrigation channels and contaminate water.
- Dumping solid wastes near rivers, lakes etc. can contaminate them.
- Use of water bodies for bathing by humans cattle, and washing clothes etc. can contaminate water.
- Defaecation and urination nearby water bodies.

(ii) Control measures of water contamination

- Ensuring that the sewer lines and water supply pipes are well laid and intact without leakage.
- Periodic cleaning of water storage sumps/ tanks and sewage drains.
- Preventing water stagnation and dumping waste in the backyard or outside the house to avoid the breeding sites of disease causing germs and insect vectors.
- Drinking boiled water or treated water to avoid the spread of infectious germs
- Periodic testing of water quantity of ground water / tap water for physical and biological impurities can ensure safe water supply.

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SCIENCE

LESSON 16. 16. ELECTRICITY AND ENERGY

CLASS: X

1. The potential difference required to pass a current 0.2 A in a wire of resistance 20 ohm is _____.

- (i) 100 V (ii) 4 V (iii) 0.01 V (iv) 40 V

Answer: (ii) 4V

2. Two electric bulbs have resistances in the ratio 1 : 2. If they are joined in series, the energy consumed in these are in the ratio ____

- (i) 1 : 2 (ii) 2 : 1 (iii) 4 : 1 (iv) 1 : 1

Answer: (i) 1 : 2

3. Kilowatt-hour is the unit of _____.

- (i) potential difference (ii) electric power
(iii) electric energy (iv) Charge

Answer: (iii) electric energy

4. _____ surface absorbs more heat than any other surface under identical conditions.

- (i) White (ii) Rough (iii) Black (iv) Yellow

Answer: (iii) Black

5. The atomic number of natural radioactive element is _____

- (i) greater than 82 (ii) less than 82
(iii) not defined (iv) atleast 92

Answer: (i) greater than 82

6. Which one of the following statements does not represent Ohm's law?

- (i) current / potential difference = constant
(ii) potential difference / current = constant
(iii) current = resistance x potential difference

Answer: (iii) current = resistance x potential difference

7. What is the fuel used in thermal power plants?

Answer: The fuels used in thermal power plants are fossil fuels like coal and petroleum.

8. Which is the ultimate source of energy?

Answer: The sun is the ultimate source of all types of energy.

Reason: Wind energy, Hydro energy, Energy of fossil fuels and the energy of our food, all come ultimately from the sun's energy.

9. What must be the minimum speed of wind to harness wind energy by turbines?

Answer: The minimum speed of wind to harness wind energy by turbines should be 15 km per hour.

10. What is the main raw material used in the production of biogas?

Answer: The main raw material (and also the starting material) used in the production of biogas is cow dung.

11. Four cells each of emf "E" are joined in parallel to form a battery. The equivalent emf of the battery will be.....

- 4E, E, E/4, E=0

Answer: E

12. The symbol for closed switch is

- (•)— —()—

Answer: —(•)—

13. The symbol of Ammeter is

- (V, A, G, I)

Answer: A

14. The main source of bio-mass energy is.....

- (coal, heat energy, thermal energy, cow-dung)

Answer: cow-dung

15. The unit of electric current is

- (Ampere, Volt, Watt, Kilo-watt)

Answer: Ampere

16. The energy produced when 1 kg of a substance is fully converted into energy is.....

- (9×10^{16} J, 9×10^8 J, 18×10^8 J, 18×10^{16} J)

Answer: 9×10^{16} J

17. 1 kwh is equal to

- (3.6×10^6 J, 3.6×10^6 , 6.3×10^6 J, 6.3×10^6 J)

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Answer: 3.6×10^6

18. Einstein's mass energy relation is

$(E = \frac{M}{c^2}, E=mc^2, E = h\lambda, E = \frac{1}{2} mc^2)$

Answer: $E=mc^2$

19. Fuse wire is made up of an alloy of

(Lead and tin, lead and copper, tin and iron, zinc and copper)

Answer: Lead and tin

20. Voltmeter is used to measure.....

(Potential difference, current, magnetic effect, electrical energy)

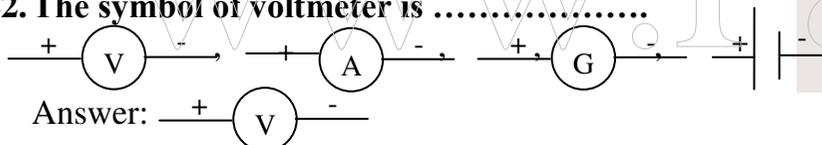
Answer: Potential difference

21. Fuse is a piece of wire made of an alloy

(63% lead 37% tin, 37% lead 63% tin, 65% lead 35% tin, 35% lead 65% tin)

Answer: 37% lead 63% tin

22. The symbol of voltmeter is



Answer:

23. The electro motive force (emf) of Lechlanche cell is

- a) 1.5 V b) 1.08 V c) 2.2 V d) 2.5 V

Answer: a) 1.5 V

PART – B

1. Fill in the blanks:

(i) Potential difference: voltmeter; then current _____.

(ii) Hydro power plant: Conventional source of energy; then solar energy: _____.

Answer: (a) Ammeter

(b) Non-conventional source of energy.

2. In the list of sources of energy given below, find out the odd one. (wind energy, solar energy, hydro electric power)

Answer: Hydro electric power, It is the conventional source of energy.

3. Correct the mistakes, if any in the following statements:

(i) A good source of energy would by one which would do a small amount of work per unit volume of mass.

(ii) Any source of energy we use to do work is consumed and can be used again.

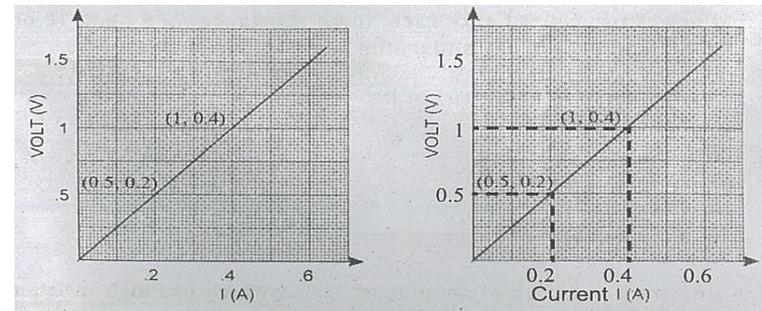
Answer: A good source of energy would be one which do a large amount of work per unit volume of mass.

(a) Any source of energy we use to do work is consumed and cannot be used again.

4. The schematic diagram, is which different components of the circuit are represented by the symbols conveniently used, is called a circuit diagram. What do you mean by the term components?

Answer: The term components represents to various electrical devices / things such as battery, ammeter, voltmeter, variable resistor (Rheostat), fixed resistor, switch, connecting wires etc. connected in an electrical circuit.

5. The following graph was plotted between V and I values. What would be the values of V / I ratios when the potential difference is 0.5 V and I V?



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Answer: Plotting the values of current (I) in x-axis and potential difference (V) in y-axis, we can get the value as follows:

Consider two points along the graph (I₁ V₁) = (0.2, 0.5)

(I₂ V₂) = (0.4, 1)

$$\text{Resistance (R)} = \frac{V}{I} = 2.5\Omega$$

V	I	R = $\frac{V}{I}$
0.5	0.2	$\frac{0.5}{0.2} = 2.5\Omega$
1	0.4	$\frac{1}{0.4} = 2.5\Omega$

6. We know that γ -rays are harmful radiations emitted by natural radio active substances.

(i) Which are other radiations from such substances?

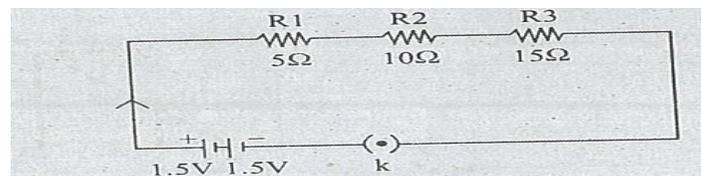
(ii) Tabulate the following statements as applicable to each of the above radiations

(They are electromagnetic radiation. They have high penetrating power. They are electrons. They contain neutrons.)

Answer: (a) α – rays (alpha rays); β – rays (Beta rays)

S. N	Property	α – rays	β – rays	γ – rays
1.	Nature	They contains	They are electrons	Electromagnetic radiation
2.	Penetrating power	-	-	High penetrating power

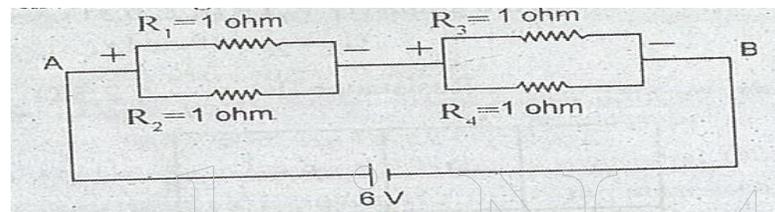
7. Draw the schematic diagram of an electric circuit consisting of a battery of two cells of 1.5V each, three resistances of 5 ohm, 10 ohm and 15 ohm respectively and a plug key all connected in series. AB



8. Fuse wire is made up of an alloy ofwhich has high resistance and

Answer: Tin and Lead. Low melting point.

9. Observe the circuit given below and find the resistance across AB.



Answer: R₁ & R₂ are connected in parallel and therefore the total resistance R_{p1}

R₃ & R₄ are connected in parallel and therefore the total resistance R_{p2}
Total resistance in parallel connection

$$\frac{1}{R_{p1}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{1} + \frac{1}{1} = \frac{2}{1} \therefore R_{p1} = \frac{1}{2} \text{ ohm}$$

Total resistance in parallel connection

$$= \frac{1}{R_{p2}} = \frac{1}{R_3} + \frac{1}{R_4} = \frac{1}{1} + \frac{1}{1} = \frac{2}{1} \therefore R_{p2} = \frac{1}{2} \text{ ohm}$$

R_{p1} & R_{p2} are connected in series and therefore total resistance across

$$= \frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1 \text{ ohm} \quad \boxed{R_{p1} + R_{p2}}$$

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10. Complete the table choosing the right terms given in brackets (zinc, copper, carbon, lead, di oxide, aluminium)

+ ve electrode	Lead acid accumulator	_____
- ve electrode	Lechlanche cell	_____

Answer:

+ ve electrode	Lead acid accumulator	Lead di oxide
- ve electrode	Lechlanche cell	Zinc rod

11. How many electrons flow through an electric bulb every second, if the current that passes through the bulb is 1.6 A.

Answer: Current (I) = 1.6 A

Time (t) = 1 s

Quantity of electric change $Q = I \times t$

$$= 1.6A \times 1s = 1.6\text{Coulomb}$$

1 Coulomb (C) is equal to the charge contained in 6.25×10^{18} electrons.

$$\begin{aligned} \therefore 1.6 \text{ C of electric charge contains } & 1.6 \times 6.25 \times 10^{18} \text{ electrons.} \\ & = 10 \times 10^{18} \text{ electrons} \\ & = 1 \times 10^{19} \text{ electrons} \end{aligned}$$

12. Vani's hair dryer has a resistance of 50Ω when it is first turned on. (i) How much current does the hair dryer draw from the 230V – line in Vani's house?

- (ii) What happens to the resistance of the hair dryer when it runs for a long time?

(Hint: As the temperature increases the resistance of the metallic conductor increases).

(i) Answer: Resistance $R = 50\Omega$

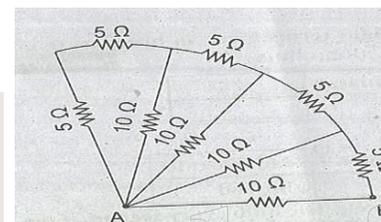
Voltage $V = 230V$

$$\therefore \text{Current } I = \frac{V}{R} = \frac{230}{50} = 4.6A$$

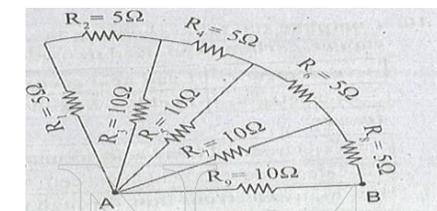
\therefore Current = 4.6A

- (ii) Answer: According to Joule's law of heating $H = I^2 \times R \times t$ When the hair dryer runs for a long time, the temperature of its coil will increase (because the kinetic energy of the vibrating atoms of metallic conductor increases) and which in turn increases the resistance ($> 50 \Omega$) of the coil of the dryer. Now, the increased resistance over heats the device leading to its damage.

13. In the given network, find the equivalent resistance between A and B.



Answer:



Answer: The equivalent resistance is calculated as follows:
Resistance of the series combination $R_1 R_2$ is.

$$R_{S1} = 5 + 5 = 10\Omega$$

Resistance of the parallel combination R_{S1} and R_3 is

$$\frac{1}{R_{p1}} = \frac{1}{10} + \frac{1}{10} = \frac{1+1}{10} = \frac{2}{10}$$

$$\therefore R_{p1} = \frac{10}{2} = 5\Omega$$

The resistance of combination R_{p1} and R_4 is

$$R_{S2} = 5 + 5 = 10\Omega$$

Resistance of the parallel combination R_{S1} and R_5 is

$$\frac{1}{R_{p1}} = \frac{1}{10} + \frac{1}{10} = \frac{1+1}{10} = \frac{2}{10}$$

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$$\therefore R_{p2} = \frac{10}{2} = 5\Omega$$

Resistance of the series combination R_{q2} and R_6 is

$$R_{S3} = 5 + 5 = 10\Omega$$

$$\therefore R_{p3} = \frac{10}{2} = 5\Omega$$

Resistance of the series combination R_{S3} and R_9 is

$$\frac{1}{R_{p4}} = \frac{1}{10} + \frac{1}{10} = \frac{1+1}{10} = \frac{2}{10}$$

$$\therefore R_{p4} = \frac{10}{2} = 5\Omega$$

\therefore Resistance between A and B is 5Ω .

14. Old – fashioned serial lights were connected in a series across a 240V household line.

(i) If a string of these lights consists of 12 bulbs, what is the potential difference across each bulb?

(ii) If the bulbs were connected in parallel, what would be the potential difference across each bulb?

(i) Answer: Since the bulbs are connected in series, the total potential difference is equal to the sum of potential difference across each bulb.

$$V = V_1 + V_2 + V_3 + V_4 + V_5 + V_6 + V_7 + V_8 + V_9 + V_{10} + V_{11} + V_{12}$$

$$\text{Total potential difference across 12 bulbs} = 240V$$

$$\therefore \text{Potential difference across each bulb} = \frac{240}{12} = 20V$$

(iii) Answer: When the bulbs are connected in parallel in a 240 V household line, the potential difference across each bulb would be 240V (such a high voltage would blow off the serial bulbs)

15. The figure is a part of a closed circuit. Find the currents i_1 , i_2 and i_3 .

Answer: $i_1 + 2 = 3$

$$\therefore i_1 = 3 - 2 = 1A$$

$$i_2 + 1 = 3$$

$$\therefore i_2 = 3 - 1 = 2A$$

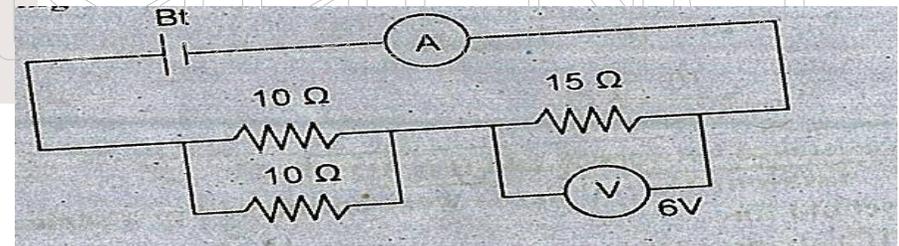
$$i_2 = 1.5 + i_3$$

$$2 = 1.5 + i_3$$

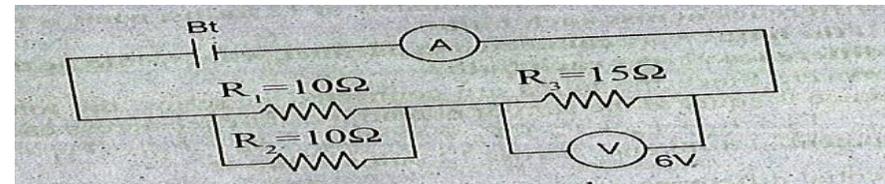
$$\therefore i_3 = 2 - 1.5 = 0.5A$$

$$\therefore i_1 = 1A, i_2 = 2A \text{ and } i_3 = 0.5 A$$

16. If the reading of the Ideal voltmeter (V) in the given circuit is 6V, then find the reading of the ammeter (A).



Answer:



Resistance of parallel combination is given by

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

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$$\frac{1}{R_p} = \frac{1}{10} + \frac{1}{10} = \frac{1+1}{10} = \frac{2}{10}$$

$$\therefore R_p = \frac{10}{2} = 5\Omega$$

Resistance of series combination is,

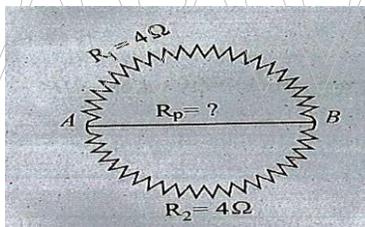
$$R_s = R_p + R_3$$

$$= 5 + 15 = 20\Omega$$

 Potential difference $V = 6\text{ V}$

$$\therefore \text{Current } I = \frac{V}{R} = \frac{6}{20} = 0.3\text{A}$$

17. A wire of resistance 8Ω is bent into a circle. Find the resistance across the diameter.



Answer:

$$R_p = 2\Omega$$

Answer: The total resistance of the wire is 8Ω . Consider that it is bent into a circle (as shown in the figure) which has two resistance values of each 4Ω connected in parallel.

The resultant resistance across the points AB

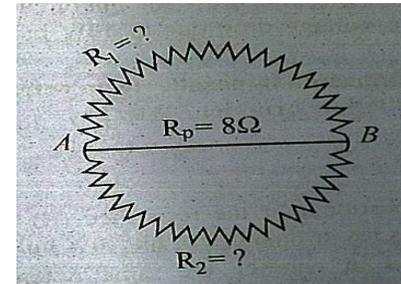
$$= \frac{1}{4} + \frac{1}{4} + \frac{2}{4}\Omega = \frac{1}{2}$$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_p} = \frac{1}{2}\Omega$$

 \therefore Resistance across the diameter $R_p = 2\Omega$

18. A wire is bent into a circle. The effective resistance across the diameter is 8Ω . Find the resistance of the wire.



Answer:

$$R_1 = 16\Omega$$

$$R_2 = 16\Omega$$

Answer: The effective resistance (R_p) across the diameter $AB = 8\Omega$. Consider that the wire is bent into a circle (as shown in the figure) which has two resistance values of each ' x ' Ω connected in parallel.

Total resistance of the wire

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R_p} = \frac{R_1 + R_2}{R_1 \times R_2}$$

Since R_1 is equal to R_2 , both R_1 and R_2 are collectively taken as ' R '

$$\frac{1}{R_p} = \frac{R + R}{R \times R} = \frac{2R}{R^2}$$

$$\therefore R_p = \frac{R^2}{2R} = R_p = \frac{R}{2}$$

$$\therefore R = 2R_p$$

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$$R_1 = 2 \times 8 \Omega = 16\Omega$$

$$R_2 = 2 \times 8 \Omega = 16\Omega$$

$$\begin{aligned} \therefore \text{The total resistance of the wire } R &= R_1 + R_2 \\ &= 16 \Omega + 16\Omega = 32 \Omega \end{aligned}$$

19. Two bulbs of 40 W and 60 W are connected in series to an external potential difference. Which bulb will glow brighter? Why?

Answer: As per the formula $P = \frac{V^2}{R}$,

electric power (P) is inversely proportional to the resistance (R) and therefore the resistance of 40W bulb is greater than that of the 60W bulb.

Since both bulbs are connected in series, the same amount of current (I) flows through the circuit the voltage drop due to 40W bulb is greater and it glows brightly.

20. Two bulbs of 70W and 50W are connected in parallel to an external potential difference. Which bulb will glow brighter? why?

Answer: As per the formula $P = \frac{V^2}{R}$,

electric power (P) is inversely proportional to the resistance (R) and therefore the resistance of 70W bulb is lesser than that of the 50W bulb.

Since both bulbs are connected in parallel, the same potential difference is maintained in the circuit but the 70W bulb draws more current and glows brightly.

21. Write about ocean thermal energy?

Answer: The water at the surface of the sea or ocean is heated by the sun while the water in deeper ocean is relatively cool. If the temperature difference between the water at the surface and water at the depths upto 2kms is 20°C (or) 20⁰ C or more, the warm surface

water is used to convert liquid ammonia into its vapour which in turn runs the turbine of generator. The deep cool water is used to condense ammonia vapour into liquid ammonia.

22. In a hydroelectric power plant, more electrical power can be generated if water falls from a greater height. Give reasons.

Answer: Hydro power plants convert the potential energy of water (collected in storage reservoirs of high-rise dams) into electricity by rotating the turbine at the bottom of the dam. As the height of the dam increases, the potential energy ($P.E. = mgh$) of water also increases and the falling water from the dam has more kinetic energy which in turn rotates the turbine with greater velocity. Thus more electrical energy can be generated.

23. What measures would you suggest to minimize environmental pollution caused by burning of fossil fuel?

Answer: To minimize environmental pollution caused by burning of fossil fuels.

- Renewable sources of energy such as solar energy, wind energy, tidal energy, wave energy, ocean thermal energy etc. Shall be harnessed extensively.
- Alternative fuels such as bio-diesel, bio-alcohol, bio-gas, compressed air, hydrogen fuel cells, compressed natural gas (CNG) etc. can be used.
- Using catalytic converters in vehicles and electrostatic precipitators and scrubbers in factories help to reduce air pollutants.
- Strict energy conservation measures (Recycling Reusing and Reduced usage) should be adopted.

24. What are the limitations in harnessing wind energy?

- The output of a single windmill is quite small and cannot be used for commercial purposes and so a number of windmills

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have to be erected to form a wind energy farm which requires a large area of land.

- The speed of wind should be higher than 15 km per hour to rotate the turbine and such a wind speed is not possible in all the seasons.
- Wind energy farms can be established only at those places where wind blows for most part of the year.
- The setting up of wind energy farm is very expensive.

25. What is bio-mass? What can be done to obtain bio-energy using bio-mass?

Answer: The organic sources such as dead parts of plants and trees (wood), animal waste (cow dung), agricultural waste (crop residues), vegetable wastes and sewage which are used as a fuel to produce energy are called biomass.

- Charcoal is a better fuel: When wood is burnt in a limited supply of oxygen, water and volatile materials present in it get removed and charcoal is left behind. Charcoal burns without flames, is comparatively smokeless and has higher heat generation efficiency.
- Gobar gas plant: in Gobar gas plant, cow dung (the main starting material), crop residues, vegetable wastes and sewage can be decomposed in the absence of oxygen to obtain the gobar gas.

26. Which form of energy leads to the least amount of environmental pollution in the process of harnessing and utilization? Justify your answer.

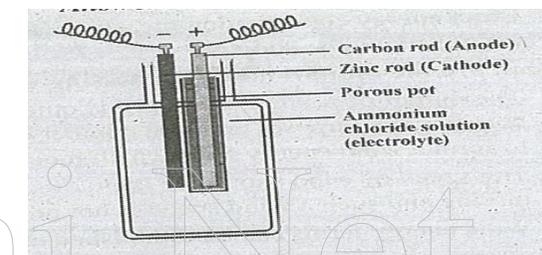
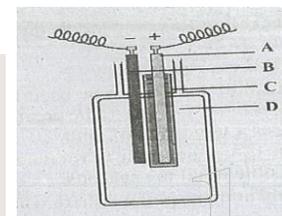
Answer: The sun's energy leads to the least amount of environmental pollution in the process of harnessing and utilization.

Justification: The energy obtained from the sun is called solar energy. Hydro energy, wind energy, wave energy and ocean thermal energy are also indirect manifestations of solar energy. In reality, no

source of energy can be said to be pollution free. The use of fossil fuels and nuclear fuels caused much pollution. The use of fossil fuels and nuclear fuels causes much pollution and the production of hydroelectricity causes ecological imbalance. In the case of wind generator, solar cells, solar coolers etc. their actual operation may be pollution. Therefore, comparatively speaking, the sun's energy is the least polluting form of energy.

27. Leclanche cell diagram is given below. Label the parts A, B, C, D.

Answer:



28. Match the following Components

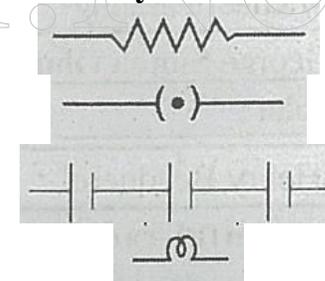
(a) Switch (closed)

(b) Battery

(c) Electric bulb

(d) Resistance

Symbols



Answer: (a) – (ii), (b) – (iii), (c) – (iv), (d) – (i)

29. Harmful radiations originate from a nuclear reactor. Precautions are taken to see that they do not become a threat to living beings. What are these precautions?

- Radioactive materials are kept in thick-walled lead container.
- Lead aprons and lead gloves are used while working in hazardous area.

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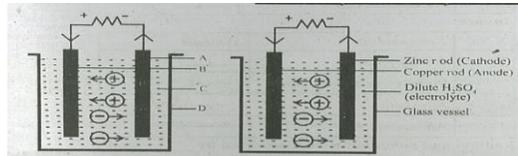
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(iii) A small micro-film badge is always worn by the person and it is checked periodically for the safety limit of radiation.

(iv) Nuclear devices can be operated using remote control system.

30. Voltaic cell diagram is given below. Label the parts marked a, b, c, d.



31. Match the following:

S.No	Scientist	Invention
(i)	Michael Faraday	First battery
(ii)	George Simon Ohm	Radioactivity
(iii)	Volta	Dynamo
(iv)	Henry Becquerel	Ohm's law

Answer:

S.No	Scientist	Invention/Discovery
(i)	Michael Faraday	Dynamo
(ii)	George Simon Ohm	Ohm's law
(iii)	Volta	First battery
(iv)	Henry Becquerel	Radioactivity

32. γ -rays are harmful radiations emitted by natural radioactive substances.

(a) Which are other radiations emitted from such substances?

Answer: (a) (Alpha) α and (Beta) β rays.

(b) What is the unit of nuclear radiation?

Answer: (b) Roentgen.

33. Match the components with symbols

S.No.	Components	Symbols
1.	A wire joint	

2.	(b) Battery	
3.	(c) Electric bulb	
4.	(d) Resistance	

Answer:

S.No.	Components	Symbols
1.	A wire joint	
2.	(b) Battery	
3.	(c) Electric bulb	
4.	(d) Resistance	

34. Radium and polonium were discovered by _____ and _____

(Marie Curie, Pierre Curie, Watson, Otto Hahn)

Radium and polonium were discovered by Marie Curie and Pierre Curie

35. Match the following:

S.No.	Components	Symbols
(a)	Plug key or switch (closed)	
(b)	(b) Battery	
(c)	(c) Electric bulb	
(d)	(d) Resistance	

Symbols

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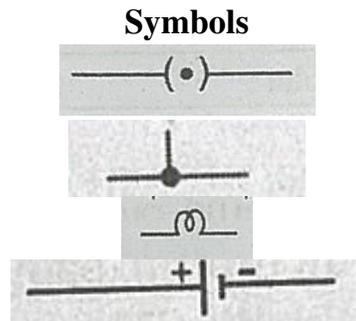
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Answer:

S.No.	Components
(a)	Plug key or switch (closed)
(b)	(b) Battery
(c)	(c) Electric bulb
(d)	(d) Resistance



36. Good source of energy should possess some special characteristics.

List them.

- Be easily accessible.
- Be easy to store and transport.
- Perhaps most importantly be economical and
- It does a large amount of work per unit volume of mass.

37. The potential difference between the terminals of an electric heater is 60V when it draws a current of 5A from the source. What current will the heater draw if the potential difference is increased to 120V?

Solution: Given the potential difference, $V = 60$ V, Current, $I = 5$ A,

$$\text{According to ohm's law, } R = \frac{V}{I} = \frac{60}{5} = 12\Omega$$

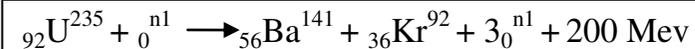
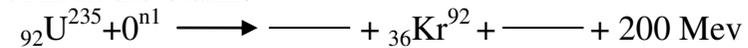
When the potential difference is increased to 120 V, the current is given by

$$\text{Current } I = \frac{V}{R} = \frac{120}{12} = 10\text{A}$$

38. In a voltaic cell the copper rod is the positive pole and Ammonium chloride is the electrolyte. The carbon rod is the negative pole. Spot the error.

In a voltaic cell the copper rod is the positive pole and dilute sulphuric acid is the electrolyte. The zinc rod is the negative pole.

39. Fill in the blanks



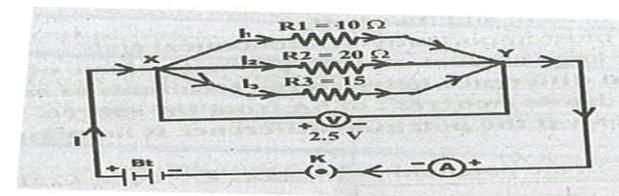
40. Match the column A with Column B

A	B
1. Current	- Volt
2. Electric Potential	- Ohm
3. Resistance	- Watt
4. Electric power	- Ampere

Answer:

A	B
1. Current	- Ampere
2. Electric Potential	- Volt
3. Resistance	- Ohm
4. Electric power	- Watt

41. You are given three resistors of 10Ω , 20Ω , 15Ω connected in parallel with a battery of 2.5 V, a key, an ammeter and a voltmeter. Draw the circuit diagram showing the correct connections of all the given components.



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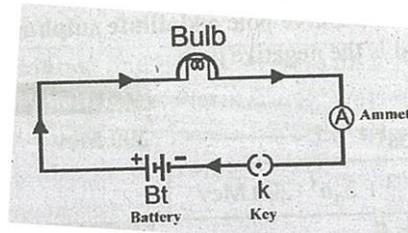
42. A 3V torch bulb draws a current 0.6A. Calculate the resistance of the bulb when glowing.

Potential Difference = 3 V

Current = 0.6 A

Resistance $R = \frac{V}{I} = \frac{3}{0.6} = 5\Omega$

43. An electric circuit is given below copy and label the parts A, K, Bt



Bt = battery
(A) = ammeter
k = Plug key

44. Three resistances having the values 5, 10, 30 ohms are connected parallel with each other. Calculate the total circuit resistance.
 $R_1 = 5\Omega, R_2 = 10\Omega, R_3 = 30\Omega.$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \quad (\text{since parallel connection})$$

$$\frac{1}{R_p} = \frac{1}{5} + \frac{1}{10} + \frac{1}{30} \therefore R_p = \frac{30}{10} = 3\Omega$$

45. Match the column A with Column B

A	B
Energy Sources	Examples
Fossil fuel	Cow dung
Hydro electric power	Heat
Bio Mass	Coal
Thermal electric power	Water

Answer:

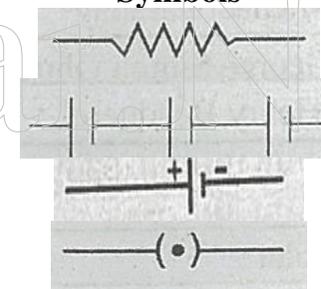
A	B
Energy Sources	Examples
Fossil fuel	Coal
Hydro electric power	Water
Bio Mass	Cow dung
Thermal electric power	Heat

46. Match the components and its symbols.

Components

Symbols

- (a) An electrical cell
- (b) Closed plug key
- (c) A resistor
- (d) A battery

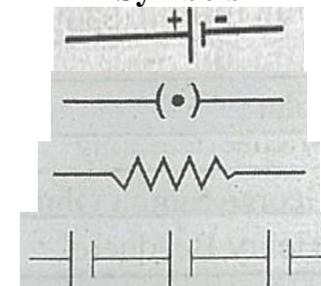


Answer:

Components

Symbols

- (a) An electrical cell
- (b) Closed plug key
- (c) A resistor
- (d) A battery



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47. Complete the table choosing the right items from within the brackets:

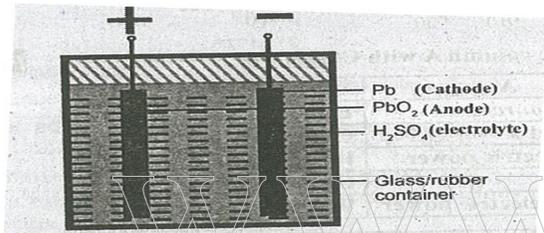
(Zinc, Copper, Carbon, Lead, Leadoxide, Aluminium)

+ ve electrode	Voltaic cell	_____
- ve electrode	Leclanche cell	_____

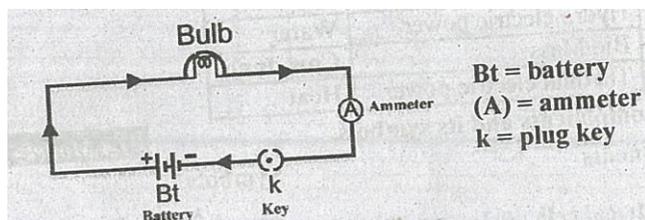
Answer:

+ ve electrode	Voltaic cell	<u>Copper.</u>
- ve electrode	Leclanche cell	<u>Zinc.</u>

48. Draw and label the parts of a lead acid accumulator.



49. Draw a schematic diagram of an electric circuit comprising battery, bulb, ammeter and a plug key.



PART - C

1. Veena's car radio will run from a 12 V car battery that produces a current of 0.20 A even when the car engine is turned off. The car battery will no longer operate when it has lost 1.2×10^6 J of energy. If Veena gets out of the car, leaving the radio on by mistake, how energy? (1 day = 86400 second)

Answer: Voltage of car battery = 12 V

Current (I) = 0.20 A

Power (P) required to run a car radio $P = V \times I$

\therefore Power (P) = $12 \times 0.2 = 2.4$ watts (or) 2.4 J/s

Electrical energy could be spent by car battery (E) = 1.2×10^6 J

$$\text{Energy (E) = Power (P) x Time (t)}$$

$$\therefore t = \frac{\text{Energy (E)}}{\text{Power(P)}}$$

$$= \frac{1.2 \times 10^6 \text{ J}}{2.4 \text{ J/s}} = \frac{1}{2} \times 10^6 \text{ s}$$

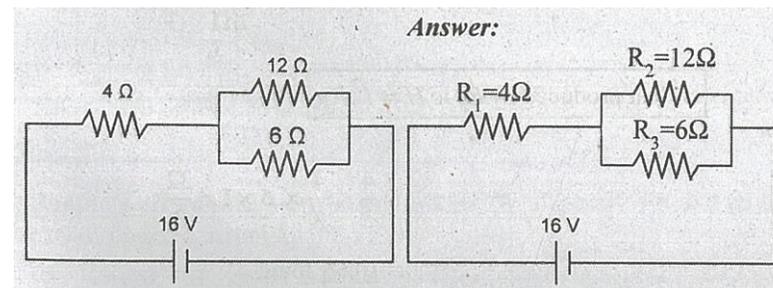
$$= 0.5 \times 10^6 \text{ s (or) } 5 \times 10^5 \text{ s}$$

1 day = $24 \times 60 \times 60$ sec = (86400 s)

\therefore No, of days the battery can work = $\frac{5 \times 10^5 \text{ s}}{86400 \text{ s}}$

$$= \frac{5,00,000}{86400} = 5.787 \text{ days}$$

2. Find the total current that passes through the circuit. Find the heat generated across the each resistor.



Answer: Let the resistance of R_1 , R_2 and R_3 be 4Ω, 12Ω and 6Ω respectively.

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Total resistance of R_2 and R_3 which are in parallel connection

$$\frac{1}{R_p} = \frac{1}{R_2} + \frac{1}{R_3}$$

$$= \frac{1}{12} + \frac{1}{6} = \frac{3}{12} \Omega = \frac{1}{4} \Omega$$

$$R_p = 4\Omega$$

$$= \frac{4}{3} \times \frac{4}{3} \times 6 \times 1 = \frac{32}{3} = 10.66 \text{ Joule}$$

- Heat produced by $R_1 = 16 \text{ J}$
- Heat produced by $R_2 = 5.33 \text{ J}$
- Heat produced by $R_3 = 10.66 \text{ J}$

3. Find the total current that passes through the circuit given in the diagram. Also find the potential difference across 1Ω resistor.

Resistances R_1 and R_p are in series connection $R_s = R_1 + R_p$
 $= 4\Omega + 4\Omega = 8\Omega$

- The current flowing through R_1 and R_p remains the same i.e. 2A

Current across R_1 (4Ω resistor) is 2A .

$$\therefore \text{Heat produced by } R_1 \text{ is } H = I^2 R_1 t$$

$$= 2 \times 2 \times 4 \times 1 = 16 \text{ Joule}$$

- Current across R_1 (4Ω resistor) is 2A .

$$\therefore \text{Current across } R_2 \text{ (12}\Omega \text{ Resistor) is } 2\text{A} \times \frac{4\Omega}{12\Omega} = \frac{2}{3} \text{ A}$$

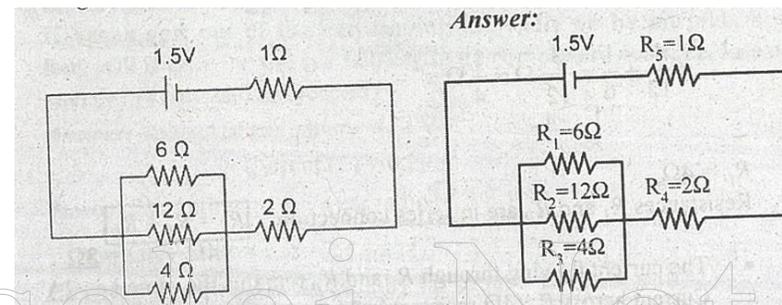
$$\therefore \text{Heat produced by } R_3 \text{ is } H = I^2 R_3 t$$

$$= \frac{2}{3} \times \frac{2}{3} \times 12 \times 1 = \frac{16}{3} = 5.33 \text{ Joule}$$

- Current across R_1 (4Ω resistor) is 2A

$$\therefore \text{Current across } R_3 \text{ (6}\Omega \text{ resistor) is } 2\text{A} \times \frac{4\Omega}{12\Omega} = \frac{2}{3} \text{ A}$$

$$\therefore \text{Heat produced by } R_3 \text{ is } H = I^2 R_3 t$$



Answer: Resistances R_1 (6Ω), R_2 (12Ω), and R_3 (4Ω) are in parallel connection.

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

$$\frac{1}{R_p} = \frac{1}{6} + \frac{1}{12} + \frac{1}{4} = \frac{2+1+3}{12} = \frac{6}{12}$$

$$\therefore R_p = \frac{12}{6} = 2\Omega$$

R_p (2Ω), R_4 (2Ω), and R_5 (1Ω) are in series connection.

$$R_s = R_p + R_4 + R_5$$

$$= 2\Omega + 2\Omega + 1\Omega = 5\Omega$$

Current (I) flowing through R_p , R_4 and R_5 remains the same.

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∴ Potential difference across R_5 (1Ω) is $V = IR_5$

$$= 0.3 \times 1 = 0.3 \text{ V}$$

4. Raman's air-conditioner consumer 2160 W of power, when a current of 9.0 A passes through it.

- (i) What is the voltage drop when the air-conditioner is running?
 (ii) How does this compare to the usual household voltage?
 (iii) What would happen if Raman tried connecting his air-conditioner to a 120V line?

Answer: (i) Power (P) = 2160 W

Current (I) = 9A

$$\text{Voltage drop (V)} = \frac{\text{Power (P)}}{\text{Current (I)}} = \frac{2160}{9} = 240\text{V}$$

- (ii) The usual household voltage ranges from 220 V to 230 V. The voltage drop (240 V) due to usage of air conditioner is slightly greater than the usual household voltage.
- (iii) When the airconditioner is connected to a 120 V line, it will not function due to low voltage supply and if the supply continues, it will heat up the coil wire of compressor motor and other cooling fans (because electrical energy dissipates in the form of heat instead of the kinetic energy required) It may damage the unit.

5. The effective resistance of three resistors connected in parallel is $60/47 \Omega$. When one wire breaks, the effective resistance becomes $15/8$ ohms. Find the resistance of the wire that is broken.

Answer: Let the resistance of three resistors by R_1 , R_2 and R_3 respectively.

The effective resistance in parallel connection $R_{P1} = \frac{60}{47} \Omega$

$$\therefore \frac{1}{R_{P1}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} = \frac{47}{60} \Omega$$

If one resistance wire (for example, R_3) breaks, the effective resistance of other two (R_1 and R_2) will be

$$R_{P2} = \frac{15}{8} \Omega$$

$$\therefore \frac{1}{R_{P2}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{8}{15} \Omega$$

$$\therefore \frac{1}{R_{P1}} = \frac{1}{R_{P2}} + \frac{1}{R_3}$$

$$\frac{47}{60} = \frac{8}{15} + \frac{1}{R_3}$$

$$\therefore \frac{1}{R_3} = \frac{47}{60} - \frac{8}{15}$$

$$= \frac{47 - 32}{60} = \frac{15}{60} = \frac{1}{4} \Omega$$

$$\frac{1}{R_3} = \frac{1}{4} \Omega$$

∴ The resistance of the broken wire $R_3 = 4\Omega$

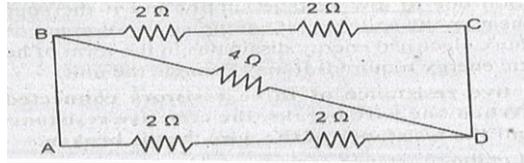
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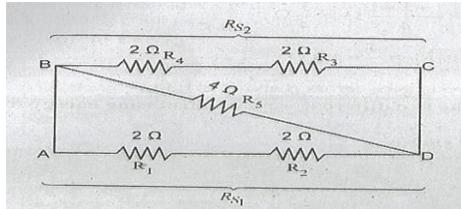
6. Find the resistance across (i) A and D (ii) B and D.



$$= \frac{1}{4\Omega} + \frac{1}{4\Omega} + \frac{1}{4\Omega} = \frac{1+1+1}{4} \Omega = \frac{3}{4} \Omega \therefore R_p = \frac{4}{3} = 1.3\Omega$$

The total resistance across B and D is 1.3Ω

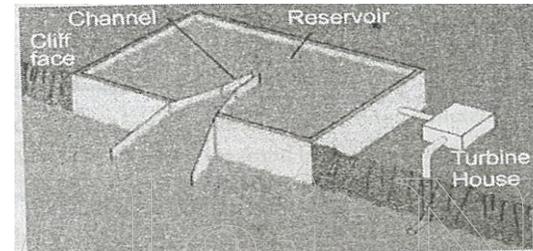
Answer:



7. Explain the two different ways of harnessing energy from the ocean.

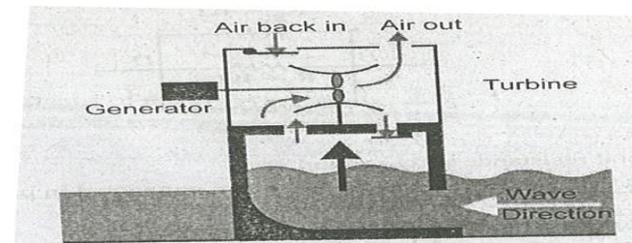
Answer:

(i) **Tidal energy:**



Due to the gravitational pull of the moon on the earth, the level of the water in the sea rises and falls. The phenomenon is called high and low tides and the difference in sea levels gives us tidal energy. Tidal energy is harnessed by constructing a dam across a narrow opening to the sea. A turbine fixed at the opening of the dam converts tidal energy to electricity.

(ii) **Wave energy:**



(i) Let the resistances connected in series between A and D be R_1 and R_2 .

\therefore The total resistance (R_{S1}) across A and D is

$$R_{S1} = 2\Omega + 2\Omega = 4\Omega$$

(ii) The total resistance between B and D can be calculated as follows:

✓ Total resistance across A and D = 4Ω

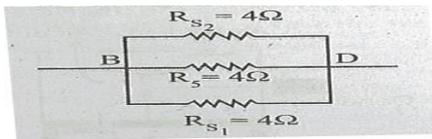
✓ The total resistance across B and C where R_3 and R_4 are connected in series is

$$R_{S2} = R_3 + R_4$$

$$\therefore R_{S2} = 2\Omega + 2\Omega = 4\Omega$$

✓ The value of resistance R_5 is 4Ω

Now,



the circuit can be redrawn as follows:

\therefore The total resistance across B and D

Where resistances (R_{S1} , R_5 and R_{S2}) are connected in parallel

$$\frac{1}{R_p} = \frac{1}{R_{S1}} + \frac{1}{R_5} + \frac{1}{R_{S2}}$$

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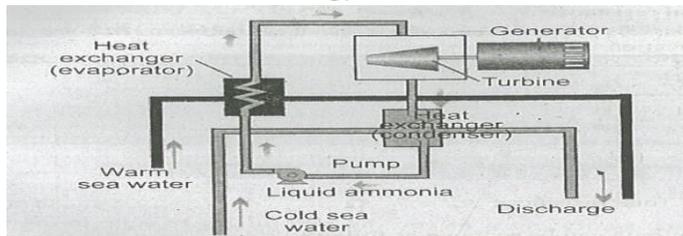
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The kinetic energy possessed by huge waves near the sea-shore can be trapped in a similar manner to generate electricity. The waves are generated by strong winds blowing across the sea. A wide variety of devices have been developed to trap wave energy for rotation of turbine and production of electricity.

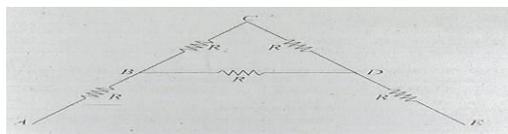
(iii) Ocean Thermal Energy:



Answer: The water at the surface of the sea or ocean is heated by the sun while the water in deeper ocean is relatively cool. If the temperature difference between the water at the surface and water at the depths upto 2kms is 20⁰ C or more, the warm surface water is used to convert liquid ammonia into its vapour which in turn runs the turbine of generator. The deep cool water is used to condense ammonia vapour into liquid ammonia.

8. Five resistors of resistance 'R' are connected such that they form a letter 'A'. Find the effective resistance across the free ends.

Answer: Let the points A, B, C, D and E be marked as shown in the circuit diagram.



- ❖ The resistance which are in between BC and CD are in series connection.
 $R_S = R + R$

∴ Total resistance $R_S = R + R = 2R\Omega$

- ❖ Total resistance R_S and the resistance between BD are in parallel connection

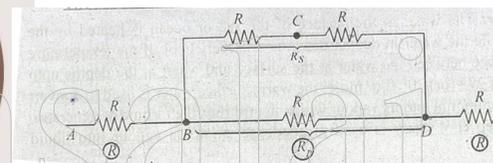
$$\frac{1}{R_P} = \frac{1}{R_S} + \frac{1}{R}$$

$$\frac{1}{R_P} = \frac{1}{2R} + \frac{1}{R}$$

$$= \frac{1+2}{2R} = \frac{3}{2R}\Omega$$

∴ Total resistance $R_P = \frac{2R}{3}\Omega$

- ❖ The circuit can be redrawn as follows:



The resistance between AB, total resistance R_P and the resistance between DE are in series connection

$$R_{S1} = R + R_P + R$$

$$= R + \frac{2R}{3} + R\Omega$$

$$R_{s1} = \frac{3R + 2R + 3R}{3} = \frac{8R}{3}\Omega$$

∴ Effective resistance across the free ends A & E = $\frac{8R}{3}\Omega$

(OR)

2.67RΩ

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LESSON 12 PERIODIC CLASSIFICATION

CLASS:X

Part A

1. In the modern periodic table, periods and groups are given. Periods and Groups indicate-----

i) Rows and Columns (ii) Columns and Rows

2. The third period contains elements. Out of these elements, how many elements are non-metals? (8, **5**)

Answer: 5 (4 Non-Metals P, S, Cl and Ar) + (1 Metalloid Si)

3. An element which is an essential Constituent of all organic compounds belongs to the-----group.

(**14th group**/15th group)

4. Ore is used for the extraction of metals profitably. Bauxite is used to extract aluminium, it can be termed as-----

(**Ore** /mineral)

5. Gold does not occur in the combined form. It does not react with air or water. It is in the ----- state.

(native/combined)

Answer: native state

6. Number of groups in modern periodic table is ----

(7, 17, **18**, 8)

7. An amalgam is an alloy of metal with-----

Carbon, **Mercury**, Hydrogen, gold

8. Number of periods in Modern periodic table is-----

(**7**, 17, 8, 8)

9. The ore of Aluminium is-----

(Haemetite, Magnetite, Bauxite, Siderite)

10. First period contains only two elements, one is hydrogen and the other is-----.

(Nitrogen, Oxygen, Helium, Neon)

11. Bauxite is the ore of -----

(**Aluminium**, Sodium, Copper, Iron)

12.-----are called coinage metals.

[(**Copper, Silver and Gold**), (Copper, Brass and Gold) (Copper, Brass and Gold), (Copper, Silver and Aluminium)]

13. The molecular formula for bauxite is-----

(Al_2O_3 , $\text{Al}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$, **$\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$** , $\text{Al}_2\text{O}_3 \cdot 10\text{H}_2\text{O}$)

14. The percentage of purity of Gold is calculated for making ornaments.

$24/22 \times 100$, **$22/24 \times 100$** , $20/22 \times 100$, $18/23 \times 100$

15. Atomic number of Iron is 26. Its electronic configuration is (2,8,8,2, 2,8,8,4, **2,8,14,2**, 2,8,14,4)

16. Elements of group 3 to 12 in the long form of periodic table are called (Representative elements, **Transition elements**,

Inner transition elements, Inert gas)

17. Any metal mixed with mercury is called-----

(**Alloy**, Solution, Amalgam, Salt)

18. Modern periodic law states that the physical and chemical properties of elements are the periodic function of their

(Atomic weight, Mass number, **Atomic number**, Neutron number)

Part B

1. Assertion: A greenish layer appears on copper vessels, if left uncleaned.

Reason: It is due to the formation of a layer of basic copper carbonate. Give the correct option:

i) Assertion and reason are correct and relevant to each other.

ii) Assertion is true but reason is not relevant to the assertion.

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LESSON 12 PERIODIC CLASSIFICATION

CLASS:X

- A process employed for the concentration of sulphide ore is ----- (**Froth floatation/** gravity separation)
- Coating the surface of iron with other metal prevents it from rusting. If it is coated with thin layer of zinc it is called----- (**galvanization/painting/cathodic protection**)
- Any metal mixed with mercury is called amalgam. The amalgam used for dental filling is-----
(**Ag-Sn amalgam,** Cu-Su amalgam)
- Assertion: In thermite welding, aluminium powder and Fe_2O_3 are used. Reason: Aluminium powder is a strong reducing agent. Does the reason satisfy the assertion.

Answer: Yes, the reason satisfy the assertion.

- Can rusting of iron nail occur in distilled water? Justify your answer.

Answer: Yes. Rusting of iron nail can occur in distilled water because rusting of iron needs both moisture (water) and air. The atmosphere air coming into contact with distilled water makes rusting a possible one.

- Iron reacts with **con.HCl** and **con.H₂SO₄**. But it does not react with **Con.HNO₃** suggest your answer with proper reason.

When iron is dipped in conc.HNO₃ it becomes chemically inert or passive due to the formation of a layer of iron oxide (Fe₃O₄) on surface.

- Why cannot aluminium metal be obtained by the reduction of aluminium oxide with coke?

The oxides of highly reactive metals like Aluminium (which are high up in the reactivity series) are very stable and cannot be reduced by chemical reduction using coke(carbon). Since positive ions of Aluminium are very stable and need a

powerful reducing agent, They can be extracted by the electrolytic reduction where in cathode acts as powerful reducing agent by supplying electrons to reduce metal ions into metal.

- To design the body of the aircraft, aluminium alloys are used. Give your reasons.

Aluminium alloys are light, have high tensile strength and are corrosion resistant.

- 'X' is the silvery White metal. 'X' reacts with oxygen to form Y. The same compound Y is obtained from the metal X on reaction with steam, with the liberation of Hydrogen gas. Identify X and Y.

Answer: $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$ X=Aluminium

$2\text{Al} + 3\text{H}_2\text{O} \rightarrow \text{Al}_2\text{O}_3 + 3\text{H}_2$ Y= Al_2O_3
(Aluminium Oxide)

- Solve the crossword puzzle:

A	L	K	A	L	I	G	V	K	L
L	G	M	N	P	E	R	I	O	D
K	O	P	H	A	L	O	G	E	N
A	L	P	Q	R	S	U	T	U	E
L	D	A	Z	Y	X	P	W	V	O
I	O	D	I	N	E	B	C	D	N
N	O	B	L	E	G	A	S	E	S
E	A	C	T	I	N	I	D	E	S

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LESSON 12 PERIODIC CLASSIFICATION

CLASS:X

CLUES:

DOWN	ACROSS
a. vertical columns are called.	a. horizontal rows are called
b. Second group elements are named as earth metals.	b. first group elements are called
c. an inert gas used in advertisement bulbs	c. group 17 elements are called
d. a yellowish shining metal weighed in carats.	d. group 18 elements are called
	e. belongs to halogen family and helps in thyroid treatment.
	f. inner transition elements present in 7 th period.

Answer:

DOWN	ACROSS
a. Groups	a. Periods
b. Alkaline	b. Alkali metals
c. Neon	c. Halogens
d. Gold	d. Noble gases
	e. Iodine
	f. Actinides

12. Give a single term for each of the following:

- The process of extracting ores from the earth's crust
- The rocky impurities associated with the ores
- The substance added to the ore to reduce fusion temperature
- The process of reducing the roasted oxide ore to metal under molten condition.
- Noble metals occur in this state.

Answer:

- Mining
- Gangue (or) Matrix
- Flux
- Smelting
- Native state

13. Connect the following metallurgical steps with the extraction of metals in the correct order:

(Roasting, bessemerisation, Hall's process, smelting(reduction), Baeyer's process, electrolytic refining, blast furnace, calcination, gravity separation, froth floatation process)

Metal	Step 1	Step 2	Step 3	Step 4	Step 5
Al			-----	-----	-----
Cu					
Fe					-----

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CLASS:X

Answer:

Metal	Step1	Step2	Step3	Step4	Step5
Al	Baeyer's Process	Hall's Process	-----	-----	-----
Cu	Froth floatation	Roasting	Smelting (reduction)	Bessemerisation	Electrolytic reduction
Fe	Gravity Separation	Calcination	Roasting	Smelting In Blast furnace	-----

14. Relate all the four columns of the table with unique properties:

Metal	Ore	Chemical formula	Reduction process
Al	Haemetite	PbS	Blast furnace
Cu	Bauxite	Fe ₂ O ₃	Bessemerisation
Fe	Copper pyrite	Al ₂ O ₃ .2H ₂ O	Froth floatation
Pb	Galena	CuFeS ₂	Hall's process

Answer:

Metal	Ores	Chemical formula	Reduction process
Al	Bauxite	Al ₂ O ₃ .2H ₂ O	Hall's process
Cu	Copper pyrite	CuFeS ₂	Bessemerisation
Fe	Haemetite	Fe ₂ O ₃	Blast furnace

Pb	Galena	PbS	Froth floatation
----	--------	-----	------------------

15. Here are a few statements related to alloys, Identify the incorrect ones and correct them.

- It is a homogeneous mixture of metals. **Correct**
- Zinc amalgam is used in dental filling. **Correct**
- Duralumin is used for making statues, coins, bells, and gongs. **Incorrect**
- Alloys are produced by compressing finely divided metals one over the other. **Correct**
- Zinc is the solvent of brass. **Incorrect**

16. Complete the following table:

Zone	Temperature	Chemical process
Combustion zone		CaCO ₃ → CaO+CO ₂ CaO +SiO ₂ → CaSiO ₃
	400°C	

Answer:

Zone	Temperature	Chemical process
Combustion zone	1500°C	C+O ₂ → CO ₂ ↑+heat
Fusion zone	1000°C	CaCO ₃ → CaO+CO ₂ CaO +SiO ₂ → CaSiO ₃

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LESSON 12 PERIODIC CLASSIFICATION

CLASS:X

Reduction zone	400°C	$\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$
----------------	-------	--

Wrought iron	0.25 - 2%	Construction of buildings and machinery
Pig iron	<0.25%	Making electromagnets

17. Guess who I am?

(i) I am a cheap metal but highly reactive. Therefore, I sacrifice myself to save objects made of iron.

MAGNESIUM

(ii) I am solid solution. Densities use me to fill cavities. **Silver-Tin(Ag-Sn)Amalgam**

(iii) I am a constituent of blood pigment. When I am less in quantity, the person is anaemic. **Iron(Fe)**

(iv) I am formed when matrix and flux react. **Slag**

18. Answer the following questions in one or two sentences:

i) What is the percentage of gold present in 'Hallmark' gold? $\frac{22}{24} \times 100 = 91.6\%$ (916 market gold)

ii) What is the meaning of "Chalogens"? **Ore forming elements.**

iii) What are the metals used in manufacture of science equipment? **Al, Mg, Cu**

iv) Name the metal present in chlorophyll which is used in photosynthesis. **Magnesium**

v) When iron is exposed to moist air, a reddish brown substance is deposited on it. What is it? Give its expansion.

Rust, Hydrated ferric oxide ($\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$)

19. Match the following:

Type of iron	Percentage of Carbon	Uses
Steel	2 - 4.5%	Making man-hole covers and drain pipes

Answer:

Type of iron	Percentage of Carbon	Uses
Steel	0.25 - 2%	Construction of buildings and machinery
Wrought iron	<0.25%	Making electromagnets
Pig iron	2 - 4.5%	Making man-hole covers and drain pipes

19. From the extract of the periodic table answer the following:

(i) How many elements are present in the second period? **Eight elements**

(ii) Write the group number for fluorine and neon? Group number for **Fluorine-17, Neon-18.**

20. An alloy of metal A is used in making aircraft parts. A reacts with strong solution of NaOH to give B with the liberation of H_2 gas. Identify A and B.

A-Aluminium, B- Sodium meta aluminate (NaAlO_2)

21. Fill in the blanks:

i) On passing steam over red hot iron-----is formed with hydrogen. (FeO , Fe_2O_3 , Fe_3O_4 , FeCO_3)

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CLASS:X

Answer: On passing steam over red hot iron Fe_3O_4 (magnetic oxide of iron) is formed with hydrogen.

ii) The components of Duralumin are-----

(Al, Mg, Cu/Al, Mn, Zn, C)

Answer: The components of Duralumin are Al, Mg, Mn, Cu.

22. (i) Modern periodic table is made up of periods and groups.

How many periods and groups are there in the periodic table?

There are seven periods and eighteen groups in the modern periodic table.

(ii) Name any two strategic metals.

Titanium, Chromium, Manganese, Zirconium.

23. After few days the nails in A are rusted while the nails B and C are unaffected. Give reasons.

i) The rusting of nail in A is due to its contact with water and atmospheric air.

ii) In B, the oily layer above water does not allow atmospheric air to come in contact with nails.

iii) In C, the substance anhydrous CaCl_2 has absorbed moisture completely.

This activity, shows that rusting of iron requires both air and water.

24. What is the percentage of impurities present in blister copper?

Blister copper contains 98% pure copper and 2% impurities and are purified by electrolytic refining.

25. "Electrolytic refining method is used to purify copper".

Raise the questions related to the above statement.

(i) Which metal is purified by electrolytic refining?

(ii)

26.

By which method is copper purified? Give below is the diagram of electrolytic refining of Aluminium. Redraw it and label the parts given below:

(Graphite rods, Electrolyte, Refined aluminium)

27. Write any two uses of aluminium.

i) Household utensils are made using aluminium

ii) Electrical cable industry makes wires using aluminium

iii) Alloys (Duralumin, Magnalium) of aluminium are used for making aeroplanes and industrial parts.

iv) Aluminium powder is used in thermite welding in joining the gap between the broken pieces of rails.

28. State any two advantages of the Modern periodic table?

i) The table is based on a more fundamental property i.e., atomic number.

ii) It correlates the position of the element with its electronic configuration more clearly.

29. Mention any two uses of Iron.

i) Pig iron is used in making pipes, stoves, radiators, railings, man hole covers and drain pipes.

ii) Steel is used in the construction of buildings, machinery, transmission and T.V. towers and in making alloys.

iii) Wrought Iron is used in making springs, anchors and electromagnets.

30. Mention the uses of Copper.

i) Copper is extensively used for making electric cables and other electric appliances.

ii) It is used for making utensils, containers, calorimeters, coins etc.,

iii) It is used in electroplating.

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CLASS:X

(i) It is alloyed with gold and silver for making coins and jewels.

(iii) of electrolyte.

Give reason for the addition of cryolite of

(iv)

Write the overall equation of this process.

Important elements(1 mark questions)

1	Last element authenticated by IUPAC is	Cn112 (Copernicium)
2	A constituent of blood pigment(haemoglobin)	-Fe
3	A constituent of bone and teeth	-Ca
4	A constituent of Vitamin-B ₁₂	-Co
5	A constituent of Chlorophyll	-Mg

Answer:

(i)

Electrolytic reduction of Alumina by

Hall's process.

(ii)

The oxygen gas evolved at the anode reacts with graphite anode and form CO₂ and this burns away the graphite rods. Therefore this graphite rods are replaced from time to time.

(iii)

Cryolite is added to lower the melting point of aluminium oxide (alumina) and make it a good conductor of electricity. Cryolite remains unchanged during the electrolysis.

(iv)



1)

A reddish brown metal A when exposed to moist air forms a green layer B. A is heated at different temperatures in the presence of O₂, it forms two types of oxides- C(Black) and D(red). Identify A, B, C, D and write the balanced equation.

Answer:

(i)

A reddish Brown metal is Copper(A)



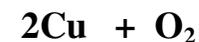
Copper(A)

(Copper carbonate

Green layer (B))

Below 1370k

(ii)



30. Name the aluminium alloys and state their uses.

Answer:

i) Duralumin. It is an alloy made up of Al, Mg, and Cu. It is used for making aircraft, tools and pressure cooker.

ii) Magnalium. It is an alloy made up of Al, Mg. It is used for making aircraft and scientific instruments.

PART C

1) Redraw and label the diagram. Then answer the following Questions:

(i) What process does the diagram represent?

(ii) Why does the graphite rod need to be replaced often?

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LESSON 12 PERIODIC CLASSIFICATION

CLASS:X

Copper(A)

Copper (II) Oxide
(Black oxide(C))

Aluminium renders nitric acid passive due to the formation of an oxide film on its surface. Because of this property aluminium containers can be used to transport HNO_3 .

Above 1370k

(iii)



Copper(A)

Copper(I) Oxide
(Red oxide(D))

A-Aluminium –Al

B – Sodium meta sulphate- NaAlO_2 C-Aluminium Chloride- AlCl_3 D- Nitric acid – HNO_3 .

A-Copper –Cu

B –Copper Carbonate - $\text{CuCO}_3 \cdot \text{Cu(OH)}_2$ C- Copper(II) oxide - CuO D-Copper I Oxide- Cu_2O

2)

A silvery white metal on treatment with NaOH and HCl liberates H_2 gas and form B and C respectively. The metal A will not react with acid D due to the formation of a passive film on the surface. Hence it is used for transporting acid D. Identify A, B, C, D and support your answer with balanced equations.

Answers: Silvery white metal(A) is Aluminium

 3H_2

Aluminium(A)

Sodium meta
Aluminate(B)

(ii)



Aluminium(A)

Aluminium Chloride(C)

(iii)

Aluminium(A) will not react with an acid(D) due to the formation of a passive film on the surface.

“D” is diluted or concentrated Nitric acid.(HNO_3)

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SCIENCE PHYSICS

LESSON 17. MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

CLASS:X

PART – A

1. The magnification produced by a mirror is $+\frac{1}{3}$. Then the mirror is a _____. (concave mirror, convex mirror, plane mirror)

Answer: **convex mirror**

2. The phenomenon of producing an emf in a circuit whenever the magnetic flux linked with a coil changes is _____. (magnetic field, mechanical force, induced current)

Answer: **magnetic field**

3. An electric current through a metallic conductor produces around it. (magnetic field, mechanical force, induced current)

Answer: **Magnetic field**

4. The field of view is maximum for --- (plane mirror, concave mirror, convex mirror) Answer: **convex mirror**

5. An object is placed 25cm from a convex lens whose focal length is 10cm. The image distance is _____. (50 cm, 16.66cm, 6.66cm, 10cm)

Answer: **16.66 cm**

6. From the following statement write down that which is applicable to a commutator.

- (a) A galvanometer uses a commutator for deadbeat
(b) A transformer uses a commutator to step up voltage
(c) A motor uses a commutator to reverse the current

Answer: **(c) A motor uses a commutator to reverse the current**

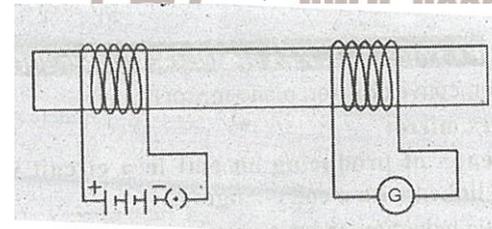
7. An overhead wire carries current from east to west. Find the direction of the magnetic field 5cm below the wire.

Answer: **The direction of the magnetic field 5cm below the wire will be from North to South.**

Explanation: Applying the Maxwell's right-hand thumb rule, when the current flows in the East-West direction, the direction of the magnetic field at a point below the wire is from North to South and above the wire is from South to North.

8. In the arrangement shown in the figure, there are two coils wound on a non-conducting cylindrical rod. Initially the key is not inserted. Then the key is inserted and later removed. Then, which of the following statement is correct?

- a. The deflection in the galvanometer remains zero throughout.
b. There is a momentary deflection in the galvanometer but it dies out shortly.



Answer: **(b) There is a momentary deflection in the galvanometer but it dies out shortly.**

9. Which part of the human eye helps in changing the focal length of the eye lens?

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SCIENCE PHYSICS

LESSON 17. MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

CLASS:X

Answer: The ciliary body of eye (which consists of ciliary muscles) helps in changing the focal length of the eye lens.

10. A pencil partly immersed in water in a glass tumbler appears to be bent at the interface of air and water. Name the phenomenon of light responsible for it.

Answer: **Refraction of light is responsible for the bending appearance of pencil at the interface of air-water.**

11. Sitting in her parlour one night, Chitra sees the reflection of her cat in the living room window. If the image of her cat makes an angle of 40° with the normal, at what angle does Chitra see him reflected?

Answer: **Chitra sees the reflected image of cat at 40°**

Explanation: According to the second law of reflection, the angle of reflection ($\angle r$) is always equal to the angle of incidence ($\angle i$).
 $\angle i = 40^\circ$, $\therefore \angle r = 40^\circ$

12. Why do the lines of the magnetic field not cross each other?

Answer: **If the magnetic field lines crossed each other, it would mean that at the point of intersection, the compass needle would point in two directions at the same time which is not possible. Thus, magnetic field lines are closed curves as they emerge from the north pole and merge at the south pole and also inside the magnet they pass from the south pole to the north pole.**

13. What is the magnetic field midway between two parallel conductors carrying same amount of current in the same direction and in the opposite direction?

Answer:

- ❖ **If the current flows in the same direction, then magnetic field at a point midway between two parallel conductors is zero.**
- ❖ **If the current flows in opposite direction, then the magnetic field at a point midway between two parallel conductors is double.**

14. How can an AC generator be converted into a DC generator?

Answer: **An AC generator can be converted into a DC generator by replacing the slip rings with split ring commutators.**

15. Compute the position of the object placed in front of a concave mirror of focal length ' f ' so that the image formed is of the same size of the object.

Answer: **In the case of a concave mirror, the object should be placed at the centre of curvature (c) of the mirror in order to obtain a same sized image.**

16. Electric power can be transmitted over long distance without much loss of energy is an important advantage of

AC, DC, Both AC & DC, None

Answer: **AC**

17. A device which converts electrical energy into mechanical energy is.....(Generator, Motor, Transformer, Power supply)

Answer: **Motor**

18. The defect myopia can be corrected by using a

(convex lens, concave lens, concave mirror, convex mirror)

Answer: **concave lens**

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SCIENCE PHYSICS

LESSON 17. MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

CLASS:X

19. In Fleming's left hand rule, the fore finger represents the direction of --- (Magnetic field, Current, Motion of a conductor, Electric field)

Answer: **Magnetic field**

20. Eye lens is a _____

(Double convex lens, Double concave lens,
Plano convex lens, Plano concave lens)

Answer: **Double convex lens**

21. Twinkling of stars is due to _____

(Reflection, dispersion,
atmospheric refraction, None of the above)

Answer: **Atmospheric Refraction**

22. The focal length of a concave lens is 2.m then the power of the lens is (0.2D, -0.2D, 0.5D, -0.5D)

Answer: **-0.5D**

23. The defect hypermetropia can be corrected by using a

(Oersted, Faraday, Edison, Newton)

Answer: **Faraday**

PART – D

1. Fill in the blanks.

(i) For a motor: a permanent magnet, then commercial motor: _____

For a motor: a permanent magnet, then for a commercial motor: **Electro magnet.**

(ii) Focal length of a lens: meter, then power of a lens: _____

Focal length of a lens: meter, then power of a lens: **Diopetre.**

2. Correct the mistake, if any, in the following statements:

(i) The magnetic field is a quantity that has magnitude only.

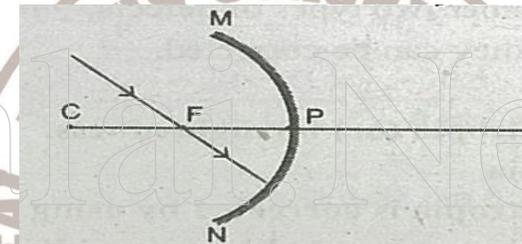
(ii) Outside the bar magnet, the magnetic field lines emerge from the south pole and merge at the north pole.

Answer:

(i) **The magnetic field is a quantity that has both magnetic field is a quantity that has both magnitude and direction**

(ii) **Outside the bar magnet, the magnetic field lines emerge from the north pole and merge at the south pole.**

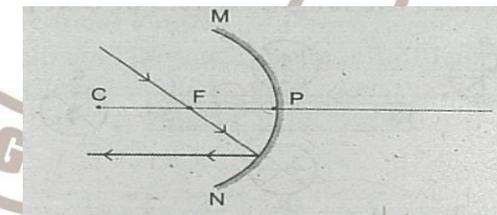
3. The ray diagram shown below is introduced to show how a concave mirror forms the image of an object.



(i) Identify the mistake and draw the correct ray diagram.

Mistake: The reflected ray is not drawn in the given diagram.

Corrected diagram:



(ii) Write the justification for your corrections. **Justification:**

A ray passing through the principal focus 'F' of a concave mirror after reflection, will emerge parallel to the principal axis.

4. In traffic signals _____ colour light is used to stop vehicles because it has _____ wave length. (Hint: scattering of light is inversely proportional to the fourth power of its wavelength)

Answer: red, longer

5. Fill the table with the appropriate words given in bracket.

_____	the tooth's	enlarged image
_____	rear side of the vehicle	erect imaae

(Convex mirror, Plano convex, Concave mirror, Plane mirror, Convex lens, Concave lens)

Answer: (i) Concave mirror

(ii) Convex mirror

6. Write down the names of the specified parts of the human eye.

(i) Dark muscular diaphragm that controls the pupil.

(ii) The screen where the image is formed by the eye lens.

Answer: (i) Iris

(ii) Retina

7. You know that myopia is a common refractive defects of vision. A person with this defect can clearly see only objects that are near. Using concave lens of suitable power this defect is corrected.

(i) Mention the other two types of defects.

(ii) Explain how they can be corrected.

Answer:

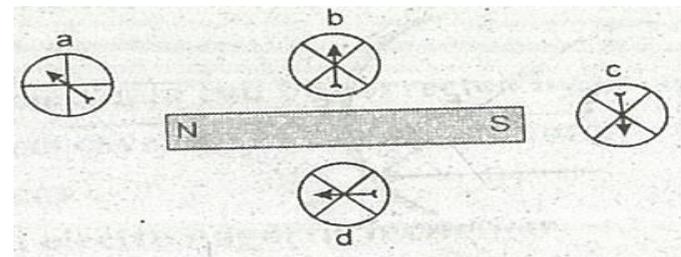
(i) (a) Hypermetropia (or) far sightedness.

(b) Presbyopia

(ii) (a) Hypermetropia is corrected by using convex lens.

(b) Presbyopia is corrected by using bifocal lenses. (which consist of both concave and convex lens)

8. (i) Which of the compass needle orientations in the following diagram correctly describes the magnet's field at that point?



- (ii) To an astronaut sky appears dark instead of blue. Give the reason.

Answer: (i) Compass needle 'a'

Reason: Since unlike poles attract each other i.e. north pole of bar magnet attracts the south pole of magnetic compass, the orientation of compass needle 'a' is correct.

Answer: (ii) For a person in land the sky appears blue due to the scattering effect of light by atmospheric particles. But the astronauts travel beyond the earth's atmosphere where there are no particles to scatter the sun light and so the sky appears black.

9. Does magnetic monopole exist? Give reasons.

Answer: No. Magnetic monopole does not exist.

Explanation: North and South poles of a magnet always exist in pairs. If a magnet is cut into several tiny pieces, each piece will become a magnet with its two poles. Therefore, monopole of a magnet can never exist.

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SCIENCE PHYSICS

LESSON 17. MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

CLASS:X

10. A 3cm tall bulb is placed at a distance of 20 cm from a diverging lens having a focal length of 10.5 cm. Determine the distance of the image.

Given: $u = -20$ cm (Distance to the left of lens is taken as negative)

$f = -10.5$ cm (Distance to the left of lens is taken as negative)

Solution: We know that $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{-10.5} + \frac{1}{-20}$$

$$\frac{1}{v} = \frac{-20 - 10.5}{20 \times 10.5} = \frac{-30.5}{210}$$

$$v = \frac{210}{-30.5} = -6.88 \text{ cm}$$

\therefore Image distance = -6.88 cm

11. A needle placed at 30 cm from the lens forms an image on a screen placed 60 cm on the other side of the lens. Identify the type of lens and determine the focal length.

Given: $u = -30$ cm (Distance to the left of lens is taken as negative)

$v = 60$ cm (Distance to the right of lens is taken as Positive)

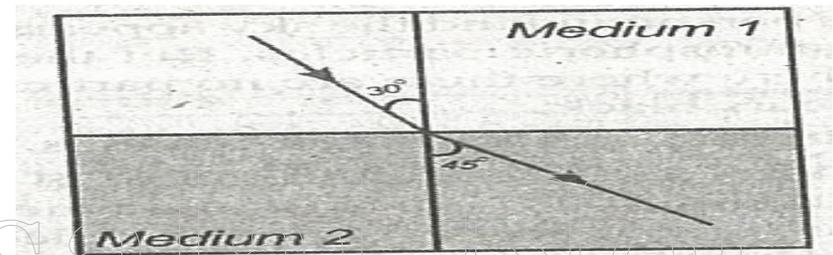
We know that $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

$$= \frac{1}{60} - \left(-\frac{1}{30}\right) = \frac{1}{60} + \frac{1}{30} = \frac{1+2}{60} = \frac{3}{60} = \frac{1}{20}$$

$f = 20$ cm (since 'f' value is positive)

The type of lens is convex lens and its focal length is 20 cm.

12. A ray from medium 1 is refracted below while passing to medium 2. Find the refractive index of the second medium with respect to medium. 1.



Given: Angle of incidence (i) = 30°

Angle of refraction (r) = 45°

Solution: From Snell's law, we know that

$$\text{Refractive Index } \mu = \frac{\sin i}{\sin r}$$

$$= \frac{\sin 30^\circ}{\sin 45^\circ} = \frac{1}{2} \times \frac{\sqrt{2}}{1}$$

$$= \frac{\sqrt{2}}{2 \times \sqrt{2}} = \frac{1}{\sqrt{2}}$$

$$= \frac{1}{\sqrt{2}} = \frac{1}{1.414} \quad \mu = 0.707.$$

∴ Refractive index $\mu = 0.707$

13. A real image, $1/5^{\text{th}}$ the size of the object, is formed at a distance of 18 cm from a mirror. What is the nature of the mirror? Calculate its focal length.

Solution: As the image formed is real, the nature of the mirror is concave mirror.

$$\text{Magnification } (m) = \frac{\text{Height of the image } (h')}{\text{Height of the object } (h)} = \frac{-1}{+5} = \frac{-v}{-u}$$

Image distance (v) = -18 cm

(Distance to the left of the mirror is taken as negative)

$$\Rightarrow \frac{-v}{-u} = \frac{-1}{+5} \Rightarrow \frac{-18}{-u} = \frac{-1}{+5} \Rightarrow -u \times -1 = -18 \times (+5)$$

$$\Rightarrow \mu = -90 \text{ cm}$$

(i.e.) object distance = -90 cm

(Distance to the left of the mirror is taken as negative)

We know that $\frac{1}{f} - \frac{1}{u} = \frac{1}{v}$

$$\frac{1}{f} = -\frac{1}{90} + \frac{1}{18} = \frac{-1-5}{90} = \frac{-6}{90}$$

$$\frac{1}{f} = -\frac{1}{15}$$

$$@ f = -15 \text{ cm}$$

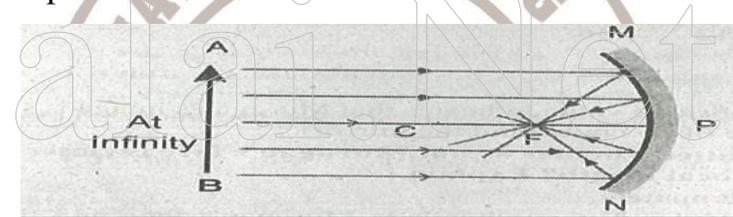
The focal length of concave mirror is 15cm.

14. A person cannot clearly see objects farther than 12 m from the eye. Name the defect in vision he is suffering from and the lenses that should be used to correct this defect.

Answer: It is said that a person cannot see any thing clearly beyond 12 m from his eye. This implies that the person is suffering with short sightedness or myopia. He should wear concave lens of suitable focal length to get it corrected.

15. Explain the use of concave mirrors are used as solar concentrators with the help of a ray diagram.

Answer: Usually concave mirrors are used in solar concentrators. The object, that is the sun is at infinity. A number of rays while come parallel to the principle axis fall on the concave mirror. The reflected rays meet at a point called principal focus (F) on the principal axis. Since all the rays are focused at a point, enormous heat is produced.



16. Light enters from air to kerosene having refractive index of 1.47. What is the speed of light in kerosene, if the speed of light in air is 3×10^8 m/s?

Given: Refractive index of kerosene $\mu = 1.47$

Speed of light in air $c = 3 \times 10^8 \text{ ms}^{-1}$

Solution: As per Snell's law of refraction

$$\text{Refractive index } \mu_m = \frac{\text{Speed of light in air}}{\text{speed of light in medium}} = \frac{C_{\text{air}}}{C_m}$$

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SCIENCE PHYSICS

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CLASS:X

$$1.47 = \frac{3 \times 10^8}{1.47}$$

$$C_m \cdot 1.47 = \frac{3 \times 10^8}{1.47} = 2.0408 \times 10^8 \text{ ms}^{-1}$$

$$\therefore \text{Velocity of light in kerosene} = 2.04 \times 10^8 \text{ ms}^{-1}$$

17. Murugan trims his beard while looking into a concave mirror whose focal length is 18 cm. He looks into it from a distance of 12 cm.

- (i) How far is Murugan's image from the mirror?
 (ii) Does it matter whether Murugan's face is closer or farther length? Explain.

Answer:

- (i) Given: Focal length $f = -18$ cm, object distance $u = -12$ cm (Distances to the left of the mirror are taken as negative)

Solution: We know that $\frac{1}{f} - \frac{1}{u} = \frac{1}{v}$

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

$$\frac{1}{v} = \frac{-1}{18} - \frac{-1}{12} = \frac{-1+3}{36}$$

$$\frac{1}{v} = \frac{1}{36}$$

$\therefore v = 36$ cm (positive value indicated that Murugan's image is supposed to be at a distance of 36 cm behind the mirror).

- (ii) Does it matter whether or not Murugan's face is closer or farther than the focal length? Explain.

Answer: Yes. It matters.

Explanation: If the distance between Murugan's face and the concave mirror is only less than the focal length of the mirror, the image of his face will be magnified, virtual and erect image which could help him trim his beard easily.

18. Light travels at $1.90 \times 10^8 \text{ ms}^{-1}$ in a crystal. What is the crystal's index of refraction?

Given: Velocity of light in crystal $C_m = 1.9 \times 10^8 \text{ ms}^{-1}$

Velocity of light in air $C_{\text{air}} = 3 \times 10^8 \text{ ms}^{-1}$

From Snell's law of refraction $\mu_m = \frac{\text{Velocity of light in air}}{\text{Velocity of light in medium}}$

$$\mu = \frac{C_{\text{air}}}{C_m} = \frac{3 \times 10^8}{1.9 \times 10^8}$$

$$1.47 = \frac{3 \times 10^8}{1.47}$$

$$\mu = 1.579$$

\therefore crystal's index of refraction = 1.579 (no unit)

19. Ranjini makes arrangements for a candle-light dinner and tops it with a dessert of gelatin filled blue berries. If a blueberry that appears at an angle of 45° to the normal in air is really located at 30° to the normal in gelatin, what is the index of refraction of the gelatin?

Given: Angle of incidence (i) = 45°

Angle of refraction (r) = 30°

Solution: From Snell's law of refraction $\mu = \frac{\sin i}{\sin r}$

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SCIENCE PHYSICS

LESSON 17. MAGNETIC EFFECT OF ELECTRIC CURRENT AND LIGHT

CLASS:X

$$= \frac{\sin 45^\circ}{\sin 30^\circ} = \frac{1}{\sqrt{2}} \times \frac{2}{1} = \frac{2}{\sqrt{2}}$$

$$= \frac{\sqrt{2} \times \sqrt{2}}{\sqrt{2}}$$

$$\mu = \sqrt{2} = 1.414$$

∴ Refractive index of the gelatin = 1.414 (no unit)

20. If the far point of a myopic person is 75 cm, what should be the focal length of the lens used to rectify this defect?

Answer: Far point of a myopic person is 75 cm. in front of lens.

(This means that this person can see the distant object (kept at infinity) clearly if the image (v) of this object is formed at this far point i.e. 75 cm)

∴ Object distance (u) = ∞ infinity

Image distance (v) = -75 cm

focal length (f) = ?

Lens formula $\frac{1}{f} - \frac{1}{v} = \frac{1}{u}$

$$\frac{1}{f} = \frac{1}{-75} - \frac{1}{\infty}$$

$$= \frac{1}{-75} - 0$$

$$= \frac{1}{-75}$$

∴ f = -75cm.

∴ The focal length of the concave lens to be used to rectify myopic person is -75cm.

21. Reena and Vani find a discarded plastic lens lying on the beach. The girls discuss what they learnt in Physics and argue whether the lens is a converging or diverging one. When they look through the lens, they notice that the objects are inverted.

(i) If an object 25cm in front of the lens forms an image 20cm behind the lens, what is the focal length of the lens?

(ii) Is it a converging or diverging lens?

Given: Object distance (u) = -25cm (distance to the left of a lens)

Image distance (v) = +20cm (distance to the right of a lens)

Solution: (i) We know that

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

$$= \frac{1}{20} - \frac{1}{-25} = \frac{5+4}{100} = \frac{9}{100}$$

$$\therefore f = \frac{100}{9} = 11.11\text{cm}$$

∴ focal length of the lens = 11.11 cm

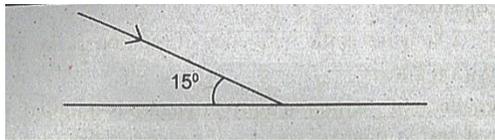
(ii) The lens of converging lens (because the positive value of focal length (f) indicates it).

22. Light which is incident on a flat surface makes an angle of 15° with the surface.

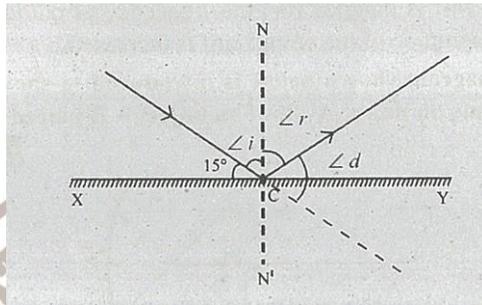
(i) What is the angle of incidence?

(ii) What is the angle of reflection?

(iii) Find the angle of deviation.



Answer:



Solution:

$$\text{Normal } NN' = 90^\circ$$

$$\text{Angle between incident ray and flat surface} = 15^\circ$$

$$\begin{aligned} \text{(i) Angle of incidence } \angle i &= \text{Normal} - \text{Angle formed between the} \\ &\quad \text{incident ray and the flat surface.} \\ &= 90^\circ - 15^\circ = 75^\circ \end{aligned}$$

$$\therefore \text{Angle of incidence } \angle i = 75^\circ$$

(ii) As per laws of reflection

$$\text{Angle of incidence } \angle i = \text{Angle of reflection } \angle r$$

$$\therefore \text{Angle of reflection} = 75^\circ$$

$$\text{(iii) Angle of deviation } \angle d = 180^\circ - 2i$$

$$= 180^\circ - 2 \times 75^\circ$$

$$= 180^\circ - 150^\circ = 30^\circ$$

23. How can you identify the three types of mirrors without touching them? Give reasons.

Answer:

We can identify the type of mirror just by looking into them.

- A plane mirror will produce an image of the same size as our face.
- A concave mirror will produce a magnified image and our face will look much bigger.

24. What will happen when the frequency of rotation in an AC dynamo is doubled?

Answer: In an AC dynamo, the induced electromotive force (emf) is given by

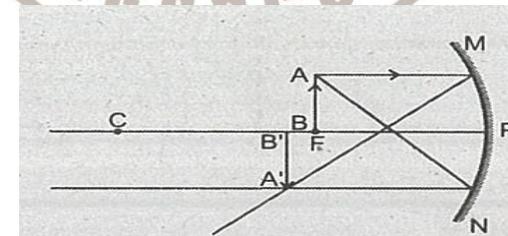
$$e = E_0 \sin \omega t$$

Where $\omega = 2\pi v$ and v is the frequency of rotation of the coil.

$$e = E_0 \sin 2\pi v t$$

If the frequency of rotation in an AC dynamo is doubled, the phase angle of induced emf is doubled (or) the frequency of output emf is doubled. Also the magnitude of the output emf is increased.

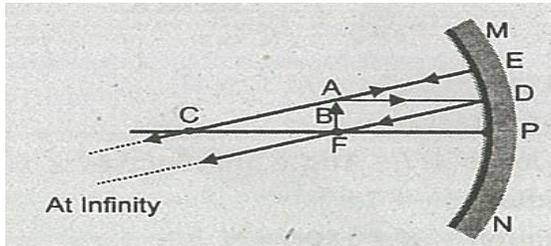
25. The ray diagram shown below is introduced to show how a concave mirror forms an image A' B' of an object A B placed at F.



- (a) Identify the mistakes and draw the correct ray diagram.

Mistake: No ray is passing through either 'F' or 'C'.

Correction:



- (b) Write the justification for your corrections

Since the object is at 'F', the ray which is parallel to principal axis after reflection, will pass through F, and the ray passing through C, after reflection will pass through the same path.

Since these rays do not intersect nearby the image formed will be at infinity and the image will be real inverted and highly magnified.

26. Odd one out.

- (a) Myopia, hypermetropia, Scurvy, presbyopia

Answer: Scurvy.

- (b) Convex mirror, concave mirror, plane mirror, convex lens.

Answer: Convex lens.

Reason: This is the only lens and the others are mirrors.

27. The focal length of a concave lens is 2 m. Calculate the power of the lens. Note :
- $P = \frac{1}{f}$

of the lens. Note : $P = \frac{1}{f}$

Solution: Focal length of concave lens. $f = -2\text{m}$

(Distance to the left of lens is taken as negative)

$$\text{Power of lens, } P = \frac{1}{f} \Rightarrow P = \frac{1}{-2\text{m}}$$

$$P = -0.5 \text{ dioptre}$$

28. Find out the odd one:

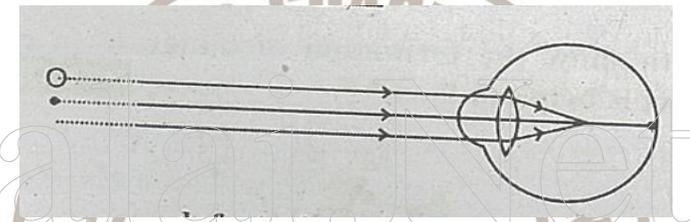
- (a) Angle of incidence, angle of refraction, angle of emergence, right angle.

Answer: Right angle.

- (b) Convex mirror, concave lens, plane mirror, convex lens.

Answer: Plane mirror.

- 29.



- (a) _____ defect of eye.

- (b) _____ lens is used to correct the defect.

Answer: (a) Myopia defect of eye.

- (b) Concave lens is used to correct the defect.

30. A convex mirror used for rear-view on an automobile has a radius of curvature of 3 m. If a bus is located at 5 m from this mirror, find the position and nature of the image.

Solution: Radius of curvature $R = +3.00 \text{ m}$ Object distance $u = -5.00 \text{ m}$

(Distance measured to the left of the pole (p) is taken as negative)

Image distance $v = ?$

$$\text{Focal length} = f \frac{R}{-2} = \frac{+3.00}{2} = +1.5 \text{ m}$$

(Distance measured to the right of pole (p) is taken as positive)

$$\text{we know } \frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$\frac{1}{v} = \frac{1}{f} - \frac{1}{u} = \frac{1}{1.5} - \frac{1}{-5.00} = \frac{1}{1.5} + \frac{1}{5.00} = \frac{5.00 + 1.00}{7.50} = \frac{6.50}{7.50}$$

$$v = \frac{7.50}{6.50} = +1.15 \text{ m}$$

Position: Image is formed at 1.15 m to the right of pole (P).

Nature: Since it is behind the mirror, it is virtual and minimized image.

31. The focal length of a concave lens is 4 m. Calculate the power of the lens. Note: $P = \frac{1}{f}$

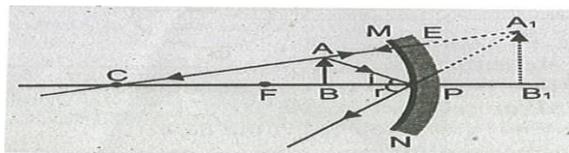
Solution: Focal length of concave lens, $F = -4 \text{ m}$

(Distance measured to the left of lens is taken as negative)

$$\text{Power of the lens } P = \frac{1}{f} \quad P = \frac{1}{-4 \text{ m}}$$

$$P = -0.25 \text{ dioptre}$$

32. Draw ray diagram to show the formation of image by a concave mirror when an object is between P and F.



33. Match the following

- | | | |
|-----------------------|---|---|
| 1. Electric motor | - | $\frac{\sin i}{\sin r}$ |
| 2. Electric Generator | - | dioptr |
| 3. Refractive index | - | converts electrical energy into mechanical energy |
| 4. Power of a lens | - | converts mechanical energy into electrical energy |

Answer :

- | | | |
|-----------------------|---|---|
| 1. Electric motor | - | converts electrical energy into mechanical energy |
| 2. Electric Generator | - | converts mechanical energy into electrical energy. dioptr |
| 3. Refractive index | - | $\frac{\sin i}{\sin r}$ |
| 4. Power of a lens | - | dioptr |

34. Assertion: A convex mirrors are commonly used as a rear-view mirrors in vehicle.

Reason: R convex mirror always gives an real image.

(Both A and R are correct, A is correct R is wrong, A is wrong R is correct, Bothe A and B are wrong)

Answer: 'A' is correct and 'R' is wrong.

Explanation: Convex mirror always gives a virtual imaged.

35. Pick the odd and one out:

- (a) Myopia, Migrane, Hypermetropia, Presbyopia
(b) Pupil, Iris, Utriculus, Retina

Answer:

- (a) Migrane
(b) Utriculus

36. We see rainbow in the sky sometimes after the rain.

(a) What is a spectrum.

The band of seven colours obtained after a white light beam is split by passing it through a prism is called its spectrum.

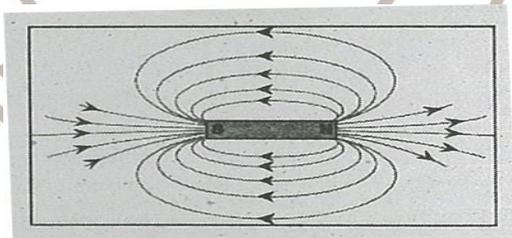
(b) Write the sequence of colours in a spectrum.

The various colours seen are Violet, Indigo, Blue, Green, Yellow, Orange and Red. The acronym is 'VIBGYOR'.

37. In traffic signals Red colour light is used to stop vehicles. Give reason.

In traffic signals, red colour light is used to stop vehicles because it has longer wave length and so it can be seen distinctly by the motorists even at a far off distance.

38.



(a) The above diagram represents _____

The above diagram represents magnetic lines of force around a bar magnet.

(b) Mention any one property of the above.

- (i) Magnetic lines of force emerge from the north pole and merge at the south pole. But inside the magnet, the direction of the field lines is from its south pole to its north pole.
(ii) Magnetic field lines are closed curves.
(iii) No two field-lines are found to cross each other.

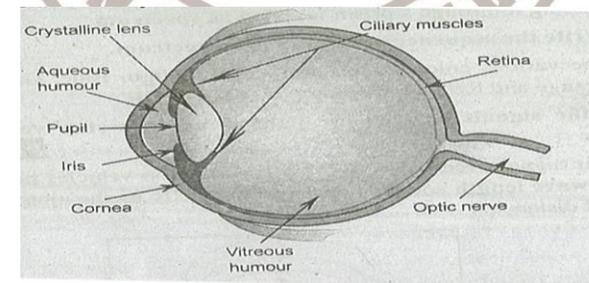
39. Define Fleming's left hand Rule (Motor rule).

Stretch the thumb fore finger and middle finger of your left hand such that they are mutually perpendicular. If the forefinger points in the direction of magnetic field and the middle finger points in the direction of current (I), then the thumb will point the direction of motion or the force acting on the conductor.

40. State Fleming's Right Hand rule (Generator rule).

Stretch the thumb, forefinger and middle finger of right hand so that they are perpendicular to each other. If the Fore Finger indicates the direction of the magnetic Field and the thumb shows the direction of motion of conductor, then the middle finger will show the direction of induced current.

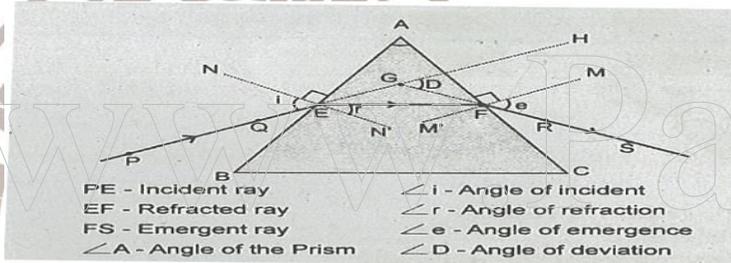
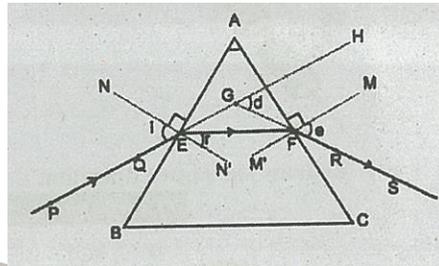
41. Draw and label the parts of human eye.



PART – C

1. (a) Draw the given diagram and label the following in the diagram.

- (i) Incident ray
 (ii) Refracted ray
 (iii) Emergent ray
 (iv) Angle of refraction
 (v) Angle of deviation
 (vi) Angle of emergence



1. (b) The refractive index of diamond is 2.42, what is the meaning of this statement in relation to speed of light?

Refractive index of diamond $\mu = 2.42$

Velocity of light in air (c) = 3×10^8 m/s

Velocity of light through diamond (V) = ?

$$\text{Refractive index } \mu = \frac{\text{Speed of light in air}}{\text{Speed of light in medium}} = \frac{C}{V}$$

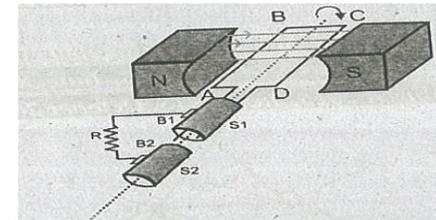
$$2.42 = \frac{3 \times 10^8}{V} = \frac{C}{V}$$

$$\text{Speed of light in medium (V)} = \frac{3 \times 10^8}{2.42} = 1.24 \times 10^8 \text{ m/s}$$

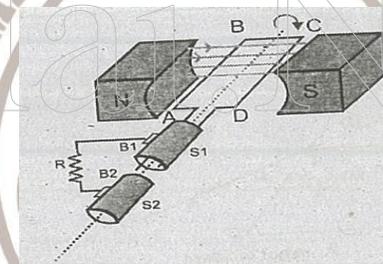
$$\therefore V < C.$$

Since velocity of light (V) through diamond is lesser than the velocity of light (C) in air, speed of light is lesser in medium than in air.

2.



- (a) Redraw the above diagram.



- (b) This diagram represents

A.C Generator

- (c) Label the parts of the diagram.

ABCD – Rotating rectangular coil

NS – Permanent magnet

S₁ and S₂ – two slip rings

B₁ and B₂ – Stationary brushes

R – Resistance in the external circuit.

(d) Write the principles of the name of the diagram is
Electromagnetic induction.

(e) Show the method of finding direction of current in this device.

By applying Fleming's hand rule the direction of induced current can be determined. When coil ABCD is rotated clockwise, the induced currents are setup in these arms along the directions A B and CD. Thus an induced current flows in the direction ABCD and that current in the external circuit flows from B₁ to B₂.

After half a rotation, arm CD starts moving up and AB moving down. As a result, the directions of the induced currents in both the arms change, giving rise to the net induced current in the direction DCBA. The current in the external circuit now flows from B₂ to B₁.

3. (i) Find the nature, position and magnification of the image formed by a convex lens of focal length 10cm, If the object is placed at a distance of (a) 15cm (b) 8cm

(a) Given: Focal length of the lens $f = +10$ cm

Solution: Object distance $u = -15$ cm

We know that $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

$$\frac{1}{v} = \frac{1}{f} + \frac{1}{u} = \frac{1}{10} + \frac{-1}{15} = \frac{3-2}{30} = \frac{1}{30}$$

$$\frac{1}{v} = \frac{1}{30}$$

$\therefore v = +30$ cm

Magnification $m = \frac{\text{image distance}}{\text{object distance}} = \frac{v}{u}$

$$m = \frac{-40}{-8} = +5$$

(If 'm' value is positive, it indicates virtual and erect image)
Nature of the image formed is enlarged, virtual and erect. It is formed at a distance of 40 cm on the same side of the convex lens.

3. (ii) Which of the above represents the use of convex lens in
(a) A film projector (b) The magnifying glass used by palm reader

(a) The lens with object distance of 15 cm and image distance of 30 cm is used in the film project. The object distance being more than the focal length forms an enlarged, real & inverted image on the other side of the lens. Hence it finds its use in film projector.

(b) The lens with object distance of 8 cm and image distance of -40 cm is used as the magnifying glass. The object distance being less than the focal length forms an enlarged, virtual and erect image on the same side of the lens. Hence it finds its use as magnifying glass.

4. An object of 5 cm tall is placed at a distance of 10 cm from a concave mirror of radius of curvature 30 cm.

(i) Find the nature, position and size of the image.

(ii) Draw the ray diagram to represent the above case.

Given: Object distance $u = -10$ cm

Radius of curvature $R = -30$ cm

Focal length of concave mirror $= \frac{R}{2} = -15$ cm

(i) Solution: We know that $\frac{1}{f} = \frac{1}{u} - \frac{1}{v}$

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

$$\frac{1}{v} = \frac{-1}{15} - \frac{-1}{10} = \frac{-2+3}{30} = \frac{1}{30}$$

\therefore Image distance $v = +30$ cm

(Positive value 'v' indicates the virtual & erect image formed behind the mirror)

Nature and position:

An enlarged, virtual and erect image is formed behind the mirror at a distance of 30 cm from its pole.

Size of the image:

Size of the object (h) = + 5 cm

Size of the image (h') = ?

$$\text{Magnification (m)} = \frac{\text{Height of the image (h')}}{\text{Height of the object (h)}} = -\frac{v}{u}$$

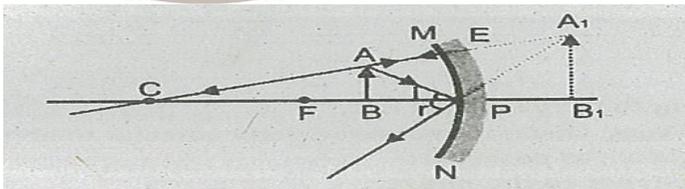
$$m = \frac{h'}{h} = -\frac{v}{u} = \frac{h'}{5} = -\frac{(+30)}{-10} \Rightarrow \frac{h'}{5} = \frac{-30}{-10}$$

$$h' = \frac{5 \times -30}{-10} = \frac{-150}{-10} = 15 \text{ cm}$$

Size of the image = + 15 cm

(+ h' value indicates that it is a virtual and erect image)

(ii)



5. The optical prescription of a pair of spectacle is Right eye : - 3.5 D left eye : - 4.00 D

(i) Name the defect of the eye

(ii) Are these lenses thinner at the middle or at the edges?

(iii) Which lens has a greater focal length?

Given : Optical prescription of a pair of spectacle

Right eye = - 3.5 D Left eye = - 4.00 D

(i) The defect of the eye is short sightedness (or) myopia.

(ii) Concave lens are used to correct the defect and these lenses are thinner in the middle.

(iii) We know that power (P) = $\frac{1}{\text{focal length (in metre)}}$

$$\text{focal length (f)} = \frac{1}{\text{power(D)}} \text{ (in metre)}$$

(a) Right eye : Power = - 3.5 D

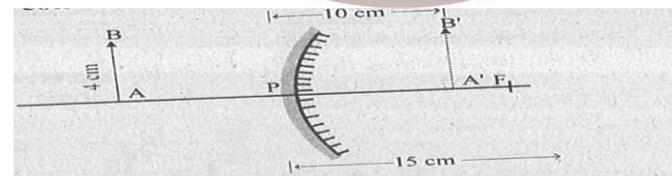
$$\text{Focal length (f}_1\text{)} = -\frac{1}{3.5} = -0.28 \text{ m}$$

(b) Left eye : Power = - 4.00 D

$$\text{Focal length (f}_2\text{)} = -\frac{1}{4.00} = -0.25 \text{ m}$$

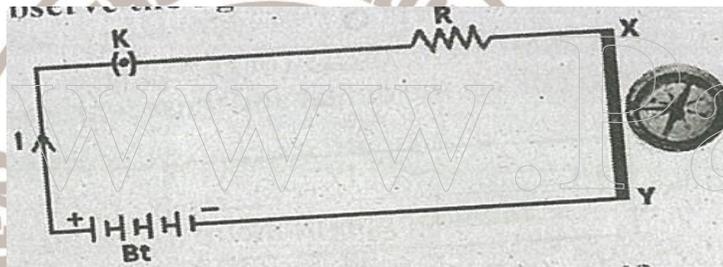
\therefore The lens of the right eye has greater focal length.

6. (a) Observe the figure and write down the following quantities using Cartesian sign convention.



- (i) The length of the object AB
4 cm (Note: Distance measured perpendicular to above the principal axis is taken as positive)
- (ii) The distance to the image.
+ 10 cm (Note: Distance measured to the right of the pole (P) is taken as positive)
- (iii) The focal length of the convex mirror
+ 15 cm (Note: The distance measured to the right of the pole (P) is taken as positive)

6. (b) Observe the figure and answer the following questions



(i) Why is the magnetic needle deflected?

When an electric current is passed through the metallic conductor XY, it produces a magnetic field around it. Therefore the magnetic needle gets deflected.

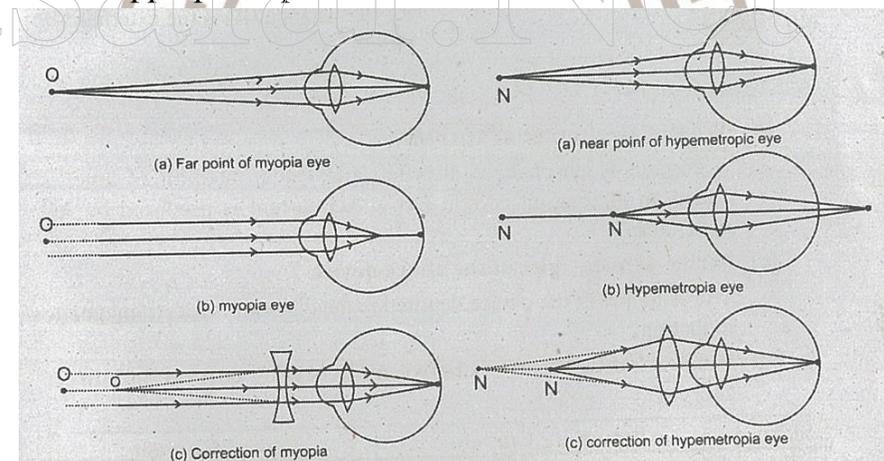
(ii) If the direction of current is reversed, what will be the direction of deflection of magnetic needle?

If the current is passed from X to Y, the north pole of the compass needle would move towards the east. If the direction of the current is reversed i.e., from Y to X. The needle moves in opposite direction, that is towards the west.

7. What are the defects of eye? How are these rectified?

There are mainly three common eye defects. They are

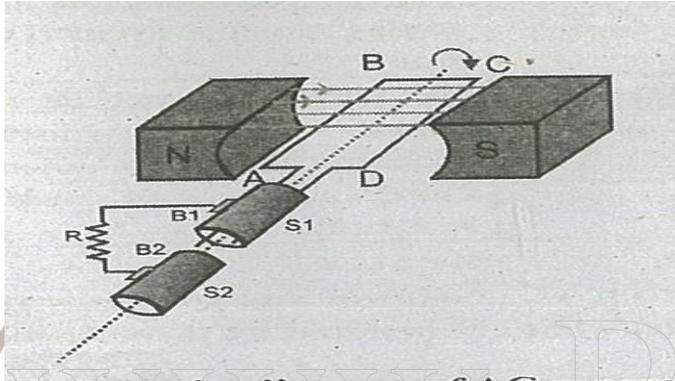
- (i) Myopia (or) near sightedness
- (ii) Hypermetropia (or) Far – sightedness
- (iii) Presbyopia
- (i) Myopia: A person with myopia can see near by object clearly but can not see the distant objects distinctly. This is due to elongation of eye ball. This can be corrected by using Concave lens of suitable power.
- (ii) Hypermetropia: A person with hypermetropia can see distant objects clearly, but can not see near by objects distinctly. This is due to the focal length of eye lens is too long. This defect can be corrected by using a Convex lens of appropriate power.



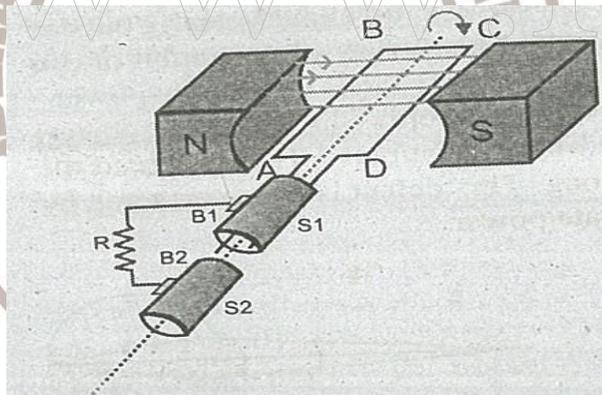
- (iii) Presbyopia: The power of accommodation of the eye usually decreases with ageing. They find it difficult to see near by objects

comfortably and distinctly without corrective eye glasses. This defect is called Presbyopia. They may suffer from both myopia and hyper metropia. It is corrected by using bifocal lens. i.e. Concave and Convex lens.

8.



(a) Copy the diagram of AC generator and label the parts.



Label the parts of the diagram.

ABCD – Rotating rectangular coil

NS – Permanent magnet

S₁ and S₂ – two rings

B₁ and B₂ – stationary brushes

R – Resistance (R) is the external circuit

(b) **What is an alternating current?**

A Current which changes direction after equal intervals of time, is called an alternating current (AC). AC current is produced by AC generator.

(c) **Write the principle of the above device.**

The principle of the device denoted in the diagram is Electromagnetic induction.

(d) **What are the differences between alternating current and direct current?**

S.No.	Alternating Current	Direct Current
1.	AC generator produces a current which changes direction after equal intervals of time and it is called an alternating current (AC).	DC generator produces a unidirectional current and it is called direct current (DC).
2.	AC generator has two slip rings in it and A.C. current is produced.	DC generator has two split ring type commutators and so unidirectional current (DC) is produced.
3.	AC current can be transmitted over long distances without much loss of energy.	DC current cannot be transmitted over long distances economically (as it needs more number of step up transformers).

N.B.: Write only the first two points if the question is asked as follows:

What are the differences between AC generator and DC generator?

9. (a) In Fleming's left hand rule, what are denoted by three fingers?

Stretch the thumb, fore finger and middle finger of your left hand such that they are mutually perpendicular. If the fore finger points in the direction of magnetic field and the middle finger points in the direction of current, then the thumb will point in the direction of motion or the force acting on the conductor.

- (b) State any two uses of concave lenses.

(i) Short sightness (or) Myopia can be corrected by using a concave lens of suitable power.

(ii) Concave lens is used in terrestrial telescope.

(c) A concave lens has focal length of 15 cm. At what distance should the object be placed so that it forms an image 10 cm from the lens.

Solution: Given is a concave lens.

Image distances, $v = -10$ cm (Distance to the left of lens is taken as negative)

Focal length, $f = -15$ cm (Distance to the left of lens is taken as negative)

Object distance, $u = ?$

$$\frac{1}{v} - \frac{1}{u} = \frac{1}{f} \quad (\text{or}) \quad \frac{1}{u} = \frac{1}{v} - \frac{1}{f}$$

$$\frac{1}{u} = \frac{1}{-10} - \frac{1}{-15} \Rightarrow \frac{1}{u} = \frac{-3+2}{30} = \frac{-1}{30}$$

$$u = -30 \text{ cm}$$

Thus, the object should be placed at 30 cm to the left of the lens.

10. (a) **What is an electric motor?**

An electric motor is a rotating device that converts electrical energy into mechanical energy.

- (b) **What is the principle used in an electric motor?**

The mechanical effect of current i.e. force experienced by a current carrying conductor kept in a magnetic field in the principle of electric motor.

Fleming's left hand rule is applied to determine the direction of force on a current – carrying conductor in a magnetic field.

- (c) **List the factors that enhance the power of a commercial motor.**

(i) An electro magnet in place of permanent magnet.

(ii) Large number of turns of the conducting wire in the current – carrying coil.

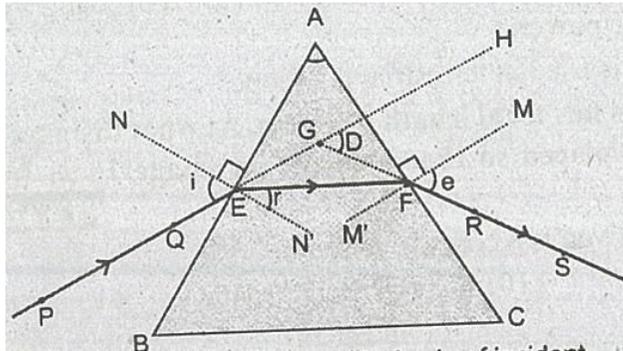
(iii) The soft iron core, on which the coil is wound, plus the coils, is called an armature and this enhances the power of the motor.

11. **Draw and explain the refraction of light through a prism.**

Refraction of light through a prism

Consider a triangular glass prism. It has two triangular bases and three rectangular lateral surfaces. These surfaces are inclined to

each other. The angle between its lateral faces is called the angle of the prism.



PE – Incident ray $\angle i$ - Angle of incident
 EF – Refracted ray $\angle r$ - Angle of refraction
 FS – Emergent ray $\angle e$ - Angle of emergence
 $\angle A$ - Angle of the Prism $\angle D$ - Angle of deviation

Explanation:

Here PE is the incident ray. EF is the refracted ray. FS is the emergent ray. A ray of light is entering from air to glass at the first surface AB. The light ray on refraction has bent towards the normal. At the second surface AC, the light ray has entered from glass to air. Hence it has bent away from normal. The peculiar shape of prism makes the emergent ray bent at an angle to the direction of the incident ray. This angle $\angle r$ is called the angle of refraction. In this case $\angle D$ is the angle of deviation. Mark the angle of deviation in the above activity and measure it.

12. Write the salient features of observations made by Hubble space Telescope (HST).

- (1) Hubble's orbit outside the distortion of earth's atmosphere allows it to take extremely sharp images with almost no background light.
- (2) Hubble Deep field and Hubble ultra Deep field images reveals that galaxies are billions of light years away.
- (3) Many Hubble observations accurately measure the rate at which the universe is expanding. It constrain the value of Hubble's constant and estimates the age of the Universe.
- (4) Hubble's images of planets were crucial in studying the dynamics of the collision of a comet with Jupiter.
- (5) Hubble's observations found that black holes are common to the centers of all galaxies.
- (6) The astronomers used the telescope to observe distant supernovae.

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LESSON 13 CARBON AND ITS COMPOUND**CLASS:X**

PART A

1. Assertion: chemical bonds in organic compounds are covalent in nature.

Reason: Covalent bond is formed by the sharing of electrons in the bonding atoms. Does the reason satisfy the given assertion?

Answer: Yes. The reason(R) satisfies the Assertion(A)

2. Assertion: Diamond is the hardest crystalline form of carbon.;

Reason: Carbon atoms in diamond are tetrahedral in nature. (Verify the suitability of reason to given Assertion mentioned above.)

Answer: The reason (R) does not suitably explain the Assertion (A).

Explanation: In diamond each carbon atom is bonded to four other carbon atoms forming a rigid three dimensional structure, accounting for it's hardness and rigidity.

3. Assertion: Due to catenation a large number compounds are formed.

Reason: Carbon compounds show the property of allotropy. Does the reason hold good for the given Assertion?

Answer: No. The reason(R) does not hold good for the given Assertion(A).

Explanation: Carbon has the ability to form covalent bonds with other atoms of carbon giving rise to larger number of

molecules through self linking property. This property is called catenation.

- 4. Buckminster Fullerene is the allotropic form to----- (Nitrogen/Carbon/Sulphur)
Answer: Carbon
- 5. Eventhough it is a non-metal, graphite conducts electricity. It is due to the presense of----- (free electrons/bonded electrons)
Answer: free electrons.
- 6. The formula of methane is CH_4 and its succeeding member ethane is expressed as C_2H_6 . The common different of succession between them is----- (CH_2 C_2H_2)
Answer: CH_2
- 7. IUPAC name of the first member of alkyne is----- (ethane/ethyne)
Answer: ethyne
- 8. Out of ketonic and aldehydic group which is the terminal functional group?
Answer: Aldehydic group is the terminal functional group. e.g., HCHO , CH_3CHO
- 9. Acetic acid is heated with Na_2CO_3 in a test tube. A colourless and odourness and odourless(X) is evolved. The gas turns lime water milky. identify X.
Answer: Odourless gas X is CO_2

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PART B

- 10. Assertion: Denaturation of ethyl alcohol makes it unfit for drinking purpose.

Answer: Yes. The reason (R) is correct for assertion(A)

- 11. The saturated hydrocarbons form homologous series with the general formula C_nH_{2n+2} . The formula of the second member in this series is (C_2H_2 , C_2H_6 , C_2H_4 , C_2H_8)

Answer: C_2H_6

- 12. Ethanol on oxidation in the presence of alkaline Potassium permanganate or acidified potassium dichromate gives the following acid. (Prapanoic acid, Butanoic acid, Methanoic acid, Ethanoic acid)

Answer: Ethanoic acid

- 13. The functional group of carboxylic acid is (-OH, -CHO, -C=O, -COOH)

Answer: -COOH

- 14. Alkanes have the general formula C_nH_{2n+2} . The molecular formula of the first hydrocarbon is-----

(CH_4 , C_2H_4 , C_2H_6 , C_2H_2)

Answer: CH_4

- 15. A good conductor among the allotropes of carbon is-----

(a)Diamond (b)graphite (c)coke
(d)charcoal

Answer: (b)graphite

1. Write down the possible isomers and give their IUPAC names using the formula C_4H_{10} .

S.No	Isomeric forms	IUPAC names
1	$CH_3-CH_2-CH_2-CH_3$	Butane
2	$ \begin{array}{c} CH_3-CH-CH_3 \\ \\ CH_3 \end{array} $	2-methyl propane.

2. Diamond is the hardest allotrope of carbon. Give the reason for its hardness.

In diamond each carbon atom is bonded to four other carbon atoms covalently and form a rigid three dimensional structure of tetrahedral shape, accounting for its hardness and rigidity.

3. An organic compound(A) is widely used as a preservative in pickles and has a molecular formula $C_2H_4O_2$. This compound reacts with ethanol to form a sweet smelling compound(B)

(i) Identify the compound A and B **A-Acetic acid(CH_3COOH), B-Ethyl ethanoate (ester)**

(ii) Name the process and write corresponding chemical equations. **Esterification:**



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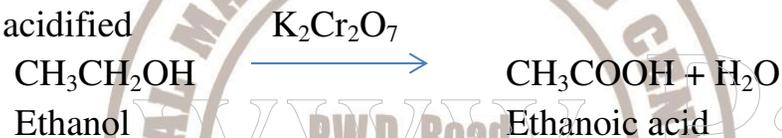
LESSON 13 CARBON AND ITS COMPOUND

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4. An organic compound(A) of molecular formula C_2H_6O on oxidation with alkaline $KMnO_4$ Solution gives an acid(B) with the same number of carbon atoms. Compound A is used as an antiseptic to sterilize wounds in hospitals. Identify A and B. Write the chemical equation involved in the formation of B from A.

Answer:Compound A is ethanol CH_3CH_2OH Compound B is ethanoic acid CH_3COOH

Ethanol is oxidized to ethanoic acid with alkaline $KMnO_4$ or acidified



5. C_2H_6O is the molecular formula for two Compounds A and B. They have different Structural formula.

- What is this phenomenon known as?
- Give the structural formula of A and B
- Write down their common and IUPAC names
- Mention the functional groups of A and B.

Answer: IsomerismStructural formula of A is CH_3-CH_2OH Structural formula of B is CH_3-O-CH_3

Isomeric forms	Common name	IUPAC name
CH_3-CH_2OH	Ethyl alcohol	Ethanol
CH_3-O-CH_3	Dimethyl ether	Methoxy methane

- (-OH)- alcohol group
R-O-R¹-Ether

6. Rewrite the following choosing the correct word from each pair given in brackets:

The hydrocarbons containing at least one carbon to carbon-----
----- (Double/triple) bond are called----- (alkenes/alkynes).
They have the general formula $C_nH_{2n}....$ These were previously
called----- (olefins/paraffines). When this compound is
treated with----- (Bromine/lime) water, decolourisation
occurs because it is----- (saturated/ unsaturated)

Answer: The hydrocarbons containing at least one carbon to
carbon **Double** bond are called **alkenes**. They have the
general formula $C_nH_{2n}....$ These were previously called **olefins**.
When this compound is treated with **Bromine** water,
decolourisation occurs because it is **unsaturated**.

7. Identify the compounds using the clues given below:

- This is dark coloured syrupy liquid containing 30% of sucrose.
- During manufacture of ethanol this is added as food for yeast

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- iii. This enzyme converts sucrose into glucose and fructose
 iv. This compound contains 95.5% ethanol and 4.5% water.
 v. This compound contains 100% pure alcohol

Answer:

- i) Sugar Molasses
 ii) Ammonium Sulphate (or) Ammonium phosphate
 iii) Invertase
 iv) Rectified Spirit
 v) Absolute alcohol

8. Read each description given below and say whether it fits for ethanol or ethanoic acid

- i) It is a clear liquid with a burning taste.
 ii) It is used to preserve biological specimens in laboratories
 iii) It is used to preserve food and fruit juices
 iv) On cooling, it is frozen to form ice flakes which look like a glacier

Answer:

- i) Ethanol
 ii) Ethanol
 iii) Ethanoic acid(Acetic acid)
 iv) Pure Ethanoic acid(Glacial Acetic acid)

9. Match these words / sentences with appropriate statements given below:

(Methonal, Fermentation, catenation, homologous series, hydrogen gas)

- (i) The ability of carbon to form large number of compounds through self linking property.
 (ii) Alcohols react with sodium to give this element.
 (iii) This series helps in giving knowledge and enables systematic study of members.
 (iv) Formation of simple molecules from complex organic compounds using enzymes.
 (v) Unlike ethanol, the intake of this compound in very small quantities can cause death.

Answer:

- (i) Catenation
 (ii) Hydrogen gas
 (iii) Homologous series
 (iv) Fermentation
 (v) Methanol

10. Match the following

Compounds	Functional groups
Alcohol	$>C=O$
Aldehyde	-OH

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Ketone	-COOH
Carboxylic acid	-CHO

Answer:

Compounds	Functional groups
Alcohol	-OH
Aldehyde	-CHO
Ketone	>C=O
Carboxylic acid	-COOH

1. Write the common names and IUPAC names of the following:

(a) CH_3COCH_3 (b) CH_3COOH

	Formula	Common name	IUPAC NAME
(a)	CH_3COCH_3	Dimethyl ketone (or) Acetone	Prapnone
(b)	CH_3COOH	Acetic acid	Ethanoic acid

2. Match the following:

- (a) Ethene $-\text{C}_3\text{H}_4$
 (b) Ethane $-\text{C}_3\text{H}_6$
 (c) Propyne $-\text{C}_2\text{H}_4$

(d) Propene

 $-\text{C}_2\text{H}_6$

Answer:

- (a) Ethene $-\text{C}_2\text{H}_4$
 (b) Ethane $-\text{C}_2\text{H}_6$
 (c) Propyne $-\text{C}_3\text{H}_4$
 (d) Propene $-\text{C}_3\text{H}_6$

3. Ethanol is oxidized to ethanoic acid with acidified $\text{K}_2\text{Cr}_2\text{O}_7$.

Ethanoic acid

- (i) During this reaction identify the colour change involved.
During this reaction, orange colour of $\text{K}_2\text{Cr}_2\text{O}_7$ changes to green.

Mention the use of the above reaction

This reaction can be used for the identification of alcohols

4. Complete the following:

	Formula	IUPAC name
1	-----	Methane
2	$\text{CH}_3\text{CH}=\text{CH}_2$	-----
3	$\text{HC}\equiv\text{CH}$	-----
4	-----	Ethanol

Answer:

	Formula	IUPAC name
--	---------	------------

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1	CH ₄	Methane
2	CH ₃ CH=CH ₂	Propane
3	HC=CH	Ethyne
4	CH ₃ CH ₂ OH	Ethanol

PART C

1. Fill in the blanks using suitable formula in the given table

S.No	Alkane	Alkene	Alkyne
1	C ₂ H ₆ Ethane	-----Ethene	C ₂ H ₂ Ethyne
2	-----Propane	C ₃ H ₆ Propane	----- Propyne
3	C ₄ H ₁₀ Butane	----- Butene	----- Butyne

Answer:

S.No	Alkane	Alkene	Alkyne
1	C ₂ H ₆ Ethane	C ₂ H ₄ Ethene	C ₂ H ₂ Ethyne
2	C ₃ H ₈ Propane	C ₃ H ₆ Propane	C ₃ H ₄ Propyne
3	C ₄ H ₁₀ Butane	C ₄ H ₈ Butene	C ₄ H ₆ Butyne

5. Denaturation of ethyl alcohol makes it unfit for drinking purposes

Reason out:

Denatured alcohol is ethyl alcohol which has been made unfit for drinking purposes by adding poisonous substances like pyridine, methanol, copper sulphate etc.

Reason: If methanol blended ethanol is consumed,

i) Methanol is oxidized to methanol in the liver and damages liver cells.

ii) Methanol coagulates the normal protoplasm and also affects the optic nerve causing blindness, and

iii) Consuming methanol blended alcohol causes even death.

6. Write the importance of Homogeneous series

i) It helps to predict the properties of the members of the series that are yet to be prepared.

ii) Knowledge of homogeneous series gives a systematic study of the members.

iii) The nature of any member of the family can be ascertained if the properties of the first member are known.

2. Homologous series predict the properties of the members of hydrocarbon. Justify this statement through any three characteristics.

i. All members of homologous series contain same elements and the same functional groups.

ii. All members of homologous series have same general molecular formula. e.g.

Alkane=C_nH_{2n+2}; Alkene=C_nH_{2n}; Alkyne=C_nH_{2n-2}

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- iii. The members in homologous series show a regular gradation in their physical properties with respect to increase in molecular mass.
- iv. The chemical properties of the members of the homologous series are similar.
- v. Each member of the series differs from the proceeding or succeeding member by a common difference of CH_2 and by a molecular mass of 14 amu (amu=atomic mass unit).
- vi. All members of each homologous series can be prepared by using same general method.

3. Write the common name and IUPAC name of the following:

- a) $\text{CH}_3\text{CH}_2\text{CHO}$
- b) CH_3COCH_3
- c) $\text{CH}_3\text{-CH-CH}_3$
 $\quad\quad\quad |$
 $\quad\quad\quad \text{OH}$
- d) CH_3COOH
- e) HCHO

	Formula	Common Name	IUPAC Name
(a)	$\text{CH}_3\text{CH}_2\text{CHO}$	Propionaldehyde	Propanal
(b)	CH_3COCH_3	Dimethyl Ketone	Propanone

(c)	$\text{CH}_3\text{-CH-CH}_3$ $\quad\quad\quad $ $\quad\quad\quad \text{OH}$	Isopropyl alcohol	2-Propanol
(d)	CH_3COOH	Acetic acid	Ethanoic acid
(e)	HCHO	Formaldehyde	Methanal

4.

Look at the diagram and answer the following questions:

- What type of structure do diamond and graphite have?
- Why are diamonds used in cutting tools?
- Why is graphite used in electrical circuits?
- Name the force that accounts for the softness of graphite?
- Name the precious diamond you know and give its weight in grams.

Answers:

- Diamond has a rigid three dimensional structure where in each carbon atom is tetrahedral fashion. Graphite has an arrangement where in each carbon atom is bonded to three other carbon atoms in the same plane giving hexagonal layers held together by Vanderwalls force.
- Diamonds are used in cutting tools due to its hardness and rigidity.

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iii. Since graphite has free electrons in it, it is a good conductor of electricity. This property of graphite makes its possibility of using in electrical circuits.

iv. Weak van der Waals forces which act between hexagonal layers of carbon atoms account for its softness.

v. **KOHINOOR DIAMOND.** Its weight is 21.68g(105 carats)

5. C_nH_{2n+2} is the general formula of a homologous series of hydrocarbons?

i. In this series saturated or unsaturated?

ii. Name the series described above. Give the formula and name of the member with two carbon atoms.

iii. Draw the structural formula of the first member in this series.

iv. Define the homologous series and find the common differences between the successive members of this family.

v. Write the formula of n-Butane and n-pentane

Answer:

i. Saturated hydrocarbons

ii. Alkanes

The formula of the alkane with two carbon atoms is

C_2H_6 (Calculated as follows)

C_nH_{2n+2}

$C_2H_{2 \times 2 + 2} = C_2H_6$

C_2H_6 is ethane

iii. CH_4 methane is the first member of alkane series

Structural formula:

iv. Definition: A Homologous series is a group or a class of organic compounds having same general formula and similar chemical properties and the successive members of this series differ by a CH_2 group.

v. $CH_3 - CH_2 - CH_2 - CH_3$

n-Butane

$CH_3 - CH_2 - CH_2 - CH_2 - CH_3$

n-pentane

6. Ethanol is heated with excess concentrated H_2SO_4 at 443K.

i. Name the reaction that occurs and explain it.

ii. Write the equation for the above reaction?

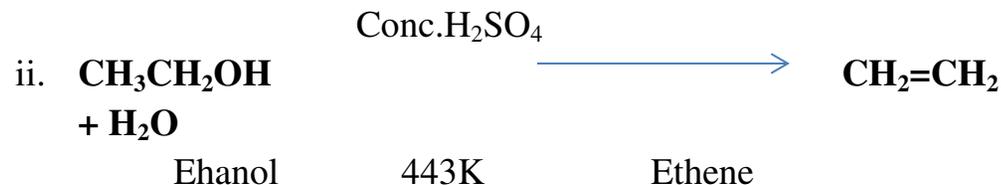
iii. What is the product formed? What happens when this gas is passed through bromine water?

iv. When ethanol vapour is passed through bromine water, why does no change occur?

Answer:

i. Intra molecular dehydration

Explanation: Ethanol, when heated with excess conc. H_2SO_4 at 443K undergoes intra molecular dehydration (i.e. removal of water within a molecule of ethanol.) to give ethane



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iii. Ethene is the product.

Bromine test: When ethane gas is passed through reddish brown coloured bromine water (taken in a test tube), decolouration occurs which indicates the presence of unsaturated nature(double bond).

iv. Bromine test for ethanol: When ethanol vapour is passed through bromine water (taken in a test tube), no colour change occurs which indicates that ethaol is a saturated compound(without double bond).

7. Complete the following table:

Molecular formula	Common Name	IUPAC Name
CH ₃ CH ₂ CH ₂ CH ₂ OH		
	Dimethyl Ketone	
		Propanal
HCOOH		
		Butanone

Answer:

Molecular formula	Common Name	IUPAC Name
CH ₃ CH ₂ CH ₂ CH ₂ OH	n-Butyl alcohol	1-Butanol
CH₃-CO-CH₃	Dimethyl Ketone	Propanone

CH ₃ CH ₂ CHO	Propionaldehyde	Propanal
HCOOH	Formic acid	Methanoic acid
CH ₃ CH ₂ CO CH ₃	Ethyl methyl ketone	Butanone

8. Ethanoic acid is a member of Homologous series with general Formula C_nH_{2n+1} COOH.

- Name the series and give its functional group.
- Give the molecular formula and the common name for ethanoic acid.
- If this compound is mixed with ethanol in the presence of Conc.H₂SO₄, a sweet smelling compound is formed. Give the equation and name the compound.
- Ethanoic acid reacts with carbonates. Which gas is liberated during this reaction?
- Write the balanced equation for the reaction of ethanoic acid with carbonate.
- Your grandmother has prepared mango pickle. What has she added to preserve it for a long time?

Answer:

(i) Carboxylic acid

-COOH is the functional group

(ii) Molecular formula CH₃COOH →

Common name Acetic acid

(iii) CH₃COOH + C₂H₅OH

CH₃COOC₂H₅ + H₂O

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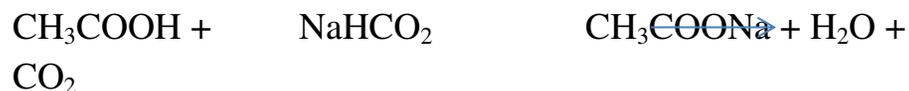
LESSON 13 CARBON AND ITS COMPOUND

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(iv) When ethanoic acid reacts with carbonates, CO_2 gas evolves with a brisk effervescence



Ethanoic acid Sodium carbonate Sodium acetate



(vi) Vinegar (Acetic acid)

9. (i) Identify A & B

(ii) Convert ethanol into power alcohol. Mention one of its uses.

(iii) What should be added to obtain denatured spirit?

(iv) Give one use of denatured spirit?

Answer:

A- Methylated spirit

B-Rectified spirit

I. When ethanol (20%) is added to petrol (80%) power alcohol is obtained.

• Power alcohol is used as a fuel in internal combustion engines and it can be used as a substitute for petrol in motor cars.

II. Pyridine should be added with ethanol to obtain denatured spirit.

V. Denatured spirit is used for the preparation of paints and varnishes as a solvent.

• It can be used as a cleaning agent of hard surfaces/ ink stain remover/ paint remover etc.

10. Write a balanced equation using the correct symbols for these chemical reactions:

(i) Action of hydrogen on ethane in the presence of nickel catalyst.

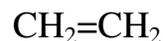
(ii) Combustion of methane evolving carbon dioxide and water.

(iii) Dehydrogenation of ethanol.

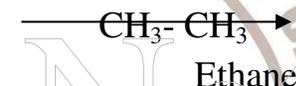
(iv) Decarboxylation of Sodium salt of ethanoic acid.

Answer:

(i) Action of heat on ethane



Ethene



(ii) Combustion of methane



(iii) Dehydrogenation of ethanol:

When the vapour of ethanol is passed over heated copper catalyst at 573K, it is dehydrogenated to acetaldehyde.



Ethanol



Acetaldehyde

(iv) Decarboxylation (Removal of CO_2) of Sodium salt of ethanoic acid. When sodium salt of ethanoic acid is heated with soda lime (mixture of NaOH and CaO in 3:1 ratio), methane gas is liberated.

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Sodium acetate

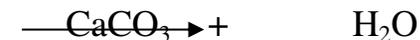


methane Sodium carbonate



Lime water

(Calcium Hydroxide)



Calcium carbonate

(milky white)

11. Look at the picture and identify what happens. Support your answer with equations.

(i) How is B formed from A?

(ii) What happens when acetic acid is treated with carbonate salt. Name the gas produced. What happens when this gas is treated with lime water?

(iii) What happens when acetic acid is treated with ethanol in the presence of concentrated H_2SO_4 ? Give the equations.

Answer:

'B' is formed 'A' by the process of oxidation Ethanol(A) on oxidation in the presence of the alkaline potassium permanganate (or) acidified potassium dichromate, gives ethanoic acid(B).



Ethanol(A)

acid



Ethanoic

● When acetic acid treated with carbonate salt, carbon-di-oxide gas is produced.

● When the liberated gas is treated with lime water, the later turns into milky white colour due to the formation of CaCO_3 .



+ CO_2

Acetic acid Sodium carbonate



Sodium acetate

When acetic acid is treated with ethanol in the presence of $\text{Con.H}_2\text{SO}_4$, fruity smelling ester is formed.



Acetic acid Ethyl alcohol

Ethyl ethanoate

12. Organic compounds 'A' and 'B' are the isomers with the molecular formula $\text{C}_2\text{H}_6\text{O}$. Compound 'A' produces gas with sodium metal, whereas compound 'B' do not. Compound 'A' reacts with acetic acid in the presence of concentrated H_2SO_4 to form compound 'C' with a fruity flavour. What are the isomers 'A', 'B' and the compound 'C'.

Answers: Compounds 'A' and 'B' are the isomers which the molecular formula $\text{C}_2\text{H}_6\text{O}$.

'A' is alcohol (ethanol)



Ethanol(A)



Sodium ethoxide

(ii) 'B' is dimethyl ether



Dimethyl ether(B)

No reaction

(iii)

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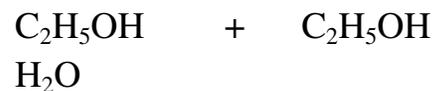
CLASS:X



Ethanol

Acetic acid

Ethyl ethanoate



Ethanol

Ethanol



Diethyl ether(B)

Compound 'A' is $\text{CH}_3\text{CH}_2\text{OH}$ – Ethanol

(iii) Intra molecular dehydration

Compound 'B' is $\text{CH}_3\text{-O-CH}_3$ - Dimethyl ether (Methoxy methane)

Ethanol, when heated with excess of conc. H_2SO_4 at 443K, it undergoes intra molecular dehydration(i.e. removal of water within a molecule of ethanol) to give ethene.

Compound 'C' is $\text{CH}_3\text{COOC}_2\text{H}_5$ – Ethyl ethanoate

Conc. H_2SO_4

13.Organic compound 'A' of molecular formula $\text{C}_2\text{H}_6\text{O}$ (iv) liberates hydrogen gas with sodium metal. 'A' gives 'B' of formula $\text{C}_4\text{H}_{10}\text{O}$, When it reacts with concentrated H_2SO_4 at 413K. At 443K with concentrated H_2SO_4 'A' gives compound 'C' of formula C_2H_4 . This compound 'C' decolourises bromine water. What are 'A', 'B' and 'C'?



Ethanol

Ethene

Answer:

Organic compound 'A' having the molecular formula, $\text{C}_2\text{H}_6\text{O}$ reacts with sodium and liberates hydrogen gas and it must be ethanol.

Ethene decolourises bromine water because it has double bond.

Compound 'A' is $\text{CH}_3\text{CH}_2\text{OH}$ – Ethanol

Compound 'B' is $\text{C}_2\text{H}_5\text{-O-C}_2\text{H}_5$ - Diethyl ether

Compound 'C' is $\text{CH}_2=\text{CH}_2$ -Ethene



Ethanol(A)

Sodium ethoxide

14.Organic compound 'A' of molecular formula $\text{C}_2\text{H}_4\text{O}_2$ gives brisk effervescence with sodium bicarbonate solution. Sodium salt of 'A' on treatment with soda lime gives a hydrocarbon 'B' of molecular mass 16. It belongs to the first member of the alkane family. What are 'A' and 'B' and how will you prepare 'A' from ethanol?

Answer:

Organic compound 'A' of molecular formula $\text{C}_2\text{H}_4\text{O}_2$ gives brisk effervescence with sodium bicarbonate and it must be acetic acid.

ii) Inter molecular dehydration

When excess of ethanol is heated with conc. H_2SO_4 at 413K, It undergoes inter molecular dehydration(ie. Removal of water (i) from two molecules of ethanol) to give diethyl ether.

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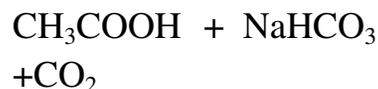
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LESSON 13 CARBON AND ITS COMPOUND

CLASS:X



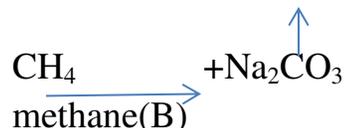
Acetic acid(A)

Sodium acetate

- ii) When sodium salt of ethanoic acid(Sodium acetate) is heated with soda lime (a mixture of NaOH and CaO in 3:1 ratio) methane gas is formed.



Sodium acetate



- iii) Preparation of Ethanoic acid:

Ethanol on oxidation in the presence of alkaline potassium permanganate or acidified potassium dichromate gives ethanoic acid.



Ethanol

Acetic acid

1. (a) What is the functional group?

Functional group may be defined as an atom or group of atoms or reactive part which is responsible for the characteristic properties of the compounds.

(b) Complete the table

S.No	Formula	Common Name	IUPAC Name
1	CH ₃ CH ₂ CH ₃	Propane	----- --

2	CH ₃ CH ₂ CH=C H ₂	Butylene	----- --
3	----- --	Dimethyl acetylene	----- --
4	----- --	Propionaldehyde	----- --

Answer:

S.No	Formula	Common Name	IUPAC Name
1	CH ₃ CH ₂ CH ₃	Propane	Propane
2	CH ₃ CH ₂ CH=C CH ₂	Butylene	But-1-ene
3	CH ₃ -C=C- CH ₃	Dimethyl acetylene	But-2-yne
4	CH ₃ CH ₂ CHO	Propionaldehyde	Propanal

2. (i) Name the enzymes used in the manufacture of ethanol from sugar molasses.

Invertase and zymase used in the manufacture of ethanol from sugar molasses.

- (ii) What happens when yeast is added to diluted molasses?

Yeast is added to the dilute molasses collected in large fermentation tanks and the mixture is kept at about 303K for a few days. During this period, the enzymes invertase and zymase present in yeast, bring about the conversion of sucrose into ethanol.

Invertase

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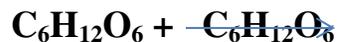
SCIENCE CHEMISTRY

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Sucrose



Glucose Fructose

zymase



Glucose or Fructose



Ethanol

- (i) As an anti-freeze in automobile radiators.
- (ii) As a preservative for biological specimen.
- (iii) As an antiseptic to sterilize wounds in hospitals.
- (iv) As a solvent for drugs, oils, fats, perfumes, dyes, etc.,
- (v) In the preparation of methylated spirit (mixture of 95% of ethanol and 5% of methonal), rectified spirit (mixture of 95.5% of ethanol and 4.5% of water), power alcohol (mixture of petrol and ethanol) and denatured sprit (ethanol mixed with pyridine).
- (vi) In cough and digestive syrups.
4. (a) Ethanoic acid reacts with ethanol in the presence of concentrated H_2SO_4 .
- (i) Name the organic product formed.
Ethyl ethonate.
- (ii) Give the name of the reaction.
Esterification
- (iii) What is the role of H_2SO_4 in the above reaction?
Catalyst.
- (b)The molecular formula of an organic compound is CH_3COOH .
- (i) Write the IUPAC name of this compound.
Ethanoic acid
- (ii)Give one use of this compound.
For coagulating rubber from latex.
5. Ethanoic acid reacts with carbonates and bicarbonates.
- (a) Write the balanced equation.

- iii) Write (any two) evil effects of consuming alcohol.
- i) If ethanol is consumed, it tends to slow down metabolism of our body and depresses the central nervous system.
- ii) It causes mental depression and emotional disorder.
- iii) It affects our health by causing ulcer, high blood pressure, cancer, brain and liver damage.
- iv) Nearly 40% accidents are due to drunken drive.

3. (a) What is the functional group of alcohol?

The functional group of alcohol is $-OH$ (Hydroxyl group)

(b)Write the Esterification reaction.

Ethanol reacts with ethanoic acid in the presence of Conc. H_2SO_4 (Catalyst) to form ethyl ethanoate and water. The compound formed by the reaction of an alcohol with carboxylic acid is known as ester (fruity smelling compound) and the reaction is called esterification.



Ethaol Ethanoic acid Ethyl ethanoate

- (c)Write any two uses of Ethanol.

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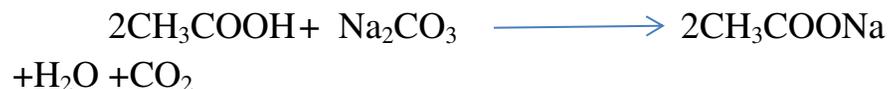
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Ethanoic acid reacts with carbonates and bicarbonates and produces brisk effervescence due to the evolution of carbon dioxide.



(b) Give three uses of ethanoic acid.

Ethanoic acid is used

- i) For making vinegar which is used as a preservative in food and fruit juices.
- ii) As a laboratory reagent.
- iii) For coagulating rubber from latex.
- iv) In the preparation of dyes, perfumes and medicine.

6. (a) The structural formula of an organic compound is $\text{CH}_3\text{-CH}_2\text{-OH}$

i) Write the IUPAC name of this compound

IUPAC Name - Ethanol

ii) Give one use of this compound

As an anti-freeze in automobile radiators.

(b) Write the common name and IUPAC name for the following:

(i) $\text{CH}_3\text{CH}_2\text{COCH}_3$

(ii) HCOOH

Answer:

S.No	Formula	Common name	IUPAC Name
1	$\text{CH}_3\text{CH}_2\text{COCH}_3$	Ethyl methyl ketone	Butanone
2	HCOOH	Formic acid	Methanoic acid

(c) Give the IUPAC name of the following.

(i) formaldehyde

(ii) Acetone

S.No	Common Name	IUPAC Name
1	Formaldehyde	Methanal
2	Acetone (Dimethyl ketone)	Propanone