G - W CLASSES, GONDIA
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SUB - SCIENCE (086) **TIME: 3 HOURS**
MAX. MARKS: 80 **CLASS X**

General Instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
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.

SECTION-A

1. There are various methods to prevent pregnancy. Which of the following contraceptive methods also provides protection from acquiring sexually transmitted diseases (STDs)?
   (a) Copper-T
   (b) Oral Pills
   (c) Condom
   (d) Tubectomy

2. In a classic Mendelian monohybrid cross, when a heterozygous tall pea plant (Tt) from the F1 generation is self-pollinated, what is the resulting phenotypic ratio of tall to dwarf plants in the F2 generation?
   (a) 1:1
   (b) 1:2
   (c) 3:1
   (d) 2:1

3. Consider the following statements regarding the process of human digestion:
   (i) The digestion of starch begins in the mouth by the action of salivary amylase.
   (ii) Pepsin is the primary enzyme in the stomach that digests proteins in an acidic medium.
   (iii) Bile juice, produced by the liver, contains powerful enzymes for digesting fats.
   (iv) Trypsin, found in the small intestine, acts on proteins and breaks them down.
   Which of the above statements are correct?
   (a) (i) and (iii) only
   (b) (i), (ii), and (iv)
   (c) (ii) and (iv) only
   (d) All are correct.

4. The regulation of blood sugar levels is a classic example of a hormonal feedback mechanism. Which hormones are responsible for lowering and raising blood sugar levels, respectively?
   (a) Glucagon and Insulin
   (b) Insulin and Glucagon
   (c) Adrenaline and Thyroxine
   (d) Thyroxine and Adrenaline

5. Photosynthesis is the process by which green plants prepare their own food. Which of the following are the essential raw materials for this process?
   (a) Oxygen, Water, and Sunlight
   (b) Carbon Dioxide, Oxygen, and Water
   (c) Sunlight, Chlorophyll, and Oxygen
   (d) Carbon Dioxide, Water, and Sunlight

6. Hormones regulate various functions in the human body. Which hormone is primarily responsible for the development of secondary sexual characteristics in males?
   (a) Oestrogen
   (b) Testosterone
   (c) Adrenaline
   (d) Insulin

7. The exchange of materials between the mother and the developing foetus is crucial for a healthy pregnancy. This exchange occurs through which specialized tissue?
   (a) Ovary
   (b) Uterus
   (c) Fallopian tube
   (d) Placenta

8. **Assertion (A) :** Food chains in an ecosystem are generally short, usually consisting of three to four trophic levels.
   Reason (R) : The amount of available energy increases at each successive trophic level in a food chain.
   (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.

9. **Assertion (A) :** Opting for public transport over private vehicles can help reduce air pollution in cities.
   Reason (R) : Public transport vehicles are designed to run without releasing any pollutants.
   (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.

10. Unlike animals, plants do not have any excretory products as they do not eat food. Comment upon the statement with justification.

11. Attempt either option A or B.
   A. How many chambers are there in the heart of the following organisms? How is the mixing of oxygenated and deoxygenated blood prevented in their body?
      (i) Fishes
      (ii) Humans

   OR

   B. Explain the mechanism by which the water is transported in plants?

12. Draw a diagram of a nerve cell and explain how nerve impulses are transmitted.

13. In a genetic experiment, plants with pure round green seeds (RRyy) were crossed with plants with wrinkled yellow seeds (rrYY).
   (i) Show the gametes formed when the F1 generation was self-pollinated.
   (ii) Show the ratio in which these traits are independently inherited.

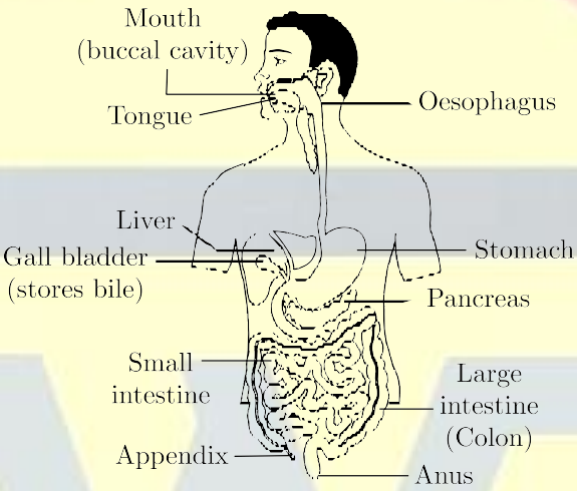
14. Neha consumed boiled sweet potatoes and boiled eggs for breakfast. Help her to understand some steps in the process of digestion by answering the questions given below.

A. Which of these food items is rich in proteins? In which part of the alimentary canal is the digestion of this component initiated? Name the enzymes and conditions required.

OR

B. Which of these food items is rich in starch? How is its digestion initiated?

C. The figure given below represents parts of the human alimentary canal. Which of these parts will have the maximum amount of digested food as soon as the process of digestion is completed?



15. About 100 acres of a grassland area was declared a nature reserve. The following organisms were predominant in the area: deer, grass, fox, tiger, and insects. Create a food web comprising two separate food chains using the above data.

16. Attempt either option A or B.

A. Puneet wanted to grow banana plants.

(i) Based on your knowledge of plant reproduction, should he opt for seeds or any alternate method of reproduction? Justify your answer.

(ii) Offsprings of a banana plant usually show very little variation. What causes variation, and are variations good or bad? Justify.

OR

B. Annie was conducting research on the number of fruits produced by watermelon under different conditions. She grew 25 watermelon plants each in both glass house A and B. She introduced pollinators in glass house A only.

(i) What difference will she observe in the number of fruits produced in the two glass houses? Explain with reason.

(ii) List 3 changes that will occur in a flower once it gets fertilized.

SECTION-B

17. In the reaction $C(s) + O_2(g) \rightarrow CO_2(g)$, which of the following statements is true?

(a) Carbon is reduced.
(b) Oxygen is oxidized.
(c) Carbon is oxidized.
(d) It is a decomposition reaction.

18. Tooth decay can be prevented by regularly brushing teeth with toothpaste. The chemical nature of a typical toothpaste is:
(a) Acidic
(b) Basic
(c) Neutral
(d) Corrosive

19. Which of the following metals reacts with both acids and bases to produce salt and hydrogen gas?
(a) Iron
(b) Copper
(c) Sodium
(d) Aluminium

20. Which of the following hydrocarbons is not saturated?
(a) Propane (C_3H_8)
(b) Butane (C_4H_{10})
(c) Pentene (C_5H_{10})
(d) Cyclohexane (C_6H_{12})

21. An aqueous solution of salt 'X' turns blue litmus paper red. The salt 'X' could be:
(a) Sodium Acetate (CH_3COONa)
(b) Sodium Chloride (NaCl)
(c) Ammonium Chloride (NH_4Cl)
(d) Potassium Sulphate (K_2SO_4)

22. During the electrolytic refining of copper, the impurities that are less reactive than copper settle down below the anode. These impurities are known as:
(a) Anode mud
(b) Cathode sludge
(c) Gangue
(d) Flux

23. When green-coloured ferrous sulphate crystals are heated, a reddish-brown solid is formed and two gases are evolved. The gases are:
(a) Oxygen and Sulphur dioxide
(b) Sulphur dioxide and Sulphur trioxide
(c) Oxygen and Sulphur trioxide
(d) Hydrogen and Sulphur dioxide

24. **Assertion (A) :** Copper does not react with dilute HCl.
Reason (R) : Copper is a less reactive metal than hydrogen.
(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.

25. What is a redox reaction? Identify the substance oxidized and the substance reduced in the following reaction: $CuO + H_2$ " $Cu + H_2O$

26. Attempt either option A or B.
A. (i) Show the formation of Sodium Oxide (Na_2O) by the transfer of electrons.
(ii) What is the nature of the chemical bond present in it?

OR

B. (i) What is this process called when iron articles are coated with a layer of zinc?
(ii) Explain why this process protects iron from rusting, even if the zinc coating is broken.

27. What is the main structural difference between an alcohol and a carboxylic acid? Describe a reliable chemical test to distinguish between them.

28. A white powder 'X' is obtained by heating gypsum at 373 K. When this powder is mixed with water, it sets into a hard solid mass, 'Y'.

(a) Identify the substance 'X' and the substance 'Y'.

(b) Write the chemical formula for both 'X' and 'Y'.

OR

(c) Write the balanced chemical equation for the conversion of Gypsum to 'X'.

(d) State two important uses of substance 'X' (Plaster of Paris).

29. Attempt either option A or B.

A. (a) Draw the electron-dot structure for a molecule of ethene (C_2H_4).

(b) What is a substitution reaction? Give one example with a balanced equation.

(c) Why does carbon form strong covalent bonds with other carbon atoms?

OR

B. (a) What is the IUPAC name of the compound C_2H_5OH?

(b) What happens when this compound is heated with excess concentrated sulphuric acid at 443 K? Write the balanced chemical equation.

(c) What happens when this compound reacts with a piece of sodium metal? Write the balanced chemical equation.

SECTION-C

30. A student is learning about the properties of spherical mirrors and makes the following statements:

I. A concave mirror is a converging mirror.

II. A convex mirror is a diverging mirror.

III. A concave mirror is used in shaving mirrors to get a magnified, erect image.

Choose from the following the correct option that lists the correct statements.

(a) I and II (b) I and III

(c) I, II and III (d) II and III

31. A student notices that when a prism is used, the violet color of light bends the most. What is the reason for this observation?

(a) The refractive index of the prism is the same for all colors.

(b) Violet light has the longest wavelength.

(c) Violet light travels slowest in the glass prism.

(d) The angle of incidence is different for each color.

32. **Assertion (A) :** A ray of light incident at the pole of a convex mirror is reflected such that the reflected ray makes the same angle with the principal axis as the incident ray.

Reason (R) : This behavior is in accordance with the laws of reflection.

(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.

33. An object is placed at focus of convex lens.

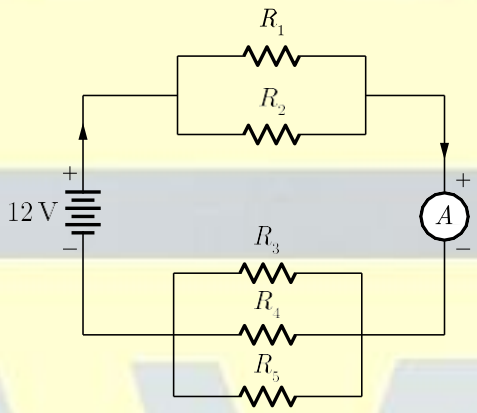
A. Where is image formed?

B. What is size and nature?

C. Draw ray diagram.

34. Attempt either option A or B.

A. If in figure A, $R_1 = 10\ \Omega$, $R_2 = 40\ \Omega$, $R_3 = 30\ \Omega$, $R_4 = 20\ \Omega$, $R_5 = 60\ \Omega$ and a 12 V battery are connected to the arrangement, calculate :

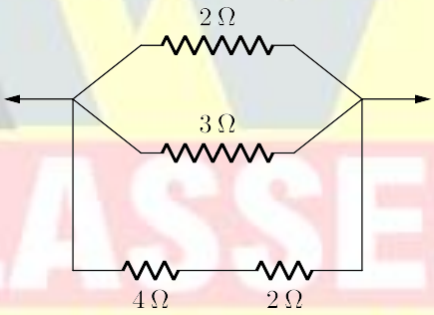


(a) Total resistance in the circuit and

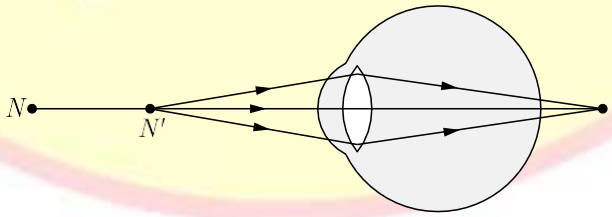
(b) Total current flowing in the circuit.

OR

B. Calculate the equivalent resistance from the following combination of resistors.



35. Study the diagram below and answer the following questions :



(i) Name the defect of vision depicted in the diagram.

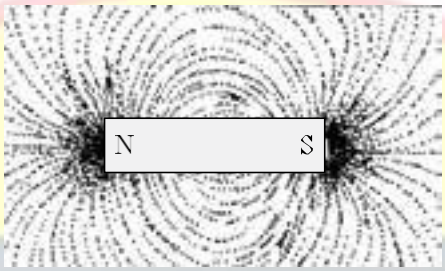
(ii) List two causes of the above defect.

(iii) Draw a ray diagram for the correction of the above defect using an appropriate lens.

Continue on next page.....

36. Draw a circuit diagram of an electric circuit containing a cell, a key, an ammeter, a resistor of 4Ω in series with a combination of two resistors (8Ω each) in parallel and a voltmeter across parallel combination. Each of them dissipate maximum energy and can withstand a maximum power of 16W without melting. Find the maximum current that can flow through the three resistors.

37. Study the diagram given below and answer the questions that follow :



(a) Why do the iron filings arrange in such a pattern?
(b) What does this pattern demonstrate ?
(c) Why do the iron filings near the bar magnet seem to align in the shape of closed curves ?

38. Is there a relationship between the radius of curvature R, and focal length f, of a spherical mirror ? For spherical mirrors of small apertures, the radius of curvature is found to be equal to twice the focal length. We put this as $R = 2f$. This implies that the principal focus of a spherical mirror lies midway between the pole and centre of curvature.

(i) Write relation between radius of curvature and focal length.
(ii) For which type of mirrors above relation is verified?
Attempt either subpart C or D.
(iii) What should be size of the aperture ?

OR

(iv) Where is the principle focus of a spherical mirror lies?

39. Attempt either option A or B

A. What is meant by magnetic force ? Name and explain the rule to determine the direction of force experienced by a current carrying conductor in a magnetic field. How does this force gets affected on :
(i) doubling the magnitude of current.
(ii) reversing the direction of current flow and
(iii) reversing the direction of magnetic field?

OR

B. Two electric lamps rated 100 W, 220 V and 25 W, 220 V are connected in parallel. Calculate the total electric current in the circuit.