

## SAMPLE PAPER-5

1. (a) The increasing order of reactivity of given metals with acid is  $Pt < H_2 < Sn < Cd < Zn$ . This is based on electrochemical series or reactivity series of metals. (1 mark)
  2. (b) Diastole is a part of cardiac cycle. In this phase, the heart ventricles are relaxed and the heart fills the with the blood. (1 mark)
  3. (c) Wind power in a windmill converts the kinetic energy to electricity. The power generated in the windmill depends on wind velocity. (1 mark)
  4. (d)  $2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$  (1 mark)
  5. (a) A- Bowman's capsule ; B - Glomerulus; C - Tubular part of nephron; D- Collective duct (1 mark)
  6. (d) Nichrome is an alloy of nickel, chromium and often iron (and possibly other elements). (1 mark)
  7. (c) A – S; B – R; C – Q; D – P (1 mark)
  8. (c) Binary fission is a common mode of asexual reproduction in *Amoeba*. As mature *Amoeba* is large in size, its nucleus extends and gradually divides into two. (1 mark)
  9. (c) Water gas is a fuel gas consisting mainly of carbon monoxide and hydrogen, made by passing steam over incandescent coke. (1 mark)
  10. (b) A tesla is equivalent to newton per ampere-meter (1 mark)
  11. Alkalis like NaOH and KOH should not be left exposed to atmosphere because they react vigorously with atmospheric air and may even catch fire. (1 mark)
  12. 10% of the energy at any trophic level is transferred to the next trophic level. The rest is lost largely through metabolic processes as heat. (1 mark)
  13. A 6 foot tall man needs 3 feet of mirror to view his whole image regardless of where he is standing.  
Minimum length of mirror =  $\frac{1}{2}$  Length of the object. (1 mark)
- OR**
- Convex mirror has a larger field of view because it is diverging in nature. (1 mark)
14. It is formed from ethanol ( $CH_3CH_2OH$ ) and acetic acid ( $CH_3COOH$ ). (1 mark)
- OR**
- (a) Methanol (b) Ethanoic acid (1 mark)
15. **Advantages of solar cell:**
    - (a) Solar cells are used as a source of electricity to artificial satellites and space probes.
    - (b) Solar cells are used to run small electrical devices like watches, calculators etc.
    - (c) Solar cell can be easily set in remote areas. (1 mark)
  16. The information source for making proteins in cells is cellular DNA. (1 mark)
- OR**
- 23 pairs of chromosome are present in human beings. (1 mark)
17. Since the focal length is half the value of the radius of curvature, so the focal length of a plane mirror is infinity. (1 mark)
  18. (a) Zinc is used in the iron to protect from rusting. (1 mark)
  19. (a) Whittaker proposed a five kingdom classification which include Monera, Protista, Fungi, Plantae and Animalia. (1 mark)
  20. (c) Convex lens forms an enlarged image of an object if the object is placed between the focus and optical centre of the lens. (1 mark)

21. (a) According to Joule's law of heating, heat produced in a resistor is directly, proportional to the resistance for a given current. Since, filament of heater is made of an alloy which has very high resistance, it becomes very hot whereas connecting wire is a good conductor which has low resistance so it becomes only warm. (2 marks)

(b) Given, Potential across an electric heater (V) = 220V

Resistance of the heater (R) = 40 Ω

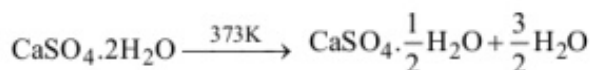
$$\therefore V = IR \Rightarrow I = \frac{V}{R} = \frac{220}{40} = 5.5 \text{ A} \quad (1 \text{ mark})$$

22. (a) (i) It is used as a domestic fuel (under name of LPG). (1 mark)

(ii) It is used to prepare carbon black and hydrogen gas which are further used as a filter and to prepare ammonia gas respectively. (1 mark)

(b) A black surface absorbs more heat or radiation as compared to white or a reflecting surface. (1 mark)

23. Plaster of paris is the compound of calcium, which is used for plastering fractured bones. Plaster of paris is prepared by heating gypsum at 373K.



The temperature should not be allowed to rise beyond 373K, as above this temperature whole water of crystallization will be lost. (3 marks)

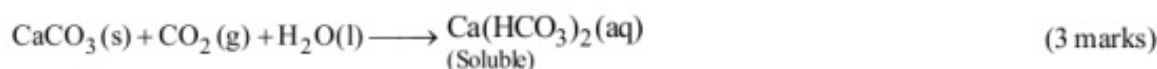
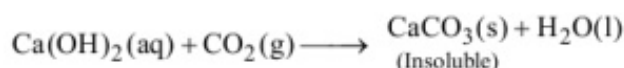
OR

(a) When gypsum is heated at 373 K then formation of plaster of paris  $\left(\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}\right)$  will take place.

(b) On heating, blue crystals of  $\text{CuSO}_4$ , it become colourless because the  $5\text{H}_2\text{O}$  molecules associated with it evaporates and it turns into anhydrous form, but when these crystals are left open, they will absorb moisture from air and regain the blue colour.



(c) On passing  $\text{CO}_2$  gas through lime water, insoluble calcium carbonate is formed. But in presence of excess of  $\text{CO}_2$ , soluble calcium bicarbonate is formed.



24. Metal atoms have 1, 2 or 3 electrons in their valence shells whereas non-metal atoms have 4 to 7 electrons in their valence shells. Electronic configuration of some element are given in the following table:

Type of Element	Element	No. of Electrons in shell			
		K	L	M	N
Metals	Sodium (Na)	2,	8,	1	
	Magnesium (Mg)	2,	8,	2	
	Aluminium (Al)	2,	8,	3	
Non-metals	Nitrogen (N)	2,	5		
	Oxygen (O)	2,	6		
	Fluorine (F)	2,	7		

(3 marks)

25. Vegetative propagation is an asexual method of reproduction. In this process, the vegetative part of a plant body such as stem, leaves, bulbs, tubers are used for growing new plants by cutting, grafting and layering which are similar to parents.

It is used to grow:

- (a) plants that have lost capacity to produce seeds.
- (b) plants which are genetically similar enough to the parent plants.
- (c) to obtain the superior quality of plants.
- (d) because, it is cheaper, easier and more rapid method of propagation. (3 marks)

**OR**

Hormones are chemical messengers that are secreted directly into the blood which carries them to the organs and tissues of the body to perform their functions.

Hormones play a very important role in the process of reproduction which are as follows:

- (a) To regulate the process of formation of sperm and ovum.
  - (b) To maintain the structure and function of accessory sex organs.
  - (c) To develop secondary sex characters. (3 marks)
26. Evolution is a gradual and continuing process of change that occur over a period of time, due to slight variations in genetic compositions as well as changes in environment, leading to formation of new species. Some of the important sources which provide evidences for evolution are:
- (a) Morphological and anatomical evidences
  - (b) Embryological evidences
  - (c) Fossil evidences (3 marks)

27. Due to atmospheric refraction the Sun at sunrise and sunset appears flattened. The density and the refractive index of the atmosphere decreases with altitude, so the rays from the top and bottom portion of the Sun of the horizon are refracted at different degrees. This causes the apparent flattening of the Sun. But the rays from the sides of the sun on a horizontal plane are generally refracted by the same amount, so the Sun still appears circular along its sides. (3 marks)

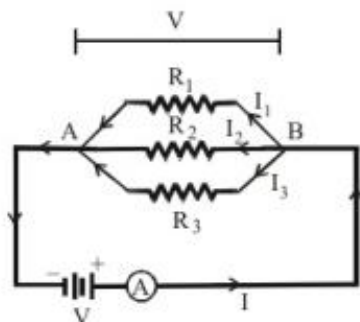
**OR**

The sky appears dark instead of blue to an astronaut because at a very high altitude, when the astronaut moves away from the atmosphere, the medium becomes rarer. Since, there is no atmosphere in the space, sunlight passing through the space fails to get scattered. As the sunlight not gets scattered so no scattered light reach to the eyes of the astronauts and the sky appears them black. (3 marks)

28. (a)  $2\text{HBr} + \text{Ca}(\text{OH})_2 \longrightarrow \text{CaBr}_2 + 2\text{H}_2\text{O}$  (1 mark)
- (b)  $\text{Ca}(\text{OH})_2 + \text{Cl}_2 \longrightarrow \text{CaOCl}_2 + \text{H}_2\text{O}$  (1 mark)
- (c)  $\text{NaCl} + \text{H}_2\text{O} + \text{CO}_2 + \text{NH}_3 \longrightarrow \text{NH}_4\text{Cl} + \text{NaHCO}_3$  (1 mark)
29. (a) The roof of the hind brain forms a thickening which is called as cerebellum. This region controls and coordinates the balancing of organs and the muscles. It helps in coordination, adjustment of movement and posture. (1½ mark)
- (b) The floor of hind brain thickens to form medulla oblongata and it continues into spinal cord. It is a seat of involuntary activities which controls heart beat, blood vessels, breathing movements, coughing, sneezing and vomiting. (1½ mark)
30. (a) Since the magnetic lines of force indicate the direction in which a hypothetical north pole which moves away from the north pole and towards the south pole of magnet that is why magnetic lines of force start from north pole and end at the south pole of the magnet.
- (b) As strength of magnetic field is high near at the poles as compared to when away from the poles that is why magnetic field lines of forces are very close to each other near poles and widely separated when away from the poles. (3 marks)

31. (a) To find out the total resistance of the circuit when three resistances are connected in parallel, Let the three resistances  $R_1$ ,  $R_2$  and  $R_3$  be connected in parallel across the two ends A and B. This combination is connected to a battery of 'V' volt which supplies a current 'I'. Since these three resistances are across the same points A and B that is why they have same potential difference. *i.e.* 'V' volt.

But the current gets divided into  $I_1$ ,  $I_2$  and  $I_3$  through  $R_1$ ,  $R_2$  and  $R_3$  respectively.



According to Ohm's law,

(½ mark)

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

$$\text{Current } I_1, (\text{flowing through } R_1) = \frac{V}{R_1}$$

$$\text{Current } I_2, (\text{flowing through } R_2) = \frac{V}{R_2}$$

$$\text{Current } I_3 (\text{flowing through } R_3) = \frac{V}{R_3}$$

Since,  $I = I_1 + I_2 + I_3$

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

$$\text{So, } \frac{V}{R} = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

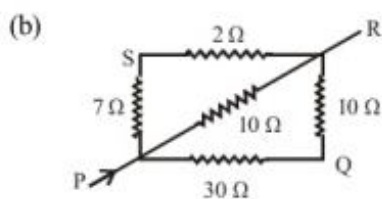
(1 mark)

$$\Rightarrow \frac{V}{R} = V \left[ \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \right]$$

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

(1 mark)

If two or more resistances are connected in parallel, then the reciprocal of total resistance is equal to sum of reciprocals of individual resistance.



$$R_1 = 7 \Omega, R_2 = 2 \Omega, R_3 = 10 \Omega,$$

$$R_4 = 30 \Omega, R_5 = 10 \Omega, V = 6 \text{ V}$$

Now,  $R_1$  and  $R_2$  are in series,

$$R' = R_1 + R_2 = 7 + 2 = 9 \Omega$$

Also,  $R_4$  and  $R_5$  are in series,

$$R'' = R_4 + R_5 = 30 + 10 = 40 \Omega$$

Now,  $R'$ ,  $R''$  and  $R_3$  are in parallel,

$$\frac{1}{R} = \frac{1}{R'} + \frac{1}{R''} + \frac{1}{R_3}$$

$$\Rightarrow \frac{1}{R} = \frac{1}{9} + \frac{1}{40} + \frac{1}{10}$$

$$\Rightarrow \frac{1}{R} = \frac{40 + 9 + 36}{360} = \frac{85}{360}$$

$$\therefore R = \frac{360}{85} = 4.23 \Omega$$

$$V = IR \Rightarrow I = \frac{V}{R} = \frac{6}{4.23} = 1.41 \text{ A}$$

(2½ marks)

32. (a) Ammonia ( $\text{NH}_3$ ) (b) Ethanol ( $\text{C}_2\text{H}_5\text{OH}$ )  
 (c) Sodium hydroxide ( $\text{NaOH}$ ) (d) Calcium oxide ( $\text{CaO}$ )  
 (e) Carbonic acid ( $\text{H}_2\text{CO}_3$ )

(1 × 5 = 5 marks)

OR

- (a)  $2\text{HCl}(\text{aq}) + 2\text{Na}(\text{s}) \longrightarrow 2\text{NaCl}(\text{s}) + \text{H}_2(\text{g}) \uparrow$   
 (b)  $\text{HCl}(\text{aq}) + \text{NaOH}(\text{aq}) \longrightarrow \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$   
 (c)  $\text{Na}_2\text{CO}_3(\text{s}) + 2\text{HCl}(\text{aq}) \longrightarrow 2\text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{CO}_2(\text{g}) \uparrow$   
 (d)  $2\text{HCl}(\text{aq}) + \text{Na}_2\text{O}(\text{s}) \longrightarrow 2\text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$   
 (e)  $2\text{NaOH}(\text{aq}) + \text{Zn}(\text{s}) \longrightarrow \text{Na}_2\text{ZnO}_2(\text{s}) + \text{H}_2(\text{g}) \uparrow$

(1 × 5 = 5 marks)

33. (a) Difference between sexual and asexual reproduction.

S No.	Sexual Reproduction	Asexual Reproduction
1.	It produces new organism from two parents.	It produces new organism from a single parent.
2.	It involves sex cells or gametes.	It does not involve sex cells or gametes.
3.	Offsprings are not identical to the parents.	Offsprings are identical to the parents.

(2 marks)

- (b) Contraceptive method is any method, medicine, or device used to prevent pregnancy. It includes mechanical barrier method, hormonal method, surgical method, IUDs, etc.  
The reasons for adopting contraceptive methods are as follows:
- (i) **Population control:** It helps in controlling the population rate or birth rate.
  - (ii) **Prevents unwanted pregnancies:** It helps to maintain a women's health by preventing unwanted pregnancies and by keeping gap between consecutive pregnancies.
  - (iii) **Prevents from STDs:** There are few contraceptive methods like condoms which prevents spread of sexually transmitted diseases and lethal diseases like HIV/AIDS.
  - (iv) **It assists in family planning:** Family planning / contraception reduces the need for abortion, especially unsafe abortion. (3 marks)

34. (a) Four characteristics of the image formed by plane mirror are as follows:

- (i) It always forms virtual and erect image.
- (ii) Size of image is equal to that of the object.
- (iii) Image is formed at the same distance behind the mirror as the object is in front of the mirror.
- (iv) Image is always laterally inverted.

(b) Let  $h_1$  be  $x$ . Therefore  $h_2 = -4x$  (2 marks)

$$\text{Magnification (m)} = \frac{h_2}{h_1} = \frac{-4x}{x} = -4$$

$$f = -40 \text{ cm}$$

$$m = -\frac{v}{u} \Rightarrow -4 = \frac{-v}{u} \Rightarrow v = 4u$$

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v} \Rightarrow \frac{1}{-40} = \frac{1}{u} + \frac{1}{4u} = \frac{4+1}{4u} = \frac{5}{4u}$$

$$4u = 5(-40) \Rightarrow u = \frac{5(-40)}{4} = -50 \text{ cm}$$

$$\therefore v = 4u = 4(-50) = -200 \text{ cm}$$

(1½ marks)

(c)  $u = -15 \text{ cm}$ ,  $f = -6 \text{ cm}$ ,  $h_1 = 4 \text{ cm}$

$$\frac{1}{f} = \frac{1}{u} + \frac{1}{v} \Rightarrow \frac{1}{-6} = \frac{1}{-15} + \frac{1}{v}$$

$$\Rightarrow \frac{1}{v} = \frac{-1}{6} + \frac{1}{15} = \frac{-5+2}{30} = \frac{-3}{30} = -\frac{1}{10}$$

$$v = -10 \text{ cm}$$

It is a real and inverted image

$$m = \frac{h_2}{h_1} = \frac{-v}{u}$$

$$\frac{h_2}{4} = \frac{(-10)}{15} \Rightarrow 3h_2 = -8 \Rightarrow h_2 = \frac{-8}{3}$$

$h_2 = -2.66 \text{ cm}$  since  $h_1$  is greater than  $h_2$ , it is a diminished image.

(1½ marks)

35. The reactivity of the halogens decreases from top to bottom in the periodic table. We see in equation (a) that Br is above I and in equation (c) that Cl is above Br in the periodic table. Therefore, neither combination (a) nor combination (c) could result in reaction. Cl is above I in the periodic table, so combination (b) results in a displacement reaction.

The more active halogen,  $\text{Cl}_2$ , displaces the less active halogen,  $\text{I}_2$ , from its compounds.



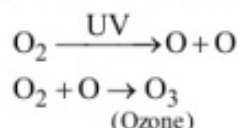
36. Despite good rains, we are not able to meet the demand for water of all the people because :

- Our population is increasing rapidly.
- Due to lack of sufficient vegetation cover on ground, only a little rain water seeps into the ground and gets stored as ground water.
- The high yielding varieties of crops require much more water for irrigation.
- Discharge of untreated sewage and industrial wastes into rivers and lakes reduces the availability of usable water.
- The changing life-style of people, especially in urban areas, is consuming more water. (5 marks)

OR

Ozone ( $\text{O}_3$ ) is a molecule formed by three atoms of oxygen. Ozone, is a deadly poison. However, at the higher levels of the atmosphere, ozone performs an essential function. It shields the surface of the earth from ultraviolet (UV) radiation from the Sun. This radiation is highly damaging to organisms.

Ozone at the higher levels of the atmosphere is a product of UV radiation acting on oxygen ( $\text{O}_2$ ) molecule. The higher energy UV radiations split apart some molecular oxygen ( $\text{O}_2$ ) into free oxygen (O) atoms.



The steps taken to limit the ozone layer depletion are:

- Banning on those companies which are producing ozone gas at large scale.
- Less use of refrigerators and air conditioner.
- Reduce the use of ozone depleting substances like CFCs.
- Use ozone friendly sprayers in perfumes, insect repellents etc.
- Do not release untreated CFCs present in ACs, fire extinguishers and refrigerators directly into the atmosphere when repairing them. (5 marks)