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| GSEB Batch : 10 th Std. Eng. Medium | MAHESH TUTORIALS SUBJECT : Science & Technology(011) First Preliminary Exam Question Paper | Date:31/12/16 Marks : 50 Time: 1 Hrs. |
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PART - A

Instructions :

[1] All **1 to 50** objective questions are compulsory. (Write your answer in the OMR Answer Sheet given separately.)

[2] All objective questions carry equal marks. Each of **1 mark**.

[3] A O, B O, C O, D O are given for each questions in the given separate OMR Answer Sheet. You have to dark compulsory ● the circle(O) with pen to the correct answer from the given alternatives.

1. **What is the approximate diameter of human hair?**
 (a) 750nm (b) 7500nm (c) 75000nm (d) 50,000nm
2. **The tensile strength of carbon nanotubes is times more than that of steel.**
 (a) 10 (b) 60 (c) 100 (d) 50
3. **What is the velocity of light in km/s ?**
 (a) 3×10^8 (b) 3×10^5 (c) 3×10^{11} (d) 3×10^{24}
4. **Final image formed by a telescope is**
 (a) Real (b) Erect (c) Horizontal (d) Inverted
5. **Primary colours are _____ .**
 (a) red, blue, yellow (b) red, orange, yellow (c) red, blue, green (d) red, green, cyan
6. **Where does the image form in a human eye?**
 (a) Cornea (b) Eyeballs (c) Iris (d) Retina
7. **Which optical phenomenon is responsible for mirage?**
 (a) only refraction (b) reflection
 (c) refraction and total internal reflection (d) only total internal reflection
8. **Who gave the law for finding the force between two charges ?**
 (a) Volta (b) Ampere (c) J.J. Thomson (d) Coulomb
9. **In volta's cell, anode is _____ and cathode is _____.**
 (a) Carbon rod, Zinc plate (b) Copper plate, Zinc plate
 (c) Zinc plate, Copper plate (d) Copper plate, Carbon rod
10. **The process of depositing a layer of desired metal on another metallic object by using electricity is called _____.**
 (a) Electroplating (b) Electrolysis (c) Electrefining (d) None of these
11. **1 mA = _____ μ A**
 (a) 10^6 (b) 10^3 (c) 10^{-6} (d) 10^{-3}
12. **The magnitude of an AC voltage used in India is _____ and the frequency is _____**
 (a) 110V, 60Hz (b) 110V, 50 Hz (c) 220V, 50Hz (d) 220V, 60 Hz
13. **Who gave the law of electromagnetic induction?**
 (a) Faraday (b) Oersted (c) Ampere (d) Volta

- 14. Electric circuit fuse is used because _____.**
 (a) It increase the voltage
 (b) It increase the current
 (c) It saves the electric energy
 (d) It protects the electrical appliances from damage
- 15. What is the approximate distance of our sun from galactic centre of Milky Way galaxy?**
 (a) 30,000 km (b) 30,000 miles (c) 30,000 lakh km (d) 30,000 light years
- 16. The first and the biggest asteroid discovered is _____.**
 (a) Vista (b) Ceres (c) Halley (d) Titan
- 17. When was the Halley's comet seen last?**
 (a) 1976 (b) 1986 (c) 1994 (d) 1997
- 18. Which of the following is not artificial satellite?**
 (a) Insat (b) Rohini (c) Phobos (d) Sross
- 19. Acid turns _____.**
 (a) Red litmus paper blue (b) Blue litmus paper red
 (c) Both (d) None
- 20. What is the pH of coffee?**
 (a) 4.5 to 5.5 (b) 4.6 to 5.6 (c) 4 to 5 (d) 5 to 6
- 21. Pepsin in stomach becomes active at pH _____.**
 (a) 3 and 4 (b) 1 and 3 (c) 2 and 3 (d) 8 and 9
- 22. pH is applicable to _____.**
 (a) aqueous solution (b) solids (c) gases (d) liquids
- 23. What is present in atmosphere ?**
 (a) Mostly metalloids (b) Mostly nonmetallic
 (c) Mostly nonmetallic gases (d) Mostly metallic gases
- 24. $\text{Al}_2\text{O}_3 \cdot 2\text{H}_2\text{O} \rightleftharpoons \text{Al}_2\text{O}_3 + \text{_____ H}_2\text{O}$**
 (a) 1/2 (b) 2 (c) 1/3 (d) 3
- 25. Which alloy is used to solder the electric wires ?**
 (a) Copper + zinc (b) Aluminium + magnesium
 (c) Lead + tin (d) Copper + tin
- 26. Which Non- Metal possesses luster?**
 (a) Bromine (b) Chlorine (c) Iodine (d) Fluorine
- 27. What acts as catalyst in hydrogenation reaction ?**
 (a) Platinum (b) Iron (c) Cobalt (d) Nickel
- 28. What is responsible for allotropy?**
 (a) Different arrangement of atoms (b) Different valencies
 (c) Different electronic structure (d) Different bonding
- 29. Sulphur containing, lower type of coal is present in Gujarat near _____.**
 (a) Valsad (b) Kachh (c) Ankleshwar (d) Baroda
- 30. How many liters of oil was drilled each day from Makum?**
 (a) 1350 (b) 1400 (c) 1300 (d) 1200

| | |
|-----|--|
| 31. | Which of the following fractions has largest number of carbons? (a) Tar (b) Kerosene (c) Diesel oil (d) Gasoline |
| 32. | What is responsible for isomerism? (a) Catenation (b) Tetravalency (c) Both a and b (d) None of above |
| 33. | Which of the following compounds is obtained by fermentation reaction of molasses? (a) Chloromethane (b) Ethanol (c) Acetone (d) All the given |
| 34. | Oxidation of methanol gives _____ (a) Methanal (b) Methanoic acid (c) Methane (d) Methanone |
| 35. | _____ and _____ are two examples of plastic. (a) Butadiene; polythene (b) Teflon; polyvinylchloride (c) Neoprene; Teflon (d) Polyethene; formalin |
| 36. | The length of small intestine in a adult human being is about : (a) 4.5 m (b) 1.5 m (c) 3.5 m (d) 6.5 m |
| 37. | The pulmonary artery supplies blood to (a) heart (b) brain (c) lungs (d) intestine |
| 38. | Which part helps amoeba in the process of excretion? (a) Nephridium (b) General body surface (c) Osculum (d) Contractile vacuole |
| 39. | Semilunar valves are present in (a) arteries (b) veins (c) capillaries (d) none of these |
| 40. | Lymph carries _____. (a) Digested food (b) Absorbed food (c) Digested and Absorbed food (d) Water |
| 41. | How many pairs of nerves arise from the spinal cord ? (a) 21 (b) 31 (c) 41 (d) 51 |
| 42. | Which is male sex hormone ? (a) Estrogen (b) Adrenaline (c) Testosterone (d) Progesterone |
| 43. | Through tubectomy (a) Entry of sperms are prevented in the oviduct. (b) Entry of ovum is prevented in the oviduct. (c) Specific chemical is use to kill sperms. (d) Release of ovum from the ovary is prevented. |
| 44. | NACO means (a) National AIDS Control Oraganization. (b) National AIDS Communication Organization. (c) National Acuired Control Organization. (d) National Address Communication |
| 45. | Pure Tall pea plant and pure dwarf pea plant when crossed (hybridized) in F₁ generation _____. (a) All plants obtained were tall (b) All plants obtained were dwarf (c) Tall and dwarf plants obtained in the ratio 1 : 1 (d) None |

- 46. The continuity of features from one generation to another is known as _____.**
(a) Evolution (b) Mutation (c) Heredity (d) Generation
- 47. Which is the main energy source for an ecosystem ?**
(a) Glucose (b) Green plant (c) Sunlight (d) Protein
- 48. What is the role of decomposers in an ecosystem ?**
(a) Converts inorganic elements in simple form
(b) Converts organic compound in inorganic elements
(c) Converts inorganic compounds in organic compounds
(d) Both B and C
- 49. In Gujarat total of _____ sq km area is covered by the forest.**
(a) 18000 (b) 18999 (c) 18555 (d) None
- 50. Coal is a _____ based fuel.**
(a) Potassium (b) Nitrogen (c) Carbon (d) Calcium



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| GSEB Batch : 10 th Std. Eng. Medium | MAHESH TUTORIALS SUBJECT : Science & Technology(011) Third Preliminary Exam Question Paper | Date: Marks : 50 Time: 2 Hrs. |
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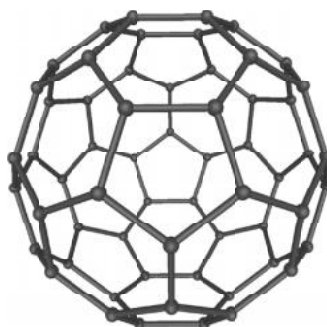
| PART - B | |
|---|-----------|
| Instructions : <ol style="list-style-type: none"> [1] There are four sections in this question paper and total 18 questions. [2] All questions are compulsory. [3] Take care of internal options in the question paper. [4] Draw neat, clean and labelled diagram as directed. [5] The number on the right-hand indicates marks. [6] Write the answer of questions according to the section. | |
| <p style="text-align: center;">SECTION - A</p> <p>Answer the following questions : [2 marks]</p> <ol style="list-style-type: none"> 1. Discuss the structure and configuration of a Bucky ball. OR 1. Why is carbon a fundamental element in nanotechnology? Explain. 2. Define Electric power. Derive its formula and unit. Define 1 watt power. 3. Give general methods of preparation of ethene. OR 3. Discuss the properties of ethene gas and explain the unsaturation present in it through reaction with bromine water. 4. Disintinguish between Equatorial orbit and Polar orbit 5. How are bases formed ? | 10 |
| <p style="text-align: center;">SECTION - B</p> <p>Answer the following questions : [2 marks]</p> <ol style="list-style-type: none"> 6. Name and explain types of blood vessels. 7. Write a note on Autonomous nervous system. 8. Note down the types of biotic components. 9. What is Heredity ? OR 9. Describe how fossils are formed. 10. Note down the importance of wild life. | 10 |
| <p style="text-align: center;">SECTION - C</p> <p>Answer the following questions : [3 marks]</p> <ol style="list-style-type: none"> 11. Describe the formation of mirage through an appropriate figure. 12. Describe the principle, construction and working of an electric generator with a figure. OR 12. Describe oersted experiment determining that a magnetic field is produced in straight conductor carrying current . 13. Write uses of dihydrogen gas. 14. Write shortnote on preparation of ethanoic acid. OR 14. Write a shortnote on formation of Nylon. 15. Explain in detail the types of fission. | 15 |
| <p style="text-align: center;">SECTION - D</p> <p>Answer the following questions : [5 marks]</p> <ol style="list-style-type: none"> 16. Obtain the general form of Snell's law in terms of refractive indices of two media? 17. Describe Hall-Heroult method for obtaining aluminium metal from alumina. OR 17. Explain chemical properties of Metals. OR 18. Explain Anaerobic respiration. 18. Explain the process of exchange of gases in leaves and stems. <p style="text-align: center;">~~~~~ All the Best ~~~~~</p> | 15 |

SECTION - A

Answer the following questions : [2 marks]

10

1.



½

- ⇒ Bucky ball/ Fullerenes is a special form of carbon molecule. Bucky ball is also known as Buckminsterfullerene.
- ⇒ Bucky ball comprises of 60 carbon atoms in the architectural configuration of a soccer ball (sphere).
- ⇒ Here, each carbon atom is bonded to three adjacent carbon atoms forming a sphere, which is around 1.0 nm in diameter.
- ⇒ The bonds between 60 carbon atoms form a pattern of joined hexagons and pentagons that is similar to the panels on a soccer ball.

½

½

½

OR

1. Carbon is a fundamental element in nanotechnology because of the following reasons:

½

- ⇒ A carbon atom can bond with many different types of atoms by forming covalent bonds.
- ⇒ Each carbon atom can extend itself to form such covalent bonds with four other atoms at a time. This helps to form chain of atoms.
- ⇒ There is no other element except carbon which bonds as strongly to other carbon atoms and in as many ways as the carbon atom.
- ⇒ Eg., When carbon atoms bond together in short chains, they have properties of a gas.
- ⇒ Their bonding together in longer chains results in solid, e.g., plastic.
- ⇒ When they bond together in 2 or 3 dimensional lattices they form extremely hard materials such as diamond.

½

½

½

2. “Electric power means the rate of electric energy.” That means the electrical energy consumed (or heat generated) in unit time is defined as an electric power. It is denoted by symbol P.

½

⇒
$$P = \frac{\text{Electrical energy consumed}}{\text{Time}}$$

½

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

$$= \frac{I^2 R t}{t}$$

$$P = I^2 R$$

$$\text{or } P = IV \quad (\because IR = V)$$

½

$$\text{or } P = \frac{V^2}{R} \quad (\because I = \frac{V}{R})$$

- ⇒ The SI unit of power is joule/second or watt (W).
- ⇒ If 1A current flows through the circuit from 1V battery, then the power consumed is said to be 1W.
- ⇒ From the above equation
1 watt = 1 volt × 1 ampere
= 1 VA

½

| | | |
|----------------------------------|---|-----------|
| ⇒ | $\text{Li}_2\text{O} + \text{H}_2\text{O} \longrightarrow 2 \text{LiOH}$ | ½ |
| | Lithium Oxide Lithium Hydroxide | |
| | SECTION - B | |
| | Answer the following questions : [2 marks] | 10 |
| 6. | There are three types of blood vessels, (1) Arteries, (2) Veins and (3) Capillaries. | |
| (i) Arteries : | | |
| ⇒ | The blood vessels which carry blood from the heart to different organs are called arteries. | ½ |
| ⇒ | Their walls are thick and elastic. | |
| ⇒ | They enter into the organs and branch into small vessels called arterioles. | ½ |
| (ii) Veins : | | |
| ⇒ | The blood vessels which carry blood from the different organs to the heart are called veins. | ½ |
| ⇒ | Their walls are thin and non-elastic. | |
| ⇒ | They contain valves. Different veins join to form the vena cava. | |
| (iii) Blood Capillaries : | | |
| ⇒ | Around the tissue, the arterioles break up into fine vessels, called capillaries. | |
| ⇒ | The capillaries are thin-walled and narrow. | ½ |
| ⇒ | Capillaries unite to form very small blood vessels called venules. Venules unite to form veins. | |
| 7. | The system which is responsible for the intervention of the organs located in the body cavity without the awareness of the brain is called autonomous nervous system. | ½ |
| ⇒ | Heart, blood vessels, glands, uterus and coelomic organs are under the control of this system. | |
| ⇒ | Autonomous nervous system is of two types (i) Sympathetic (ii) Parasympathetic. | ½ |
| ⇒ | By the coordination of these two systems, the involuntary action of the body are controlled and regulated. | |
| ⇒ | The effects of sympathetic and parasympathetic nervous systems are complimentary and contradictory. | ½ |
| ⇒ | If sympathetic system increases heart beat than normal, parasympathetic system decreases it and brings it back to normal. | ½ |
| 8. | Biotic components can be of two types- | |
| ⇒ | Producers-Organisms are autotrophic. | 1 |
| ⇒ | Consumers-Organisms are heterotrophic. | 1 |
| 9. | Heredity is transmission of characters from parents to the offsprings. | ½ |
| → | This involves the tendency of every individual to resemble their parents. | 1 |
| → | Hereditary information is present in the fertilized egg or zygote. | ½ |
| | OR | |
| 9. | When plant or animals die, the micro organism in the presence of moisture and oxygen decompose their bodies. | ½ |
| → | Sometimes due to environmental condition their bodies do not decompose completely. | |
| → | Such body parts of plants or animals become fossils and are available on digging the earth. | ½ |
| → | If dead leaf gets caught in the mud, leaf will not decompose completely. | ½ |
| → | The mud around leaf will harden to form rock and retain the impression of the leaf. | |
| → | Thus, fossil of leaf is formed. | ½ |
| 10. | The importance of wild life are as follows- | |
| → | Wild life is economically beneficial. | ½ |
| → | It is an important component of the food web of ecosystem. | ½ |
| → | It helps in maintaining the balance of the ecosystem. | |
| → | The important of wild life is success of the gene bank. | ½ |

→ Men use them for developing varieties of plants & animals in agriculture, animal husbandary etc.

½

SECTION - C

Answer the following questions : [3 marks]

15

11. Mirage is an optical illusion usually seen in desert. It is also seen on coal tar road during summer.

½

⇒ In summer the air near the surface of the earth is hotter than the air above it.

⇒ Therefore, the air near the earth is rarer than that above it. So as we move up above the surface of the earth the refractive index increases continuously.

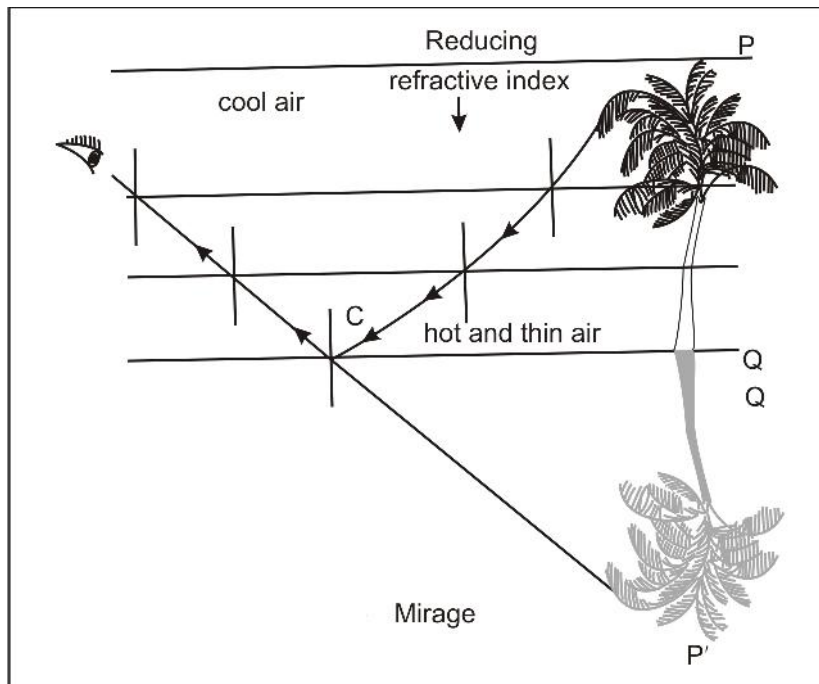
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⇒ As shown in the figure the light rays coming from a point of a tall object like a tree pass through the air of gradually decreasing refractive index towards the ground. The light rays bend gradually more and more away from normal and their angle of refraction increases gradually. So they enter the observer's eye after the total internal reflection occurs.

½

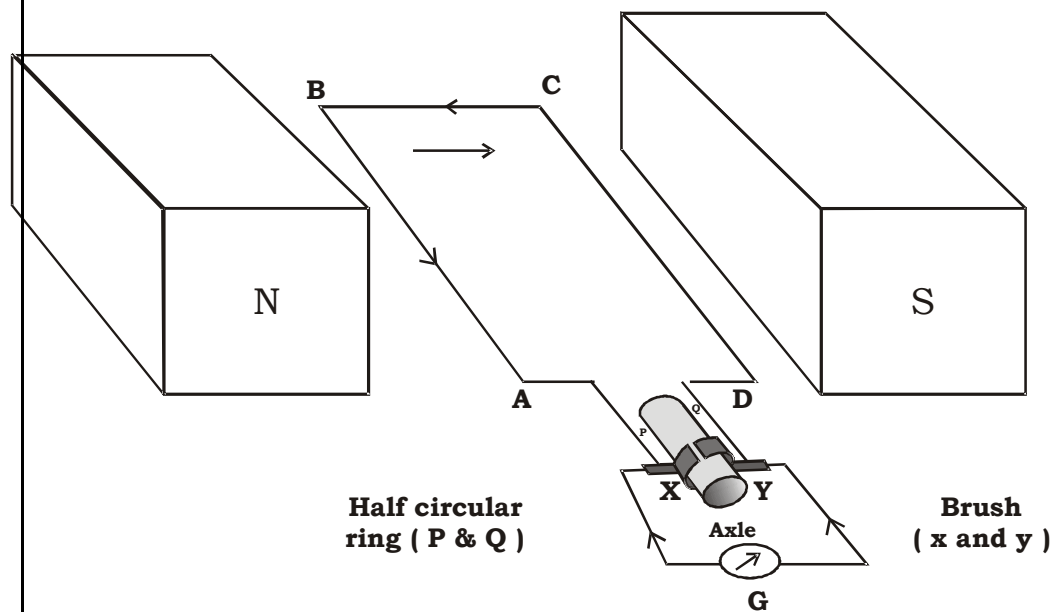
⇒ Thus a virtual and inverted image of an object appears as it is reflected from the water surface.

½



1

12.



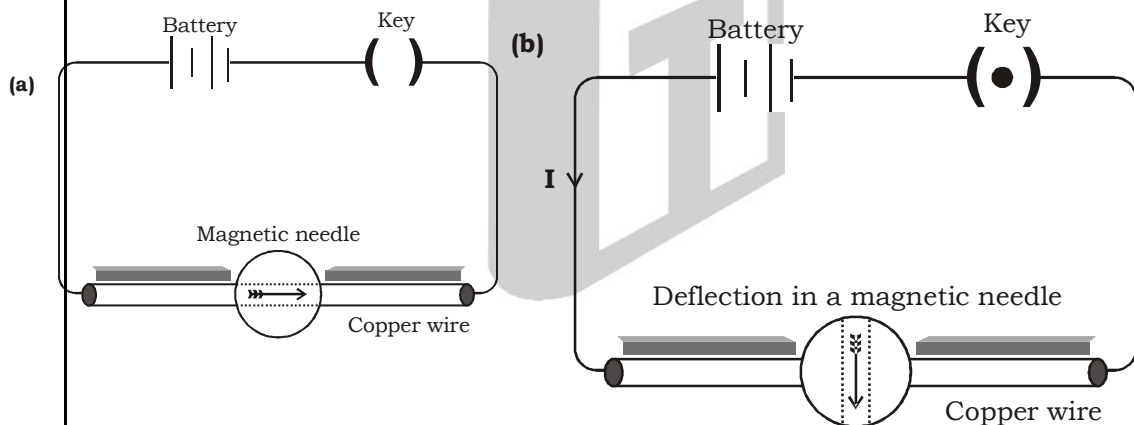
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Construction of electric generator

- ⇒ Electric generator converts mechanical energy into electrical energy. It works on the principle of an electromagnetic induction. ½
- ⇒ The construction of an electric generator is like the construction of an electric motor which is shown in Figure.
- ⇒ The two ends of a loop ABCD are placed in a magnetic field and are connected with two semi-circular rings P and Q.
- ⇒ These two rings are insulated from each other. These rings can slide while remaining in contact with the brushes X and Y.
- ⇒ A galvanometer is connected between the two ends of brush. By applying mechanical rotation to the loop ABCD in the magnetic field, the number of magnetic field lines associated with it changes so that an electric current is induced which is observed from the deflection of galvanometer. ½
- ⇒ Thus, the mechanical energy is converted into electrical energy.
- ⇒ By rotating the loop in a magnetic field, the side AB moves upward and the side CD move downwards. The direction of an induced electric current in wire AB and CD can be known by Fleming's right hand rule. As shown in the Figure, induced electric current flows in a path B-A-G-D-C. ½
- ⇒ After the half rotation of a loop, the ring P comes in the contact with brush Y and the ring Q with the brush X. Here, the brush X is always in contact with the side moving upwards while the brush Y is always with the side moving downwards as a result of which the current flows only in one direction.
- ⇒ This current is called direct or DC current. This type of generator is called DC generator. Similarly instead of half ring if full ring is used then A.C. current can be generated and such generator is called A.C. generator. ½

OR

12.



Magnetic field produced by conducting wire

- ⇒ In 1819, a science teacher H.C. Oersted at a school in Denmark investigated that when an electric current is passed through the conducting wire, a magnetic field is produced in a region around it. ½
- ⇒ As shown in Figure, connect a straight conducting copper wire in series with a battery and a key.
- ⇒ Arrange a magnetic needle on a copper wire and arrange the wire such that it remains parallel to the magnetic needle. [Figure A]
- ⇒ Now make the electric current to flow through the wire by closing a key in the circuit and observe the magnetic needle. ½
- ⇒ You will see the deflection in a magnetic needle. [Figure B]
- ⇒ On reversing the polarity of a battery in the circuit, the current will flow through the wire in a reverse direction, magnetic needle will also move in the opposite direction. ½
- ⇒ From this activity, we can say that, on passing the electric current through the wire it acts as a magnet and it possesses its own magnetic field so that the magnetic needle gets deflected. ½
- ⇒ On reversing the direction of electric current, the direction of magnetic field is also reversed. ½

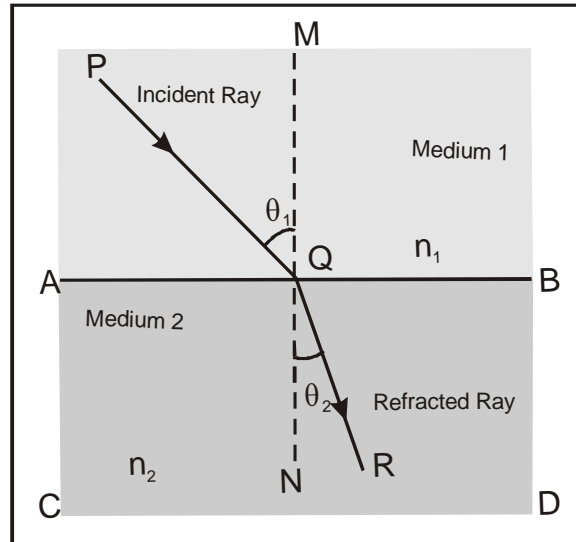
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| 13. | As one of the reactant in the production of ammonia gas by Haber's process. | ½ |
| ⇒ | In hydrogenation reaction of preparation of vegetable ghee from vegetable oil in presence of nickel catalyst. | ½ |
| ⇒ | In welding of metals and in oxy-hydrogen flame for cutting metals. | ½ |
| ⇒ | In industrial production of methanol and hydrochloric acid, as fuel in rockets and fuel cells for production of electricity. | ½ |
| ⇒ | Dihydrogen gas gets adsorbed on solid alloy and can be released whenever required and can be stored to use it again. | ½ |
| ⇒ | The calorific value of dihydrogen gas is the highest of all other fuels. By combustion of dihydrogen gas, water is produced and so there is no question of pollution. | ½ |
| ⇒ | Thus, there is a possibility of hydrogen being an important source of energy in future. | ½ |
| 14. | The common name of ethanoic acid is acetic acid. Its formula is CH ₃ COOH. | ½ |
| | Preparation of Ethanoic Acid : | |
| ⇒ | Ethanoic acid (vinegar) is formed by oxidation of ethanol in air by fermentation in presence of acetobacter enzyme. | ½ |
| | $\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \xrightarrow[\text{Enzyme}]{\text{Acetobacter}} \text{CH}_3\text{COOH} + \text{H}_2\text{O}$ | ½ |
| ⇒ | The proportion of ethanoic acid obtained by this method is very less. | ½ |
| ⇒ | In the modern industrial production of ethanoic acid, methanol is reacted with carbon monoxide in presence of catalyst Iodine - Rhodium (I ₂ - Rh) | ½ |
| | $\text{CH}_3\text{OH} + \text{CO} \xrightarrow{[\text{I}_2-\text{Rh}]} \text{CH}_3\text{COOH}$ | ½ |
| | Methanol + Carbon monoxide → Ethanoic acid or Acetic acid OR | ½ |
| 14. | Polyamide is a polymer containing amide group. it can be prepared by condensation of amine and carboxylic acid. Which is known as nylon. | 1 |
| | $\text{H}_2\text{N}-\boxed{\text{---}}-\text{NH}_2 + n \text{HOOC}-\boxed{\text{---}}-\text{COOH} \xrightarrow[\Delta]{\text{Polymerisation}} \text{H}_2\text{N}-\left[\boxed{\text{---}}-\text{NHCO}-\boxed{\text{---}}\right]_n-\text{COOH} + n \text{H}_2\text{O}$ | 2 |
| | Diamine + Dicarboxylic acid → Nylon + n H ₂ O where $\boxed{\text{---}}$ shows hydrocarbon part. | |
| 15. | Fission is of two types - | |
| | A) Binary fission | ½ |
| | B) Multiple fission | ½ |
| | Binary Fission - the nucleus lengthens and divides into two parts. | ½ |
| ⇒ | Cytoplasm then divides into two parts, one part around each nucleus. | ½ |
| ⇒ | This results into 2 daughter cells. | ½ |
| ⇒ | Each one grows into an adult. | ½ |
| ⇒ | Eg - Amoeba, Paramecium. | |
| | Multiple Fission - The parent organism divides to form many new organisms at the same time. | ½ |
| ⇒ | During unfavourable condition, a cyst is formed around single cell organism. | ½ |
| ⇒ | The nucleus divides to form many smaller daughter nuclei. | ½ |
| ⇒ | Small amount of cytoplasm collects around each daughter nuclei and membrane is formed. | ½ |
| ⇒ | Under favourable condition cyst breaks and many daughter cells are release each forming a new organism. | ½ |
| ⇒ | Eg - Plasmodium, Amoeba . | |

SECTION - D

Answer the following questions : [5 marks]

16.

15



$\angle PQM =$ Angle of incidence (θ_1) and

$\angle RQN =$ Angle of refraction (θ_2)

According to Snell's Law

$$\frac{\sin \theta_1}{\sin \theta_2} = \text{Constant}$$

Snell's law: The ratio of sine angle of incidence to the sine of the angle of refraction is constant.

⇒ This constant is known as refractive index of medium 2 with respect to medium 1 and is denoted by η_{21} .

$$\text{Now, } \eta_{21} = \frac{\sin \theta_1}{\sin \theta_2} \dots\dots (1)$$

Suppose,

$c =$ velocity of light in vacuum

$v_1 =$ velocity of light in medium 1

$v_2 =$ velocity of light in medium 2

⇒ Refractive index of medium 2 with respect to medium can also be expressed as

$$\eta_{21} = \frac{v_1}{v_2} \dots\dots (2)$$

⇒ Hence, the absolute refractive index of medium 1

$$\eta_1 = \frac{c}{v_1} \dots\dots (3)$$

⇒ Absolute refractive index of medium 2

$$\eta_2 = \frac{c}{v_2} \dots\dots (4)$$

⇒ Dividing (4) by (3)

$$\therefore \frac{\eta_2}{\eta_1} = \frac{c/v_2}{c/v_1} = \frac{v_1}{v_2}$$

$$\therefore \frac{\eta_2}{\eta_1} = \frac{v_1}{v_2}$$

But $\eta_{21} = \frac{v_1}{v_2}$ [from equation (2)]

1

1/2

1/2

1/2

1/2

1/2

1/2

$$\therefore \frac{\eta_2}{\eta_1} = \eta_{21}$$

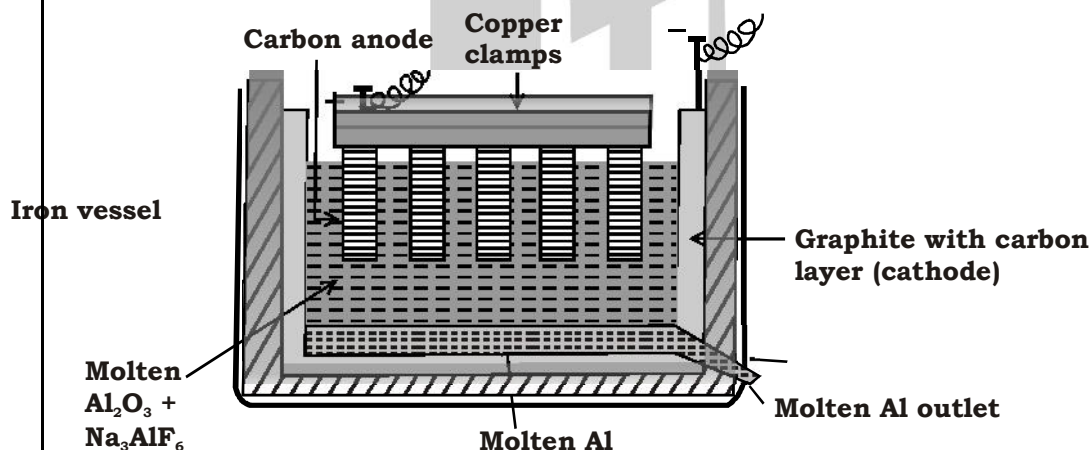
$$\frac{\eta_2}{\eta_1} = \frac{\sin\theta_1}{\sin\theta_2} \quad \text{[from equation (1)]}$$

$$\therefore \eta_1 \sin \theta_1 = \eta_2 \sin \theta_2 \quad \dots\dots (5)$$

Equation (5) is known as generalized form of Snell's law.

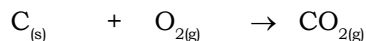
17. The method to obtain aluminium from alumina by electrochemical method was invented by American chemist Charles Martin Hall and French scientist Paul Heroult in 1886.

- ⇒ Hence, this method is also known as Hall-Heroult method.
- ⇒ Electric current cannot pass through solid form of alumina.
- ⇒ Also, melting point of alumina is very high 2348 K.
- ⇒ Electrolysis at such a high temperature is very expensive.
- ⇒ Hence, cryolite (Na_3AlF_6) is added so that electrolysis can be carried out easily.
- ⇒ This mixture works as better electric conductor than melted alumina.
- ⇒ The melting point can be brought still lower by addition of feldspar (CaF_2).
- ⇒ As shown in Figure, the mixture of alumina, cryolite and feldspar is electrolysed in a vessel of iron having inner surface layered with carbon.
- ⇒ In this cell, the rods of carbon are joined by copper clamp as anode and carbon layered graphite is taken as cathode.
- ⇒ On passing the electric current molten aluminium is deposited on cathode and dioxygen gas is produced at the anode.



Electrolysis cell for the extraction of aluminium

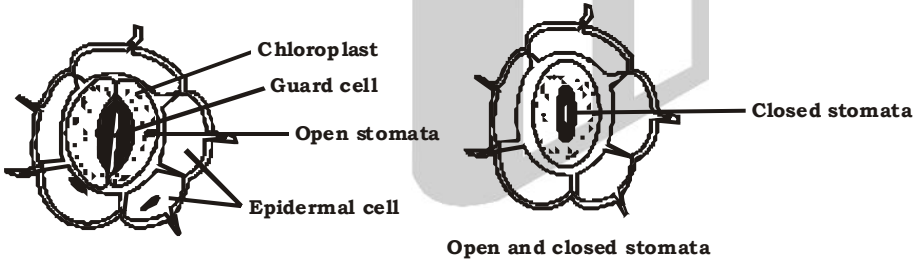
- ⇒ The molten aluminium collected at the bottom of the cell is taken out.
- Cathod** : $2\text{Al}^{3+}_{(l)} + 6e^- \rightarrow 2\text{Al}_{(l)}$
- Anode** : $6\text{O}^{2-}_{(l)} \rightarrow 3\text{O}_{2(g)} + 12e^-$
- ⇒ The dioxygen gas produced at the anode reacts with rod of carbon and forms carbon dioxide.
- ⇒ As a result anode is corroded. Hence, then are frequently replaced.



OR

17. Reaction of Metal with dioxide :
 Metal + Dioxygen \dot{E} Metal Oxides
 E.g. $2\text{Mg}_{(s)} + \text{O}_{2(g)} \dot{E} 2\text{MgO}_{(s)}$
 Magnesium oxide

- ⇒ Reaction of metal with water :
 Metal + water \dot{E} Metal hydroxide + dihydrogen gas
 OR Metal oxide

| | | |
|-----|--|-----|
| | $2K_{(s)} + 2H_2O_{(l)} \rightarrow 2KOH_{(aq)} + H_{2(g)}$ $Zn_{(s)} + H_2O_{(g)} \rightarrow ZnO_{(s)} + H_{2(g)}$ | 1/2 |
| | <p>⇒ Reaction of metal with Acid :</p> <p>Metal + dilute Acid → Salt corresponding + Dihydrogen gas to metal</p> | 1/2 |
| | $2Al_{(s)} + 6HCl_{(aq)} \rightarrow 2AlCl_{3(aq)} + 3H_{2(g)}$ $Mg_{(s)} + H_2SO_{4(aq)} \rightarrow MgSO_{4(aq)} + H_{2(g)}$ | 1/2 |
| | <p>⇒ Reaction of metal with Dichlorine :</p> <p>Metal + Dichlorine gas → Metal chloride</p> $Ca_{(s)} + Cl_{2(g)} \rightarrow CaCl_{2(s)}$ <p>Calcium chloride</p> | 1/2 |
| | <p>⇒ Reaction of metal with Dihydrogen :</p> <p>Active metal + Dihydrogen → Metal hydride</p> $2Na_{(s)} + H_{2(g)} \rightarrow 2NaH_{(s)}$ <p>Sodium hydride</p> | 1/2 |
| 18. | (i) The respiration taking place in the absence of oxygen is referred to as anaerobic respiration. | 1 |
| | (ii) It is seen in microorganisms like yeast, fungi, endoparasites and muscle cells. | 1 |
| | (iii) CO ₂ and ethanol are formed as end products in plants while in animals the end product is lactic acid. | 1 |
| | (iv) The energy released is less compared to the aerobic respiration. | 1/2 |
| | (v) The equations for the respiration in plants and animals are as follows. | 1/2 |
| | $\text{Glucose} \xrightarrow[\text{In cytoplasm}]{\text{Glycolysis}} 2\text{Pyruvic acid} \xrightarrow[\text{yeast}]{\text{In absence of oxygen}} 2\text{Ethanol} + 2\text{CO}_2 + 2\text{ATP}$ | 1 |
| | $\text{Glucose} \xrightarrow[\text{In cytoplasm}]{\text{Glycolysis}} 2\text{Pyruvic acid} \xrightarrow[\text{In muscles of animals}]{\text{In absence of oxygen}} 2\text{Lactic Acid} + 2\text{ATP}$ | 1 |
| | OR | |
| 18. |  | 1 |
| | (i) The leaf surface has many tiny apertures called stomata. | 1 |
| | (ii) During exchange of gases Oxygen from the atmosphere diffuses into the leaves through the stomata and reaches all the cells of stamp for respiration. | 1 |
| | (iii) When carbon dioxide concentration increases in the cells during respiration, the stomata opens and it is released back in the atmosphere. | 1 |
| | (iv) The opening and closing of the stomata depends upon various factors. | 1 |
| | ~~~~~ All the Best ~~~~~ | |