

SOLUTIONS

SAMPLE
QUESTION PAPER - 4

Solved _____

Time : 3 Hours

Maximum Marks : 90

SECTION 'A'

- The respiratory pigment in human being is haemoglobin. Haemoglobin is present in RBC's of blood in humans. $\frac{1}{2} + \frac{1}{2}$
- The melting point of the wire used in heater element is high while a fuse wire has low melting point. $\frac{1}{2} + \frac{1}{2}$
- AC can be easily transmitted over long distances without much loss of energy. 1

4. $R = \frac{\rho l}{A}$ $\frac{1}{4}$

$$= \frac{2.8 \times 10^{-8} \times 2}{1.55 \times 10^{-6}} \quad \frac{1}{4}$$

$$= \frac{2.8 \times 2 \times 10^{-8} \times 10^6}{1.55} = \frac{2.8 \times 2 \times 10^{-2}}{1.55} \quad 1$$

$$= 0.036 \Omega. \quad \frac{1}{2}$$

- (i) To prevent rancidity.
(ii) Rusting corrosion. [CBSE Marking Scheme, 2014] 1 + 1

- (a) A colourless gas is evolved. 1
(b) Test-tube becomes hot. [CBSE Marking Scheme, 2012] 1

- (a) The four types of information given by an equation are as follows :
(i) Physical state of reactants and products.
(ii) Conditions such as temperature, pressure and heat.
(iii) Catalyst involved.
(iv) Change in the state. $\frac{1}{2} \times 4$
- (b) Total mass of the elements present in the reactants of a chemical reaction has to be equal to the total mass of elements present in the products. 1

- (i) $\text{CaCO}_3(s) + 2\text{HCl}(aq) \longrightarrow \text{CaCl}_2(s) + \text{H}_2\text{O}(l) + \text{CO}_2(g)$
(ii) $2\text{Al}(s) + 6\text{HCl}(aq) \longrightarrow 2\text{AlCl}_3(aq) + 3\text{H}_2(g)$
(iii) $\text{MnO}_2 + 4\text{HCl}(aq) \longrightarrow \text{MnCl}_2 + 2\text{H}_2\text{O}(l) + \text{Cl}_2(g)$

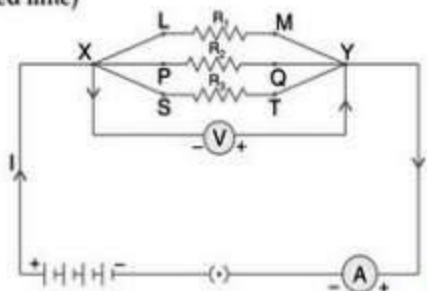
[CBSE Marking Scheme, 2014] 1 + 1 + 1

9. When food containing fat or oil is not used and left over for a long time, its smell and taste changes because fats and oils slowly oxidize. This process is called rancidity. 1
 Two methods that are used to slow down the oxidation process are :
 (i) keeping food in air tight container. 1
 (ii) flushing the bags containing food with nitrogen gas. 1

10. The three products are :
 Sodium hydroxide (NaOH), Chlorine (Cl₂) and Hydrogen (H₂). 1
 NaOH — for soaps and detergents and paper making or artificial fibres.
 Cl₂ — PVC, pesticides, CFCs. 1
 H₂ — fuels, margarine, NH₃ for fertilizers. [CBSE Marking Scheme, 2012] 1

11. (i) Yes, temperature rises as the beaker gets hot. This is because large amount of heat is released or the reaction is exothermic. 1
 (iii) Combination reaction. Reaction in the which a single product is obtained from two or more reactants. 1
 (iii) $\text{CaO} + \text{H}_2\text{O} \longrightarrow \text{Ca(OH)}_2 + \text{heat}$ 1
 (Quick lime) (Slaked lime)

12.



It is observed that the total current, I is equal to the sum of the separate currents through each branch of the combination. ½

$$I = I_1 + I_2 + I_3 \quad \frac{1}{2}$$

Let R_p be the equivalent resistance of the parallel combination of resistors. By applying Ohm's law to the parallel combination of resistors, we have,

$$I = V/R_p \quad \frac{1}{2}$$

On applying Ohm's law to each resistor, we have,

$$I_1 = V/R_1; I_2 = V/R_2; \text{ and } I_3 = V/R_3 \quad \frac{1}{2}$$

From equations, we have

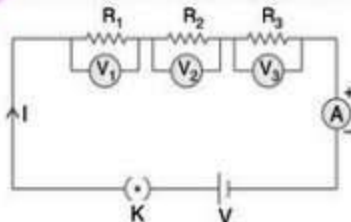
$$V/R_p = V/R_1 + V/R_2 + V/R_3 \quad \frac{1}{2}$$

or

$$1/R_p = 1/R_1 + 1/R_2 + 1/R_3 \quad \frac{1}{2}$$

Thus, we may conclude that the reciprocal of the equivalent resistance of a group of resistances joined in parallel is equal to the sum of the reciprocals of the individual resistances.

13. (a) Potential difference 1 volt means the amount of work done when a unit charge moves from one point to the other point in an electric field.
 (b) First symbol is variable resistance and second is ammeter.
 Variable resistance changes the magnitude of current in the circuit, by variation in resistance. Ammeter is used to find current. 1 + 1 + 1
14. (i) When three resistors of r ohm are connected in series combination, the current flowing in each resistor is same but potential difference across each resistor is different.

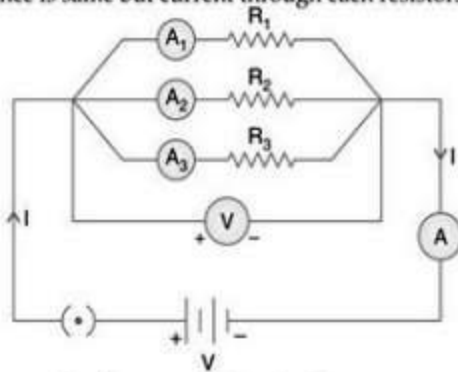


$$\begin{aligned} \text{Total potential } V &= V_1 + V_2 + V_3 \\ R &= R_1 + R_2 + R_3 = r + r + r \\ R &= 3r \Omega \end{aligned}$$

∴

In this overall, resistance increases when resistors are connected in series.

- (ii) When three resistors of r ohm are connected in parallel combination, the potential difference across each resistance is same but current through each resistors is different.

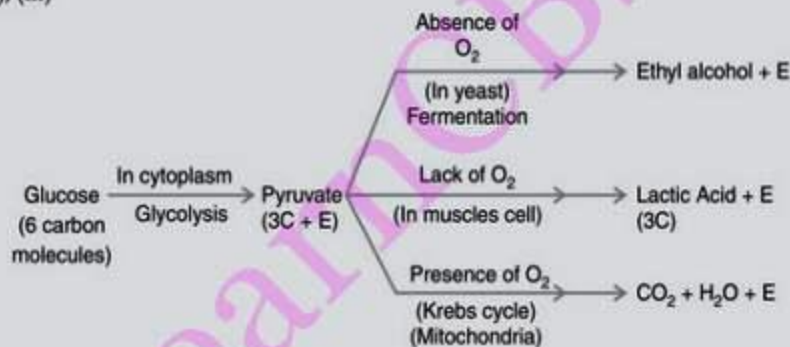


$$\begin{aligned} \text{Total current } I &= I_1 + I_2 + I_3 \\ I_1 &= \frac{V}{R_1}, I_2 = \frac{V}{R_2}, I_3 = \frac{V}{R_3} \\ \frac{1}{R} &= \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \\ &= \frac{1}{r} + \frac{1}{r} + \frac{1}{r} \\ &= \frac{1+1+1}{r} = \frac{3}{r} \\ R &= \frac{r}{3} \Omega \end{aligned}$$

In this overall, resistance decreases when resistors are connected in parallel.

1½ + 1½

15. (i), (ii), (iii)



[CBSE Marking Scheme, 2012] 1

16. (a) Because they do not maintain their own body temperature, therefore they do not require separation of oxygenated and deoxygenated blood. 1
 (b) Because plant bodies have a large proportion of dead cells. 1
 (c) Capillaries are smallest vessels which have one cell thick wall. The exchange of material between the blood and the surroundings take place through capillaries. 1

[CBSE Marking Scheme, 2012]

17. (a) Energy can be converted from one form to another.
 (b) Energy in the usable form is dissipated to the surroundings in less usable form.
 (c) Non-renewable source of energy is consumed and cannot be used again.

[CBSE Marking Scheme, 2013] $1 \times 3 = 3$

18. Renewable source of energy is used here.

This type of energy is non-polluting, and it saves electrical energy and money.

1 + 1

Associated value : The learners will appreciate the practice of adopting renewable sources of energy such as CNG, biofuel, solar energy.

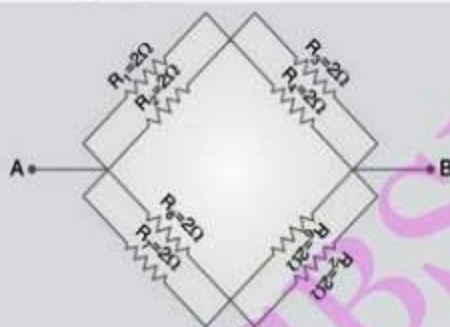
1

19. (i) HCl will give rise to more H^+ ions and CH_3COOH produce less H^+ ions on dissociation. The colour of pH paper depends on the concentration of H^+ ion. Colour becomes red for high H^+ concentration. 1
- (ii) Aqueous solution of acids have H^+ which carry electric current through the solution. 1
- (iii) (a) Most acidic — A, Most basic — C $\frac{1}{2} + \frac{1}{2}$
- (b) C, B, D, A / $C < B < D < A$ $\frac{1}{2} + \frac{1}{2}$
- (c) In C-blue, In D-green [CBSE Marking Scheme, 2012] $\frac{1}{2} + \frac{1}{2}$

20. (i) $2NaOH(aq) + Zn(s) \longrightarrow Na_2ZnO_2(aq) + H_2(g)$
 (ii) $Ca(OH)_2(aq) + CO_2(g) \longrightarrow CaCO_3(s) + H_2O$
 (iii) $Na_2CO_3 + H_2SO_4(dil) \longrightarrow Na_2SO_4(aq) + H_2O(l) + CO_2(g)$
 (iv) $CaCO_3 + 2HCl \longrightarrow CaCl_2 + H_2O + CO_2$
 (v) $CuO + 2HCl(dil) \longrightarrow CuCl_2 + H_2O$

1 + 1 + 1 + 1 + 1

21.



2

$$\frac{1}{R_{1,2}} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{20} + \frac{1}{20} = \frac{2}{20} = \frac{1}{10} \Rightarrow R_{1,2} = 10\Omega$$

$\frac{1}{2}$

Similarly $R_{3,4} = 10\Omega$

$$R_{5,6} = 40\Omega$$

$$R_{7,8} = 40\Omega$$

$\frac{1}{2}$

Now $R_{1,2}$ and $R_{3,4}$ are connected in series

$$R_{1,2,3,4} = R_{1,2} + R_{3,4} = 10 + 10 = 20\Omega$$

$\frac{1}{2}$

Also, $R_{5,6}$ and $R_{7,8}$ are connected in series

$$R_{5,6,7,8} = R_{5,6} + R_{7,8} = 40 + 40 = 80\Omega$$

$\frac{1}{2}$

Now, equivalent resistance

$$\frac{1}{R} = \frac{1}{R_{1,2,3,4}} + \frac{1}{R_{5,6,7,8}} = \frac{1}{20} + \frac{1}{80} = \frac{4}{80} + \frac{1}{80} = \frac{5}{80} = \frac{1}{16} \Rightarrow R = 16\Omega$$

$\frac{1}{2}$

$$R = 16\Omega$$

[CBSE Marking Scheme, 2012] $\frac{1}{2}$

22. (a) The two resistors are joined in parallel. 1
 (b) Current through 10 ohm resistance : 1

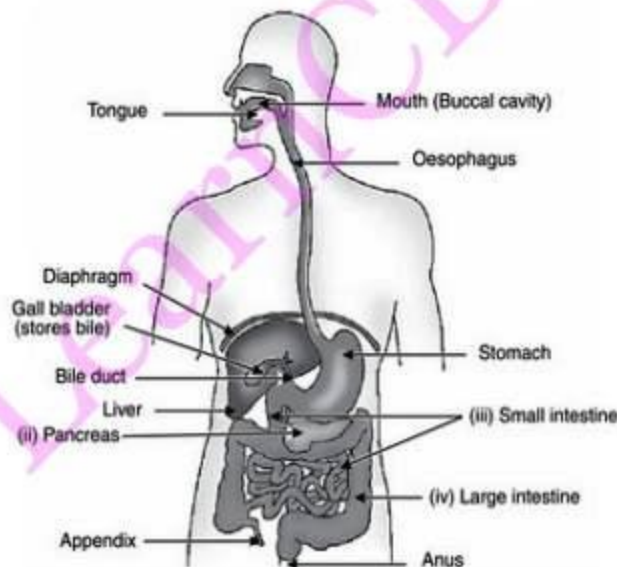
$$I_1 = \frac{V}{R_1} = \frac{3V}{10\Omega} = 0.3A$$

 Current through 15 ohm resistance : 1

$$I_2 = \frac{V}{R_2} = \frac{3V}{15\Omega} = 0.2A$$

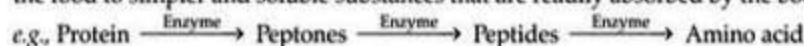
 (c) Ammeter reading : $I = I_1 + I_2 = 0.3 + 0.2 = 0.5 A$ $\frac{1}{2}$
 (d) Unit of current is Ampere. $\frac{1}{2}$
Ampere : If one coulomb of charge flows through any section of a conductor in one second, the current through it is said to be one ampere. 1
23. (a) **Schematic Diagram** : 1
 Root hairs → Cortex → Endodermis → Xylem of roots → ↓
 Stomata → Epidermis → Xylem of leaves → Xylem of Stem
- Explanations** : Transpiration helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves. The effect of root pressure in transport of water is more important at night. During the day when the stomata are open, the transpiration pull becomes the major driving force in the movement of water in the xylem. 1
- (b) The transport of soluble products of photosynthesis is called translocation and it occurs in the part of the vascular tissue known as phloem. Besides the products of photosynthesis, the phloem transports amino acids and other substances. These substances are especially delivered to the storage organs of roots, fruits and seeds, and to growing organs. The translocation of food and other substances takes place in the sieve tubes with the help of adjacent companion cells both in upward and downward directions. $1\frac{1}{2}$
- (c) If the distances between soil-contacting organs and chlorophyll-containing organs are small, energy and raw materials can easily diffuse to all parts of the plant body. But if these distances become large because of changes in plant body design, diffusion processes will not be sufficient to provide raw materials in leaves and energy in roots. A proper system of transportation is, therefore, essential in such situations. $1\frac{1}{2}$

24. (a)



1 + 2 = 3

- (b) Digestive enzymes are hydrolytic enzymes that breakdown the complex substances present in the food to simpler and soluble substances that are readily absorbed by the body.



Thus, the digestive enzymes breakdown food particles in simpler form and help in the digestion of complex foods such as carbohydrates, proteins etc. 2

SECTION 'B'

25. (D) Properties of base. 1
26. (B) Liquids have more surface of contact for reaction. 1
27. (B) Increase in light decreases photosynthesis. 1
28. (B) Carotene is orange in colour. 1
29. (B) KOH absorbs CO_2 1
30. (D) Least count = $\frac{\text{Range}}{\text{No. of divisions}} = \frac{0.5}{20} = 0.025 \text{ A}$ 1
31. (D) $R = \rho \frac{l}{A} \therefore$ Resistance is inversely proportional to the area of cross section. 1
32. (B) Correct arrangement of three resistors in parallel. 1
33. (B) $R = \frac{V}{I} = \frac{1.8 \times 10^3}{150 \text{ mA}} = \frac{180}{15} = 12 \Omega$ 1
34. $\frac{3R}{2}$
- Equivalent resistance in series (R_s) = $R + R = 2R$
 Equivalent resistance in parallel, (R_p),
- $$\frac{1}{R_p} = \frac{1}{R} + \frac{1}{R}$$
- $$\frac{1}{R_p} = \frac{2}{R}$$
- $\therefore R_p = \frac{R}{2}$
- $\therefore R_s - R_p = 2R - \frac{R}{2}$
- $$= \frac{4R - R}{2}$$
- $$= \frac{3R}{2} \quad \text{1 + 1}$$
35. The change will be observed in test-tube B because iron is more reactive than copper. 1 + 1
36. Keeping a potted plant in darkness for about 48 hours for removing its starch is destarching the leaves. The plants get destarched as the leaf utilizes all the starch for its metabolic activities. 2



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