



PART-A (PHYSICS)

I. Choose the correct alternative and write the complete answer along with its letter of alphabet.
3 x 1 = 3

1. The device used to change the resistance at many times in the electric circuit is
(A) Electric generator (B) Electric motor (C) Galvanometer (D) Rheostat

Ans: (D) Rheostat

2. The correct statement among the following related to the Concave lens is,
(A) Converges the light rays (B) forms inverted image
(C) forms real image (D) diverges the light rays

Ans: (D) diverges the light rays

3. The resistivity(Ωm) of four materials A, B, C and D are 6.84×10^{-8} , 1.62×10^{-8} , 5.20×10^{-8} and 2.63×10^{-8} respectively. Which of these materials has very less electric conductivity?
(A) Material B (B) Material C (C) Material A (D) Material D

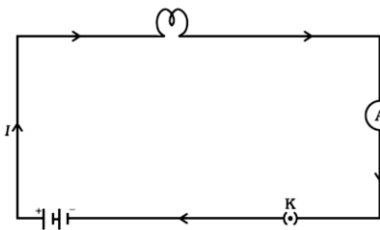
Ans: (C) Material A

II. Answer the following questions.

2 x 1 = 2

4. Draw the symbol diagram of two electric cells that are connected in series in an electric circuit.

Ans :



5. What is 'Optic centre' of spherical lens?

Ans : The central point of a lens is 'Optic centre' of spherical lens.

III. Answer the following questions.

3x2=6

6. What is solenoid? List the properties of the magnetic field due to the flow of electric current in a solenoid.

Ans : Solenoid : A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder.

properties of the magnetic field due to the flow of electric current in a solenoid :

- * The field lines inside the solenoid are in the form of parallel straight lines.
- * The magnetic field is uniform inside the solenoid.

7. How does rainbow form in nature? Explain.

Ans : : Rainbow is a natural spectrum appearing in the sky after a rain shower .It is caused by dispersion of sunlight by tiny water droplets, present in the atmosphere. A rainbow is always formed in a direction opposite to that of the Sun. The water droplets act like small prisms. They refract and disperse the incident sunlight, then reflect it internally, and finally refract it again when it comes out of the raindrop . Due to the dispersion of light and internal reflection, different colours reach the observer's eye.

8. Ray of light travelling in air enters obliquely into water. Does the light ray bend towards the normal or away from the normal? Why?

Ans : Ray of light travelling in air enters obliquely into water. Then the light ray bend towards the normal. Air is rarer medium and water is denser medium. When the light ray enters from a rarer medium to a denser medium it bends towards the normal.

OR

Convex mirror is commonly used as a rear-view mirror in vehicles. Why? Write the relationship between the focal length and radius of curvature of a convex mirror.

Ans : Convex mirror is commonly used as a rear-view mirror in vehicles because,

- * They always give an erect diminished image.
- * Also they have a wider field of view as they are curved outwards.

relationship between the focal length and radius of curvature of a convex mirror is $f = \frac{R}{2}$

IV. Answer the following questions.

3x3=9

9. Explain the method of production of biogas in biogas plant and write any two characteristics of biogas.

Ans : A slurry of cow-dung and water is made in the mixing tank from where it is fed into the digester. The digester is a sealed chamber in which there is no oxygen. Anaerobic micro-organisms that do not require oxygen decompose or break down complex compounds of the cow-dung slurry and generate biogas.

Characteristics of biogas.

- Leaves no residue like ash.
- It burns without smoke / eco friendly.
- Its heating capacity is high.

OR

How power is generated from nuclear energy? Explain. Write any two hazards of nuclear power generation.

Ans : Nuclear fission reaction is carried out in nuclear power reactors. The nucleus of heavy atom (such as uranium, plutonium or thorium) when bombarded with low-energy neutrons, can be split apart into lighter nuclei.

- When this is done, a tremendous amount of energy is released at a controlled rate.
- The released energy is used to produce steam and further generate electricity.

hazards of nuclear power generation.

- Improper nuclear waste storage and disposal result in environmental contamination
- There is a risk of accidental leakage of nuclear radiation.

10. Draw the ray diagram of image formation when the object is kept at 'C' of the concave mirror. With the help of the ray diagram mention the position and the nature of the image formed. (F: Principal focus of the mirror, C: Centre of curvature of mirror)

Ans :

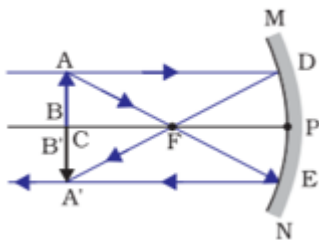


Image position: At C
Nature of image : Real , inverted and same sized

11. Stars appear to be twinkling. Why? Explain. What are the reasons for the appearance of the sun in red colour during sunrise?

Ans : Stars emit their own light and they twinkle due to the **atmospheric refraction of starlight**. The starlight, on entering the earth's atmosphere, undergoes refraction continuously before it reaches the earth.

During sunrise, the light rays coming from the Sun have to travel a greater distance in the earth's atmosphere before reaching our eyes. The shorter wavelengths of lights are scattered out and only longer wavelengths are able to reach our eyes. There for, the Sun appears reddish early in the morning.

OR

a) What is meant by power of accommodation of the eye ?

Ans : The ability of the human eye lens to adjust its focal length to view both distant and nearby objects clearly is called the power of accommodation of the eye.

b) What is myopia (near sightedness)? What are the reasons that cause this defect ?

Ans : An eye defect in which a person can see near objects clearly but cannot see distant objects clearly is called myopia.

Reasons: (i) excessive curvature of the eye lens,
(ii) elongation of the eyeball.

V. Answer the following questions.

2x4=8

12. a) Two resistors of resistance 5Ω and 20Ω are connected in parallel and connected to a 12V battery. Calculate the total resistance in the electric circuit and the total current flowing in this circuit.

Ans : $R_1=5\Omega$, $R_2=20\Omega$, $V = 12\text{ V}$

$$\frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} = \frac{1}{5} + \frac{1}{20} = \frac{4+1}{20} = \frac{5}{20}, R_p = \frac{20}{5} = 4\Omega$$

current through the circuit $I = \frac{V}{R} \rightarrow \frac{12}{4} = 3\text{A}$

b) 200 J of heat is produced in two seconds in a 8Ω resistance. Find the potential difference across the resistor.

Ans : $H= 200\text{ J}$, $t = 2\text{ sec}$, $R = 8\Omega$, $I = ?$, $V = ?$

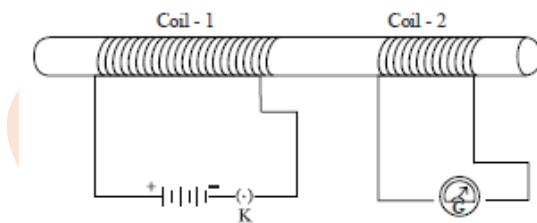
According to Joules law of heating $H = I^2 Rt$

$$200 = I^2 \times 8 \times 2$$

$$I^2 = \frac{200}{16} = 12.5 \quad I = 3.5\text{ A.}$$

$$V = RI = 8 \times 3.5 = 28\text{V}$$

13. a) Coil-1 is connected to the battery and plug key and Coil-2 with a galvanometer are kept close to each other as shown in the diagram.



Write your observation in the galvanometer. When

i) plug key K is closed and ii) plug key K is opened. Give reasons for your observations.

Ans : i) needle of the galvanometer instantly jumps to one side and just as quickly returns to zero.

ii) the needle momentarily moves, but to the opposite side.

b) Write the functions of the following.

i) Earthing wire ii) Electric fuse

Ans : i) Earthing wire: Earth wire provides a low-resistance conducting path for the current. Any leakage of current flows into the earth, and protects the user from severe electric shock.

ii) Electric fuse : protects circuits and appliances by stopping the flow of any unduly high electric current.

PART-B (CHEMISTRY)

VI. Four alternatives are given for each of the following statements / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. $3 \times 1 = 3$

14. The Chemical equation that represents neutralisation reaction among the following is

- (A) Sodium Hydroxide + Hydrochloric acid \rightarrow Sodium Chloride + Water
- (B) Barium Chloride + Sulphuric acid \rightarrow Barium sulphate + Hydro Chloric acid
- (C) Manganese dioxide + Hydrochloric acid \rightarrow Manganese chloride + Water + Chlorine
- (D) Silver nitrate + Hydrochloric acid \rightarrow Silver chloride + Nitric acid

Ans : (A) Sodium Hydroxide + Hydrochloric acid \rightarrow Sodium Chloride + Water

15. "Properties of elements are periodic function of their atomic number". This law was proposed by

- (A) Dobereiner (B) Mendeleev (C) Newlands (D) Henry Moseley

Ans : (D) Henry Moseley

16. The substance that converts red litmus paper into blue colour is

- (A) KOH Solution (B) distilled water
- (C) dilute solution of HCl (D) concentrated solution of HNO₃

Ans : (A) KOH Solution (Base) (ABRB- Acid turns blue litmus red . Base turns red litmus blue)

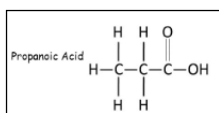
VII. Answer the following questions.

$3 \times 1 = 3$

17. Mention the number of single bonds and double bonds present in the structure of C₂H₅COOH molecule.

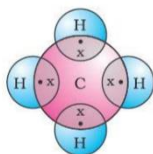
Ans : Single bonds 8

Double bond 1



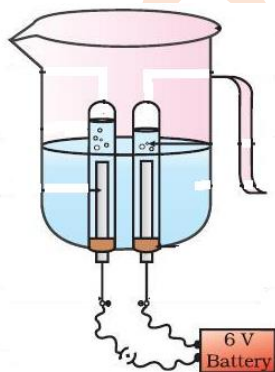
18. Write the electron dot structure of methane.

Ans :



19. Draw the diagram of the arrangement of apparatus to show electrolysis of water.

Ans :



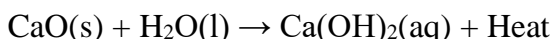
VIII. Answer the following questions.

$3 \times 2 = 6$

20. Calcium oxide reacts with water to form slaked lime. What type of Chemical reaction is this?

Write the balanced chemical equation for this reaction.

Ans : Combination Reaction/ Exothermic reaction



21. What is the chemical name of bleaching powder ? Write any two uses of it.

Ans : chemical name : Calcium oxy chloride(CaOCl₂)

- Uses :
- (i) for bleaching cotton and linen in the textile industry, for bleaching wood pulp in paper factories and for bleaching washed clothes in laundry;
 - (ii) as an oxidising agent in many chemical industries; and
 - (iii) to make drinking water free from germs.

OR

What is concentrated acid? Name the acid present in the stinging hair of nettle leaves.

Ans : Concentrated acid : Acid with more concentration of H^+ / H_3O^+ ions per unit volume.

Acid present in the stinging hair of nettle leaves : Methanoic acid

22. Give reason.

i) Ionic compounds have high melting and boiling points.

Ans : Ionic compounds have high melting point because a considerable amount of energy is required to break the strong inter-ionic attraction .

ii) Ionic compounds in solid state do not conduct electricity.

Ans : In the solid state ionic compounds do not conduct electricity because movement of ions in the solid is not possible due to their rigid structure./ strong force of attraction between the positive and negative ions.

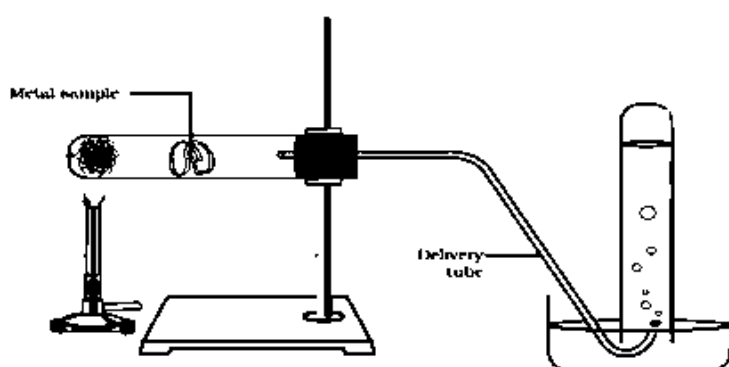
IX. Answer the following questions.

3 x 3 = 9

23. Draw the diagram of the arrangement of apparatus to show the action of steam on metals.

i) Metal piece

ii) Delivery tube



24. The electronic configuration of four elements are given in the below table. Write the elements in the increasing order of their electropositivity and give reason.

Elements	Electronic Configuration
Na	2, 8, 1
S	2, 8, 6
Al	2, 8, 3
K	2, 8, 8, 1

Ans : $S < Al < Na < K$

Electropositivity decreases along the period and increases down the group.

Explanation:

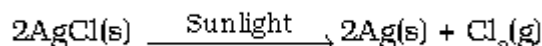
Elements	Electronic Configuration	Group	Period
Na	2, 8, 1	1	3
S	2, 8, 6	16	3
Al	2, 8, 3	3	3
K	2, 8, 8, 1	1	4

Arrangement of these four elements in periodic table will be

Na Al S
K

25. Silver chloride exposed to the sunlight turns grey colour. Why? Write the balanced chemical equation for this reaction and mention the type of reaction.

Ans : Silver chloride decomposes into silver(grey coloured) and chlorine when exposed to sunlight.

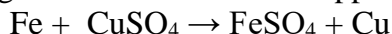


OR

Why does the colour of copper sulphate solution change when an iron nail is dipped into it?

Write the balanced chemical equation for this reaction.

Ans : Iron displaces copper from copper sulphate solution so, the colour of copper sulphate solution change when an iron nail is dipped into it



X. Answer the following question.

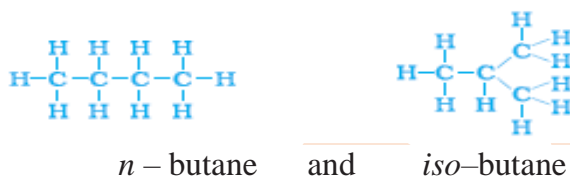
1 x 4 = 4

26. a) The conversion of ethanol to ethanoic acid is an oxidation reaction. Why?

Ans : The conversion of ethanol to ethanoic acid is an oxidation reaction because oxidation of ethanol in to Ethanoic acid involves addition of oxygen and removal of hydrogen.

b) What are structural isomers? Write the structural isomers of butane.

Ans : Organic compounds having the same molecular formula but different structural formulae, are called isomers.



PART-C (BIOLOGY)

XI. Four alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. 2 x 1=2

27. AIDS : Virus :: Warts : _____

- (A) Bacteria (B) Fungus (C) Protozoan (D) Virus

Ans : (A) Bacteria

28. Algae → Small insects → Large insects → Small fish → Large fish → Human.

The arrangement of trophic levels in this food chain are in the

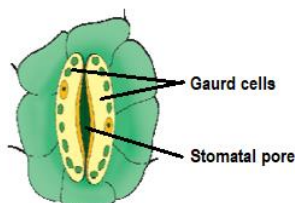
- (A) increasing order of energy availability.
(B) increasing order of both energy availability and storage of harmful chemicals.
(C) increasing order of storage of harmful chemicals.
(D) decreasing order of both energy availability and storage of harmful chemicals.

Ans : (C) increasing order of storage of harmful chemicals.

XII. Answer the following questions.

3 x 1 = 3

29. Draw the diagram showing the structure of closed stomata.



30. What is the function of ozone layer?

Ans : Ozone protects the earth from harmful UV-radiation.

31. Rejuvenating ancient water harvesting systems is being encouraged. Why?

Ans : Rejuvenating ancient water harvesting systems

- * reduces mismanagement and over-exploitation of water resources.
- * Increases ground water level.

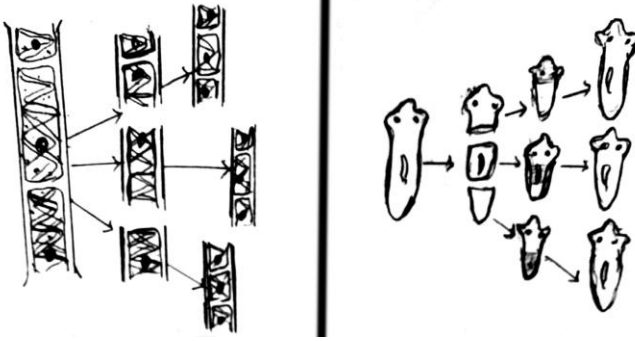
XIII. Answer the following questions.

2 x 2 = 4

32. What needs of the local people are fulfilled by the forest?

- Ans: * Fire wood: Timber and Thatch. * Bamboo used in huts & baskets
* Implements of agriculture, fishing and hunting. * Fruits, nuts and medicines.
* Fodder for their cattle.

33.



SPIROGYRA

PLANARIA

The reproduction methods expressed in both of the above figures are similar or different from each other? Write the justification to your answer.

Ans : The reproduction methods expressed in both of the above figures are different from each other.

SPIROGYRA	PLANARIA
Spirogyra reproduces by fragmentation	Planaria reproduces by regeneration.
breaks up into smaller pieces upon maturation and these pieces grow into new individuals.	can be cut into any number of pieces and each piece grows into a complete organism.

XIV. Answer the following questions.

3 x 3 = 9

34. a) How is the vegetative propagation in plants useful to the field of agriculture?

- Ans :
- (i) Good qualities of a variety can be maintained indefinitely.
 - (ii) Vegetative propagation gives a genetically uniform population.
 - (iii) Plants raised by vegetative propagation can bear flowers and fruits earlier.

b) Consistency of the DNA copying is important during reproduction. Why?

Ans : The consistency of DNA copying during reproduction is important for maintenance of body design features that allow the organism to use that particular niche [area where organisms live].

- Reproduction is linked to the stability of population of species

OR

a) How do germ cells receive half the amount of DNA? What is the need of this process?

Ans : Germ cells receive half the amount of DNA. This is achieved by a process of cell division called meiosis. When these germ-cells from two individuals combine during sexual reproduction to form a new individual, it results in reestablishment of the number of chromosomes and the DNA content in the new generation.

b) How does menstruation in women occur?

Ans : The uterus prepares itself every month to receive a fertilised egg. Its lining becomes thick and spongy. But if fertilisation does not occur then this lining of the uterus breaks down along with blood vessels. The degenerated part of uterus along with the blood moves out of the vagina in the form of bleeding, called menstruation.

35. How phototropism, thigmotropism and chemotropism are co-ordinated in the apparent movement of creepers (climbing-up plants) towards particular direction?

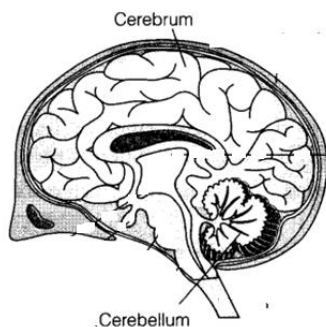
Ans : When growing plants detect light, a hormone called auxin, synthesised at the shoot tip, helps the cells to grow longer. When light is coming from one side of the plant, auxin diffuses towards the shady side of the shoot. i.e. phototropism. When tendrils come in contact with any support, the part of the tendril in contact with the object does not grow as rapidly as the part of the tendril away from the object. i.e. thigmotropism. The concentration of chemical substance auxin controls both these tropisms. i.e. chemotropism.

36. Draw the diagram showing the structure of the human brain. Label the following parts.

i) Cerebrum

ii) Cerebellum

Ans :



XV. Answer the following question.

1 x 4 = 4

37. a) What is the important function of 'villi' and 'alveoli' in our body?

Ans : The small intestine has millions of tiny finger-like projections called villi. These villi increase the surface area for more efficient food absorption.

Each lung contains large number of alveoli which increase the surface area for gaseous exchange making the process of respiration more efficient.

b) Explain the structure and function of nephron.

Ans : The main components of the nephron are glomerulus, Bowman's capsule, and a long renal tubule.

Functioning of a nephron:

- The blood enters the kidney through the renal artery,
- Waste materials in the blood are filtered and collected by Bowman's capsule.
- 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 urine forming in each kidney eventually enters a long tube, the ureter, which connects the kidneys with the urinary bladder.

OR

a) What is the importance of transpiration in plants?

Ans : Transpiration helps in the absorption and upward movement of water and minerals. And helps in temperature regulation.

b) How does translocation of materials take place by phloem tissue?

Ans : Transport of soluble products of photosynthesis is called **translocation**. Phloem transports food materials from the leaves to different parts of the plant body. The transportation of food in phloem is achieved by utilizing energy from ATP. 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.

XVI. Answer the following question.

1 x 5 = 5

38. a) Tall pea plant (TT) is crossed with short pea plant (tt). What type of the plants will obtain in F1 generation? Write the genetic make up of this progeny.

Ans : Tall plants will be obtained in F1 generation.

genetic make up of this progeny is- Tt

b) Forelimbs of frog, wings of bird, wings of bat, forelimbs of lizard pair them as analogous and homologous organs. Give reason for your pairing.

Homologous organs	Analogous organs
Forelimbs of frog and forelimbs of lizard	wings of bird and wings of bat
They have similar structure and perform different functions.	They have different structure and perform similar functions.
Have common origin	Have different origin