BLUE PRINT

S. No.	Chapter Name	Section-A (MCQs & A/R) 1 Mark	Section-B (VSAQs) 2 Marks	Section-C (SAQs) 3 Marks	Section-D (LAQs) 5 Marks	Section-E (Case Study) 4 Marks	Total Marks
		Q. No.	Q. No.	Q. No.	Q. No.	Q. No.	
1	Chemical Reactions and Equations	2(Q2,3)		1(Q33)			5
2	Acids, Bases and Salts	2(Q1,17)	1(Q21)	1(Q28)			5
3	Metals and Non-metals	1(Q5)	1(Q21 OR)		1(Q36)		8
4	Carbon and its Compounds	3(Q4,6,7)				1(Q38)	7
5	Life Processes	2(Q12,20)	1(Q22)		1(Q34)		9
6	Control and Co-ordination	1(Q13)	1(Q26)			1(Q37)	7
7	How do Organism Reproduce	2(Q14,16)		1(Q30)			5
8	Heredity and Evolution	2(Q15,19)	1(Q25)				4
9	Light- Reflection and Refraction	1(Q10)		1(Q 31)		1(Q39)	8
10	Human Eye and Colourful World	1(Q8)		1(Q 29)			4
11	Electricity	1(Q9)	1(Q24)		1(Q35)		8
12	Magnetic Effects of Electric Current	2(Q11,18)		1(Q27)			5
13	Our Environment		1(Q23)	1(Q32)			5
	* Total Questions (Total Marks)	20(20)	6(12)	7(21)	3(15)	3(12)	80

* The number given outside the bracket denotes number of questions asked in the sample paper, while the number given inside the bracket denotes marks.

Time Allowed : 3 Hours **Max. Marks : 80**

General Instructions

1. This question paper consists of 39 questions in 5 sections.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
3. **Section A** consists of 20 objective type questions carrying 1 mark each.
4. **Section B** consists of 6 Very Short Answer type questions carrying 02 marks each. Answers to these questions should in the range of 30 to 50 words.
5. **Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should in the range of 50 to 80 words
6. **Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
7. **Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

SECTION-A

Select and write one most appropriate option out of the four options given for each of the Questions 1 to 20

1. During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through the guard tube containing calcium chloride. The role of calcium chloride taken in the guard tube is to

(a) absorb the evolved gas (b) moisten the gas
(c) absorb moisture from the gas (d) absorb Cl^- ions from the evolved gas

2. Lead nitrate on decomposition gives-

(a) lead oxide (b) nitrogen dioxide (c) oxygen (d) All of these

3. Which one of the following processes involve chemical reactions?

(a) Storing of oxygen gas under pressure in a gas cylinder
(b) Liquefaction of air
(c) Keeping petrol in a China dish in the open
(d) Heating copper wire in the presence of air at high temperature.

4. Observe the following pairs of organic compounds :

(i) C_4H_9OH and $C_5H_{11}OH$ (ii) $C_7H_{15}OH$ and $C_5H_{11}OH$
(iii) $C_6H_{13}OH$ and C_3H_7OH

Which of these pair is a homologous series according to increasing order of carbon atom?

(a) (iii) only (b) (ii) only (c) (i) only (d) All of these

5. The composition of aqua-regia is

(a) Dil.HCl : Conc. HNO_3
3 : 1
(b) Conc.HCl : Dil. HNO_3
3 : 1
(c) Conc.HCl : Conc.HNO_3
3 : 1
(d) Dil.HCl : Dil.HNO_3
3 : 1

6. Carbon exists in the atmosphere in the form of :

(a) carbon monoxide only.
(b) carbon monoxide in traces, and carbon dioxide.
(c) carbon dioxide only.
(d) coal

7. 'Drinking alcohol' is very harmful and it ruins the health. 'Drinking alcohol' stands for –

(a) drinking methyl alcohol (b) drinking ethyl alcohol
(c) drinking propyl alcohol (d) drinking isopropyl alcohol

8. A student sitting on the last bench in the class cannot read the writing on the blackboard clearly but he can read the book lying on his desk clearly. Which of the following statement is correct about the student?

(a) The near point of his eyes has receded away.
(b) The near point of his eyes has come closer to him.
(c) The far point of his eyes has receded away.
(d) The far point of his eyes has come closer to him.

9. 20 coulomb charge is flowing in 0.5 second from a point in an electric circuit then value of electric current in amperes will be

(a) 10 (b) 40 (c) 0.005 (d) 0.05

10. If the speed of light in medium 1 and medium 2 are 2.5×10^8 ms^{-1} and 2×10^8 ms^{-1}, respectively, then the refractive index of medium 1 with respect to medium 2 is _____.

(a) $\frac{3}{2.5}$ (b) $\frac{2}{2.5}$ (c) $\frac{2.5}{3}$ (d) $\frac{2.5}{2}$

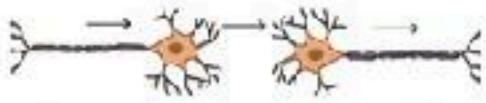
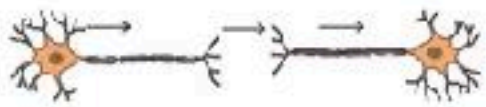
11. The strength of magnetic field inside a long current carrying straight solenoid is

(a) more at the ends than at the centre
(b) minimum in the middle
(c) same at all points
(d) found to increase from one end to the other

12. The normal systolic and diastolic pressure is about

(a) 120 mmHg and 80 mmHg
(b) 80 mmHg and 90 mmHg
(c) 90 mmHg and 120 mmHg
(d) 120 mmHg and 90 mmHg

13. What is the correct direction of flow of electrical impulses?

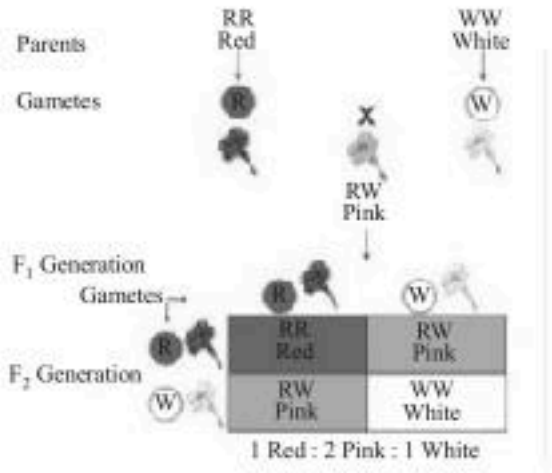
(a) 
(b) 
(c) 
(d) 

14. Offspring formed by asexual method of reproduction have greater similarity among themselves because

(i) asexual reproduction involves only one parent
(ii) asexual reproduction does not involve gametes
(iii) asexual reproduction occurs before sexual reproduction
(iv) asexual reproduction occurs after sexual reproduction

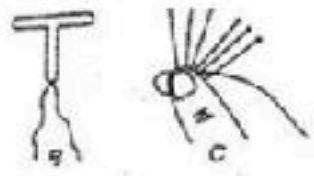
(a) (i) and (ii) (b) (i) and (iii) (c) (ii) and (iv) (d) (iii) and (iv)

15. State which law is shown in the given figure



(a) Law of dominance
(b) Crossing over
(c) Law of independent assortment
(d) None of these

16. Refer to given below diagram and choose the correct option



(a) A - copper T - Bimplants
(b) A - Jubectomy, B - implants
(c) A - Vaseclomy, B - Tubestomy
(d) A - copper T, B - Tempons

Directions: Q.No. 17–20 are Assertion - Reasoning based questions: These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true and R is not the correct explanation of A
(c) A is true but R is false
(d) A is False but R is true

17. **Assertion :** After white washing the walls, a shine white finish on walls is obtained after two to three days.
Reason : Calcium Oxide reacts with Carbon dioxide to form Calcium Hydrogen Carbonate which gives shiny white finish.

18. **Assertion :** Force experienced by moving charge will be maximum if direction of velocity of charge is perpendicular to applied magnetic field.
Reason : Force on moving charge is independent of direction of applied magnetic field.

19. **Assertion:** The flower colour of sweet pea shows the inheritance of complementary genes.
Reason: The ratio obtained for complementary gene is 9 : 7.

20. **Assertion:** Fishes use gills, whereas reptiles, birds and mammals respire through lungs.
Reason: Amphibians like frogs can respire through their moist skin also.

SECTION-B

Q. no. 21 to 26 are Very Short Answer Questions.

21. Name the gas which is liberated when an acid reacts with a metal. Illustrate with an example. How will you test the presence of this gas?

OR

State reason for the following :
(i) Non-metals cannot displace hydrogen from the acids.
(ii) Hydrogen is not a metal, yet it is placed in the activity series of metals.

22. Why is sino-atrial node also called pace maker ?

23. Accumulation of harmful chemicals in our bodies can be avoided. Explain how this can be achieved?

24. Show how would you join three resistors, each of resistance 9 Ω so that the equivalent resistance of the combination is (i) 13.5 Ω, (ii) 6 Ω?

OR

(a) Write Joule's law of heating.
(b) Two lamps, one rated 100 W; 220 V, and the other 60 W; 220 V, are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is 220V.

25. Mendel blended his knowledge of Science and mathematics to keep the count of the individuals exhibiting a particular trait in each generation. He observed a number of contrasting visible characters controlled in pea plants in a field. He conducted many experiments to arrive at the laws of inheritance.
(a) If only one pair of contrasting characters like tall and short plants is taken, plants obtained in F1 generation are not of medium height. Why ?
(b) Name the recessive traits in above case.
(c) Mention the type of the new combinations of plants obtained in F_2 progeny along with their ratio, if F_1 progeny was allowed to self pollinate.

26. What are plant hormones? Give two different types of plant hormones and state their function briefly.

SECTION-C

Q.no. 27 to 33 are Short Answer Questions.

27. What is a solenoid? Draw the pattern of magnetic field lines of (i) a current carrying solenoid and (ii) a bar magnet. List two distinguishing features between the two fields.

OR

When does an electric short circuit occur?

28. Differentiate between:

(a) Strong acid and Weak acid.

(b) Strong acid and Concentrated acid.

29. State the cause of dispersion of white light by a glass prism. How did Newton, using two identical glass prisms, show that white light is made of seven colours? Draw a ray diagram to show the path of a narrow beam of white light, thought a combination of two identical prisms arranged together in inverted position with respect to each other, when it is allowed to fall obliquely on one of the face of the first prism of the combination.

30. What happens when:

(i) Accidentaly, *Planaria* gets cut into many pieces?

(ii) *Bryophyllum* leaf falls on the wet soil?

(iii) On maturation sporangia of *Rhizopus* bursts?

31. A spherical mirror produces an image of magnification – 1on a screen placed at a distance of 50 cm from the mirror.

(i) Write the type of mirror.

(ii) Find the distance of the image from the object.

(iii) What is the focal length of the mirror?

(iv) Draw the ray diagram to show the image formation in this case.

32. What is ozone? How and where is it formed in the atmosphere?

33. Give chemical equation to show the changes that occur when green coloured ferrous sulphate crystals are heated.

SECTION-D

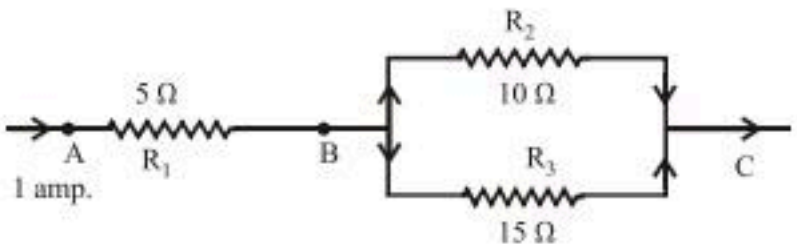
Q.no. 34 to 36 are Long Answer Questions.

34. (a) Draw a diagram of excretory system in human beings and label the following parts. Aorta, kidney, urinary bladder and urethra.

(b) How is urine produced and eliminated?

35. (i) With the help of circuit diagram derive the formula for the equivalent resistance for three resistance connected in series?

(ii) Three resistors are connected as shown in the following figure. Through the resistor 5 ohm a current of 1 A is flowing.



(a) What is the total resistance?

(b) What is the potential difference across AB and BC?

(c) What is the current through other two resistors?

36. What is an alloy? Name the constituents of (a) brass (b) bronze (c) solder. Give one use of each.

OR

(a) Which metals does not stick to glass ?

(b) Which metal is commonly used in thermit welding ?

(c) What is the nature of zinc oxide ?

(d) Will the CO (carbon monoxide) change the colour of blue litmus solution ?

(e) What is the nature of phosphorus oxide ?

SECTION-E

Q.no. 37 to 39 are case - based/data - based questions with 2 to 3 short sub - parts. Internal choice is provided in one of these sub-parts.

37. Read the following case/passage and answer the questions.

While conducting experiments to study the effect of various stimuli on the plants, it was observed that the roots of a plant X grow and bend towards two stimuli A and B but bend away from a third stimulus C. The stem of the plant X, however, bends away and from stimuli A and B but bends towards the stimulus C. The stimulus B is known to act on the roots due to too much weight of the earth. Keeping these points in mind, answer the following questions.

(i) What could stimulus A be?

(ii) Name the stimulus B.

(iii) What could stimulus C be?

(iv) The branches of a fallen tree in a forest grow straight up in response to two stimuli. What could be these two stimuli out of A, B and C? Also name these two stimuli.

OR

(i) How does a plant react to stimuli?

(ii) Why the roots of a plant bend towards stimuli A?

38. Read the following case/passage and answer the questions.

Reactions in which an atom or a group of atoms is replaced by some other atom or another group of atoms without causing any change in the structure of the remaining part of the molecule, are called substitution reactions.

All organic compounds containing double or triple bonds give addition reactions, i.e., alkenes, alkynes and aromatic hydrocarbons give addition reactions.

Reactions in which the compounds react with oxygen and form carbon dioxide and water is known as combustion reaction. This process occurs with release of great amount of heat.

(a) Define substitution reaction with example.

(b) Identify the types of reactions:

(i) $CH_2 = CH_2 + H_2 \rightarrow CH_3 - CH_3$

(ii) $C_2H_6 + O_2 \rightarrow 2CO_2 + 3H_2O$

OR

(b) (i) Combustion reactions are exothermic-comment.

(ii) Why is the conversion of ethanol to ethanoic acid an oxidation reaction?

39. Read the following case/passage and answer the questions.

A thin spherical lens with refractive index greater than that of surrounding behaves as a convergent or convex lens i.e. converges parallel rays. Its central (i.e. paraxial) portion is thicker than marginal one. If a number of lenses are placed in close contact with each other, then the power of the combination of lenses is equal to the algebraic sum of the powers of individual lenses.

(a) What is the importance of optical centre of lens?

(b) If focal length of a convex lens is 20 cm. Find it's power.

(c) Power of lens is 4 diopter. Find 'f' in cm and name the lens.

OR

(i) Find the power of a concave lens of focal length 2 m.

(ii) Define 1 dioptre of power of a lens.

Solution

SAMPLE PAPER-9

1. **(c)** Calcium chloride is a good dehydrating agent so calcium chloride ($CaCl_2$) will absorb moisture from the gas (HCl).

2. **(d)** $2Pb(NO_3)_2 \xrightarrow{\Delta} 2PbO + 4NO_2 + O_2$

3. **(d)** When one or more reactant(s) react to form new substance(s) with entirely different properties, the reaction is called chemical reaction.

In option (d), copper reacts with oxygen to form copper oxide (chemical reaction).

$$\underset{\text{Copper wire}}{2Cu} + O_2 \xrightarrow{\Delta} \underset{\text{Copper oxide}}{2CuO}$$

4. **(c)** C_4H_9OH and $C_5H_{11}OH$ represent homologous series in increasing order of C atoms, other two also represent homologous series, but in decreasing order because they differ from each other by a CH_2 group.

$CH_3CH_2CH_2CH_2OH$, $CH_3CH_2CH_2CH_2CH_2OH$

5. **(c)** Conc. HCl and conc. HNO_3 in 3 : 1 ratio form aqua-regia.

6. **(b)** **7.** **(b)** **8.** **(d)** **9.** **(b)** **10.** **(b)**

11. **(c)** The strength of magnetic field lines inside a long current carrying straight solenoid same at all points because the magnetic field lines are straight, equi-spaced and parallel to the axis of solenoid and thus uniform magnetic field exist inside the solenoid.

12. **(a)** The normal systolic and diastolic pressure is about 120/80 mmHg.

13. **(c)** Correct direction of flow of electrical impulses is as follows:

Impulse → Dendrite → Cell body → Axon → Release of chemicals that cross synapse → Dendrite of next neuron

14. **(a)** Offsprings have greater similarity because only one parent is involved in asexual reproduction thus, no gametes formation. Asexual reproduction is based on mitosis i.e., division of a nucleus into two identical daughter nuclei. Each daughter nucleus has similar genetic make up because of replication of parentals DNA. The new offsprings produced are called clones.

15. **(c)** The figure is showing low of independent assortment.

16. **(a)** A is refer for copper T and is for B is for implants.

17. **(c)** Suspension of calcium hydroxide $Ca(OH)_2$ is used in white wash. It reacts with CO_2 in air to form a thin layer of calcium carbonate ($CaCO_3$) on the walls which gives shiny white finish after two or three days.

18. **(c)**

19. **(a)** Both Assertion and Reason are correct and the Reason is a correct explanation of Assertion.

9 purple and 7 white flowers are obtained in sweet pea (*Lathyrus odoratus*).

20. **(b)** Both Assertion and Reason are correct but Reason is not a correct explanation of Assertion.

Mammals have a well-developed respiratory system.

21. Hydrogen gas is liberated when an acid reacts with a metal. (1 mark)

During reaction of zinc with dilute hydrochloric acid, colourless gas (H_2) with pop up sound is evolved.

$2HCl + Zn \longrightarrow ZnCl_2 + H_2\uparrow$ (1 mark)

OR

(i) Non-metals do not donate electron, they cannot supply electrons so as to convert H^+ ion to $H_2(g)$. (1 mark)

(ii) Like metals, it has properties to lose an electron to form positive H^+ ion. (1 mark)

22. Sino-atrial node also called pace maker because it determines the rate of heart beat by determining the rate of discharge of cardiac impulse. (2 marks)

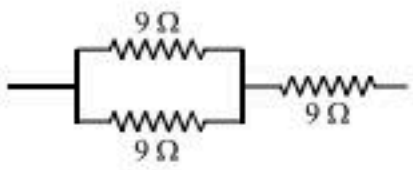
23. We should have to drink plenty of water, eat healthy food perform exercise and not take stress to avoid accumulation of harmful chemicals in our body. We should eat more vegetables i.e. cruciferous vegetables (such as broccoli, cauliflower, etc.) than meat. (2 marks)

24. (i) For getting a resistance of 13.5 Ω, the two resistors should be connected in parallel and one in series with them.

The equivalent resistance of the two resistors in parallel, R_p is given by

$$\frac{1}{R_p} = \frac{1}{9} + \frac{1}{9} = \frac{2}{9} \Rightarrow R_p = 4.5\,\Omega$$ (½ mark)

Now, the equivalent resistance of R_p and 9 Ω in series is given by



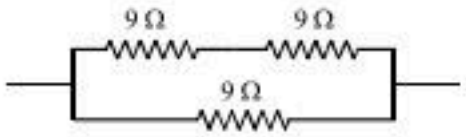
$R = R_p + 9 = 4.5 + 9 = 13.5\,\Omega$. (½ mark)

(ii) To get a resistance of 4 Ω, two resistors should be connected in series and one is parallel to them.

The equivalent resistance of the two resistors in series is given by

$R_p = 9\,\Omega + 9\,\Omega = 18\,\Omega$ (½ mark)

Now, the equivalent resistance of R_p and 9 Ω in parallel is given by



$$\frac{1}{R} = \frac{1}{R_p} + \frac{1}{9} = \frac{1}{18} + \frac{1}{9} = \frac{1+2}{18} = \frac{3}{18} = \frac{1}{6}$$

$R = 6\Omega$ (½ mark)

OR

(a) **Joule's Law of Heating:** It states that the amount of heat produced in a conductor is

(i) directly proportional to the square of current passing through it, i.e., $H \propto I^2$ .... (i)

(ii) directly propotional to the resistance of conductor, i.e., $H \propto R$ .... (ii)

(iii) directly proportional to the time for which current passed, i.e., $H \propto t$ .... (iii)

Combining (i), (ii) and (iii). $H \propto I^2 Rt$.

Here, constant of proportionality is 1.

$\therefore H = I^2Rt$ joule (1 mark)

(b) Resistance of first lamp = R_1

Resistance of second lamp = R_2

$$R = \frac{V^2}{P}, \quad R_1 = \frac{220 \times 220}{100} = 484\,\Omega$$

$$R_2 = \frac{220 \times 220}{60} = \frac{2420}{3}\Omega$$

They are connected in parallel

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{484} + \frac{3}{2420}$$ (½ mark)

$$R = \frac{484 \times 2420}{3\left(484 + \frac{2420}{3}\right)} = \frac{605}{2}\Omega$$

$$\therefore \quad I = \frac{V}{R} = \frac{220 \times 2}{605} = \frac{8}{11}A$$

$I = 0.727A$

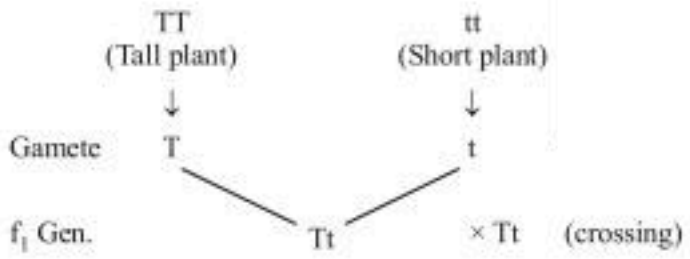
i.e., current drawn by two bulbs, I = 0.727 A.

(½ mark)

25. (a) If only one pair of contrasting characters is taken. f_1 generation either shows tall or short characterstic, as it follows law of dominance where only dominant character expres itself. (1 mark)

(b) Short plant have recessive trait. (½ mark)

(c)



f_2 Gen. TT, Tt, Tt, tt

Phenotype Ratio → 3 : 1 (½ mark)

26. The chemical compound released by stimulated cells for control and coordination in plants are called plant hormones or phytohormones. (1 mark)

Auxin - controls growth

Gibberellins - helps in growth of stem (1 mark)

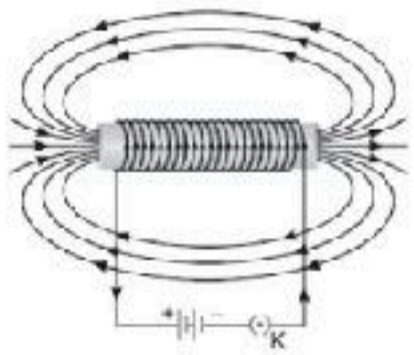
Cytokinin - promotes cell division (any two)

Abscisic acid - Inhibits growth, wilting of leaves

27. A solenoid is a long coil of wire wrapped in many turns. When a current passes through it, it creates a nearly uniform magnetic field inside. (1 mark)

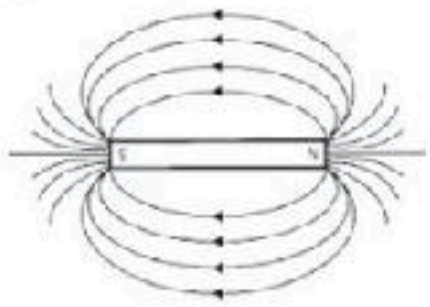
Pattern of magnetic field lines of

(i) A current carrying solenoid



(½ mark)

(ii) A Bar magnet-



(½ mark)

Two distinguishing features between the two fields:

Solenoid	Bar Magnet
(1) It produces very strong magnetic field.	(1) It produces weak magnetic field.
(2) Its strength can be changed by changing current or turns.	(2) Its strength cannot be changed.

(1 mark)

OR

Electric short circuit occurs when

(i) a current of value more than its rating passes through a wire;

(ii) the live wire touches with the earth or neutral-wire;

(iii) the insulation of the wires is weak;

(iv) over load is provided in the circuit. (3 marks)

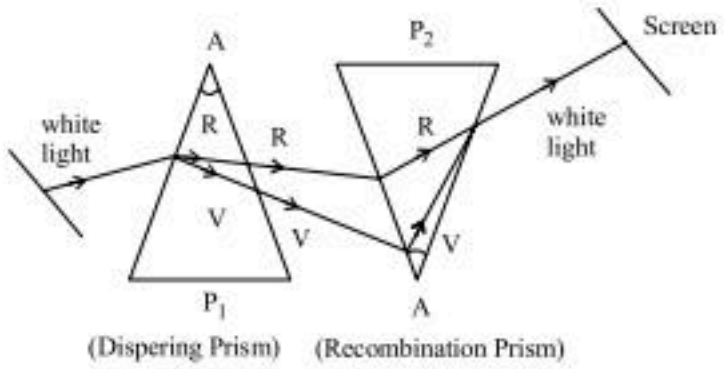
28. (a) A strong acid in aqueous solution ionises to a large extent thereby producing a high concentration of hydrogen ions. For example, HCl, H_2SO_4 and HNO_3. Whereas, a weak acid ionises partially in aqueous solution to a smaller extent and contain ions as well as molecules. For example, acetic acid, carbonic acid and formic acid. (1½ marks)

(b) Strong acids are those which ionize completely in solution. For example, H1, H_2SO_4. A concentrated acid has more moles of acid per litre of its solution as compared to a dilute acid. For example, Conc. H_2SO_4 has more moles of acid per litre of its solution as compared to dilute H_2SO_4. (1½ marks)

29. Light is formed of different colours which travel at their own speed inside a prism. Due to which the light bend the through different angles with respect to the incident ray, as they pass through a prism. The red light bends the least while the violet most causing dispersion this can be explained by the fact that light of different colours having different wavelengths has different velocities while travelling in a medium $v_m = n\lambda_m$. (1 mark)

Newton showed that the reverse of dispersion of light is also possible. If we kept two prisms close to each other one in erect position and the other in an inverted position. The light get dispersed when passes through the first prism. The second prism receives all the seven coloured rays from first prism and combines into original while light i.e. , recombine the different colour of spectrum & hence gives white light. This proves that white light is made of seven colours. (1 mark)

Diagram:



(1 mark)

30. (i) *Planaria* on being cut into many pieces, each piece regenerates into a new individual. (1 mark)

(ii) When *Bryophyllum* leaf falls on the wet soil, the buds that are developed in the notches along the leaf will develop into new plants via a process known as vegetative propagation. (1 mark)

(iii) when the matured sporangia of *Rhizopus* burst open, it releases spores which germinate into new mycelium in moist conditions. (1 mark)

31. (i) As magnification is negative, the image formed by mirror is real.

Hence, it is a concave mirror. (1 mark)

(ii) Magnification $m = -v/u = -1$

$\therefore \quad u = v = -50$ cm

Distance of the image from the object

$v - u = -50 - (-50) = 0$ cm (1 mark)

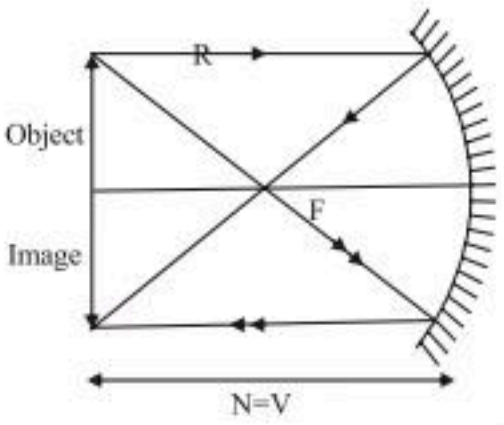
(iii) By using mirror formula:

$1/f = 1/v + 1/u$

$= 1/(-50) + 1/(-50) = -1/25$

$\therefore \quad f = -25$ cm (½ mark)

(iv)



(½ mark)

32. Ozone is molecule which contains three atoms of oxygen (O_3). It is highly poisonous gas present on the upper layer of the atmosphere. (½ + ½ = 1 mark)

Formation of ozone – The UV radiations split some molecular oxygen (O_2) apart into free oxygen atoms (O + O). These atoms then combine with molecular oxygen to form ozone.

$$O_2 \xrightarrow{UV} O + O$$

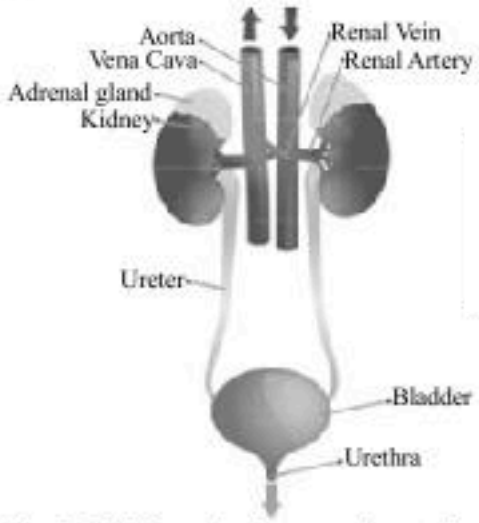
$$O + O_2 \longrightarrow O_3 \quad \text{(Ozone)} \qquad \text{(2 marks)}$$

33. On heating, $FeSO_4$ crystals lose water and anhydrous $FeSO_4$ is formed, so colour of crystals changes to white. On further heating, $FeSO_4$ decomposes to form SO_2, SO_3 and a brown iron oxide. (2 marks)

$$\underset{\text{(green)}}{FeSO_4 . 7H_2O} \xrightarrow{\text{Heat}} \underset{\text{(white)}}{FeSO_4} + 7H_2O \quad \text{(anhydrous form)} \qquad (½ \text{ mark})$$

$$\underset{\text{(white)}}{2FeSO_4} \xrightarrow{\text{Heat}} \underset{\text{(brown)}}{Fe_2O_3} + SO_2 + SO_3 \qquad (½ \text{ mark})$$

34. (a)



(2½ marks)

(b) Each kidney has large numbers of these filtration units called nephrons packed close together. Some substances in the initial filtrate, such as glucose, amino acids, salts and a major amount of water, are selectively re-absorbed as the urine flows along the tube. The amount of water re-absorbed depends on how much excess water there is in the body, and on how much of dissolved waste there is to be excreted. The urine forming in each kidney eventually enters a long tube, the ureter, which connects the kidneys with the urinary bladder. Urine is stored in the urinary bladder until the pressure of the expanded bladder leads to the urge to pass it out through the urethra.

(2½ marks)

35. (i) **To find out the total resistance of a circuit in which 3 resistances are connected in series :**

3 resistances – R_1, R_2 and R_3 are connected in series and put in a circuit as shown in figure. The circuit has cell of voltage 'V' which supplies current I ampere.

When current I flows through the circuit, it remains same in each resistance but PD gets distributed in these three resistances, i.e., V_1, V_2, V_3 across R_1, R_2, R_3 respectively.

According to Ohm's law, **V = IR**

Therefore, V_1 (across resistance R_1) = IR_1

V_2 (across resistance R_2) = IR_2

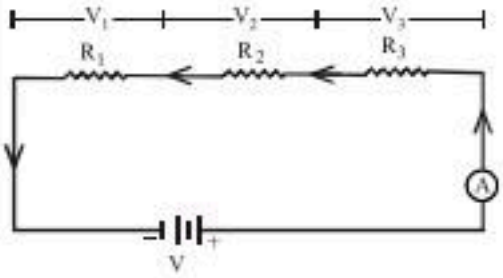
V_3 (across resistance R_3) = IR_3

Since, $V = V_1 + V_2 + V_3$

$\Rightarrow IR = IR_1 + IR_2 + IR_3$

$\Rightarrow IR = I(R_1 + R_2 + R_3)$

$\Rightarrow R = R_1 + R_2 + R_3$ (1 mark)



(1 mark)

Conclusion : It means if two or more resistances are connected in series then the total resistance of the circuit is equal to the sum of individual resistances.

Therefore if 'n' resistances are connected in series then total resistance is,

$R = R_1 + R_2 + R_3 + \ldots\ldots\ldots\ldots + R_n$.

(ii) $R_1 = 5\,\Omega$, $R_2 = 10\,\Omega$, $R_3 = 15\,\Omega$, $I = 1\,A$

(a) $\frac{1}{R'} = \frac{1}{R_2} + \frac{1}{R_3} = \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30}$

$R' = \frac{30}{5} = 6\,\Omega$

$R = R_1 + R' = 5 + 6 = 11\,\Omega$ (1 mark)

Now, $V = IR = 1 \times 11 = 11V$

(b) $V_1 = IR_1 = 1 \times 5 = 5\,V$.

Therefore, $V_2 = V - V_1 = 11 - 5 = 6V$ (1 mark)

(c) $V_2 = I_1 R_2 \Rightarrow I_1 = \frac{V_2}{R_2} = \frac{6}{10} = 0.6\,A$;

$I_2 = \frac{V_2}{R_3} = \frac{6}{15} = 0.4\,A$ (1 mark)

36. An alloy is a homogeneous mixture of two or more metals or a metal and a non-metal.

(a) Brass is an alloy of Cu and Zn.

(b) Bronze is an alloy of Cu and Sn.

(c) Solder is an alloy of Pb and Sn.

Brass is used for making cooking utensils, screw, nuts, bolts wires etc.

Bronze is used for making cooling pipes, utensils, statues.

Solder is used for welding electric wires. (5 marks)

OR

(a) Mercury (Hg) (b) Aluminium

(c) Amphoteric (d) No, its a neutral gas

(e) Acidic ($5 \times 1 = 5$ marks)

37. (i) Water (1 mark)

(ii) Gravity (1 mark)

(iii) Light (1 mark)

(iv) B and C; Gravity and Light (Sunlight) (1 mark)

OR

(i) Like all organism, plant defect and respond to stimuli in their environment.

(ii) This is due to stimulus of gravity.

38. (a) Reaction in which an atom or group of atoms are replaced by other atom or group of atoms without causing any change in the structure of remaining part of the molecule is known as substitution reaction.

Example: $CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$ (1 mark)

(b) (i) $CH_2 = CH_2 + H_2 \rightarrow CH_3 - CH_3$; Addition reaction (1 mark)

(ii) $C_2H_6 + O_2 \rightarrow 2CO_2 + 3H_2O$; Combustion reaction (1 mark)

OR

(b) (i) While a compound reacts with oxygen in a combustion reaction a great amount of heat is generated. This is why combustion reactions are exothermic reactions. (1 mark)

(ii) $CH_3CH_2OH \xrightarrow[\text{or Acidified } K_2Cr_2O_7, \Delta]{\text{Alkaline } KMnO_4, \Delta} CH_3COOH$

In the conversion of ethanol to ethanoic acid oxygen gets added to the product. So the reaction is oxidation reaction and these substances ($KMnO_4$ or $K_2Cr_2O_7$) are known as oxidizing agents. (1 mark)

39. (a) (i) A ray passing through the optical centre, is displaced but not deviated. But in thin lenses the displacement is very small which can be neglected. (1 mark)

(ii) Optical centre of a lens can be within the lens or outside, depending on the nature of lens. ($\frac{1}{2} \times 2 = 1$ mark)

(b) $f = 20$ cm (convex lens) $= 0.2$m,

$$P = \frac{1}{f} = \frac{1}{0.2} = 5 \text{ diopter}$$ (1 mark)

(c) $P = 4D$, $P = \frac{1}{f} \Rightarrow 4 = \frac{1}{f} \Rightarrow f = \frac{1}{4} = 0.25$ cm (1 mark)

$f = (0.25 \times 100)$ cm $= 25$ cm

It is a convex lens ('f' is + ve) (1 mark)

OR

(i) $f = -2$ m

$$P = \frac{1}{f} = \frac{1}{-2} = -0.5 \text{ dioptre}$$ (1 mark)

(ii) When the focal length of a lens is one metre then the power of lens is called one dioptre. (1 mark)