Sample Paper 21

Class X 2026-27

Science (086)

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

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. The nephron is the filtering unit of the kidney. What is the name of the cup-shaped structure at the start of the nephron that encloses a ball of capillaries?

(a) Ureter
(b) Bowman's capsule
(c) Collecting Duct
(d) Glomerulus

2. In a 'fight or flight' emergency situation, which endocrine gland is stimulated to release a hormone that prepares the body for rapid, intense action?

(a) Pituitary gland
(b) Thyroid gland
(c) Adrenal gland
(d) Pancreas

3. The transfer of pollen grains from the anther to the stigma of the very same flower is known as:

(a) Self-pollination
(b) Cross-pollination
(c) Fertilization
(d) Germination

4. In genetics, the set of observable characteristics of an individual, such as its height, eye colour, or flower colour, is referred to as its:

(a) Genotype
(b) Phenotype
(c) Allele
(d) Genome

5. Organisms that can produce their own food from inorganic sources like sunlight, water, and carbon dioxide form the base of every food chain. These organisms are at the first trophic level and are known as:

(a) Carnivores
(b) Herbivores
(c) Decomposers
(d) Producers

6. Consider the following statements about the human male reproductive system:

(i) The testes are located in the scrotum to maintain a temperature lower than the body for sperm production.
(ii) The hormone testosterone is responsible for the development of male secondary sexual characteristics.
(iii) The vas deferens is a tube that transports sperm from the epididymis towards the urethra.
(iv) Seminal vesicles and the prostate gland add their secretions to the sperm to form semen.

Which of the above statements are correct?

(a) (i) and (ii) only
(b) (iii) and (iv) only
(c) (i), (ii), and (iii) only
(d) All are correct.

7. What are the tiny pores present on the surface of plant leaves that are responsible for the exchange of gases like carbon dioxide and oxygen with the atmosphere?
(a) Stomata
(b) Lenticels
(c) Hydathodes
(d) Cuticle

8. **Assertion (A) :** The roots of a plant always grow downwards.
Reason (R) : The downward growth of roots is an example of positive geotropism.
(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) :** Using disposable plates made from banana leaves is a more environmentally sound choice than using disposable plastic plates.
Reason (R) : Plastic is a non-biodegradable material that persists in the environment and causes pollution.
(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. Mammals and birds have a four-chambered heart with the right and left sides completely separated. Why is this separation necessary, and what is the structure responsible for it?

11. Student to attempt either option A or B.
A. List the functions of the following plant hormones:
(i) Auxin and
(ii) Cytokinin.

OR

B. What is the key difference between inhalation and exhalation regarding the movement of the rib cage?

12. "The flow of energy in a food chain is unidirectional." Justify this statement. What happens to the energy captured by producers that is not passed on to consumers?

13. Draw a neat diagram of a neuron (nerve cell) and label the following parts:
(i) Cell Body
(ii) Axon
(iii) Dendrite

14. A cross was made between a pure-breeding pea plant having round, yellow seeds (RRYY) and a pure-breeding pea plant having wrinkled, green seeds (rryy).
(i) What would be the phenotype of the plants in the F1 generation?
(ii) Write the genotypes of the gametes produced by the F1 plants.
(iii) What type of cross is this?

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15. Refer to the diagram of the human alimentary canal to the questions.

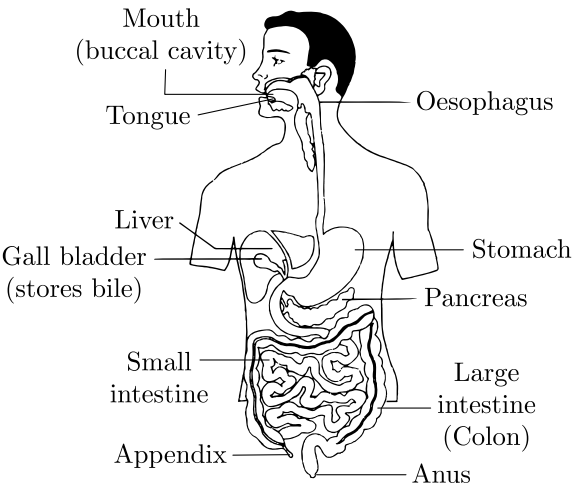


Figure:- Human Alimentary canal

A. What is the role of HCl in the part labelled 'N' (Stomach)?

OR

B. Describe the function of bile juice in digestion. Which organ produces it? C. Where does the final absorption of water from undigested food take place?

16. Attempt either option A or B.

A. (i) What is vegetative propagation?
(ii) List two advantages of growing plants using this method.
(iii) Name two plants that are commonly propagated by layering.

OR

B. (i) Draw a labelled diagram of the longitudinal section of a typical flower.
(ii) What is the function of the stamen and the carpel in a flower?
(iii) Differentiate between pollination and fertilization.

SECTION-B

17. In the reaction $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$, which substance acts as the reducing agent?

(a) Fe_2O_3 (b) CO
(c) Fe (d) CO_2

18. Which of the following acids is not organic in nature?

(a) Acetic acid (b) Formic acid
(c) Nitric acid (d) Lactic acid

19. Which of the following non-metals exists as a liquid at room temperature?

(a) Carbon (b) Sulphur
(c) Bromine (d) Iodine

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20. A molecule of ammonia (NH_3) has:
(a) Only single bonds
(b) Only double bonds
(c) Only triple bonds
(d) One double bond and two single bonds

21. The reaction between an acid and a base to give a salt and water is known as a:
(a) Combination reaction
(b) Decomposition reaction
(c) Neutralisation reaction
(d) Displacement reaction

22. Calcification is a process used in metallurgy to convert an ore into its oxide. The process involves:
(a) Heating a sulphide ore strongly in the presence of excess air.
(b) Heating a carbonate ore strongly in a limited supply or absence of air.
(c) Reducing an oxide ore with carbon.
(d) Melting the ore to remove impurities.

23. The chemical formula for rust, which forms on the surface of iron when exposed to moist air, is:
(a) FeO
(b) Fe_2O_3
(c) Fe_3O_4
(d) $Fe_2O_3 \cdot xH_2O$

24. **Assertion (A) :** Unsaturated hydrocarbons like ethene undergo addition reactions.
Reason (R) : The double and triple bonds in unsaturated hydrocarbons are weak and can easily break to add other atoms.
(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 galvanization? Why is this process carried out on iron articles?

26. Attempt either option A or B.
A. How is ethanol manufactured on a large commercial scale? Write the chemical equation for the reaction involved in the process.

OR

B. (i) Why is the conversion of ethanol to ethanoic acid considered an oxidation reaction?
(ii) What is the role of alkaline $KMnO_4$ in this reaction?

27. A student places a clean strip of zinc metal in a blue-coloured solution of copper sulphate.
(a) What change in the colour of the solution will the student observe after some time?
(b) What will be observed on the surface of the zinc strip?
(c) Write a balanced chemical equation for the reaction and identify the type of reaction.

28. A white crystalline solid 'X' is a common ingredient found in kitchens. It is used in baking to make cakes rise and is also an active ingredient in some antacids. When heated, it decomposes to form sodium carbonate, water, and carbon dioxide.
(a) Identify 'X' and write its chemical name and chemical formula.
(b) Explain the role of 'X' in making a cake soft and spongy.

OR

(c) Write the balanced chemical equation for the decomposition of 'X' upon heating.
(d) Explain why 'X' can be used as an antacid. Write the balanced chemical equation for its reaction with excess acid (HCl) in the stomach.

29. Attempt either option A or B.

A. (a) What is the reactivity series of metals?
(b) How does this series help in predicting the feasibility of a single displacement reaction?
(c) You are given solutions of $FeSO_4$, $ZnSO_4$, and $CuSO_4$ and metal pieces of Fe, Zn, and Cu. Suggest a set of three experiments to arrange these metals in order of decreasing reactivity.

OR

B. (a) Define a functional group in the context of organic compounds.
(b) Identify the functional group present in the following compounds: (i) CH_3CH_2OH (ii) CH_3COCH_3 (iii) HCOOH
(c) Write the name of the third member of the alcohol homologous series.

SECTION-C

30. A student makes the following statements about image formation by lenses:

I. A convex lens can form both real and virtual images.
II. A concave lens always forms a virtual image.
III. A convex lens always forms a real and inverted 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. What is the unit of power of a lens?

(a) Meter (b) Centimeter
(c) Diopter (d) Watt

32. **Assertion (A) :** The color of the warning signal is red.
Reason (R) : The red color has the longest wavelength and scatters the least, so it can be seen from a long distance.

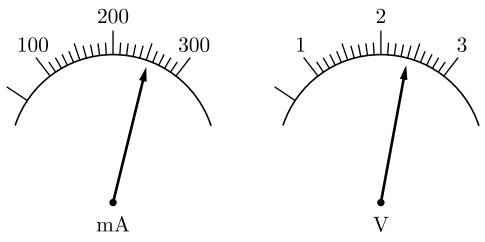
(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, and R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

33. Explain refraction of light through a rectangular glass slab.

A. What happens to the ray when it enters from air into glass?
B. What happens when it emerges back into air?
C. State the relation between emergent and incident rays.

34. Attempt either option A or B.

A. The current flowing through a resistor connected in a circuit and the potential difference developed across its ends are as shown in the diagram by milliammeter and voltmeter readings respectively :
(a) What are the least counts of these meters?
(b) What is the resistance of the resistor?

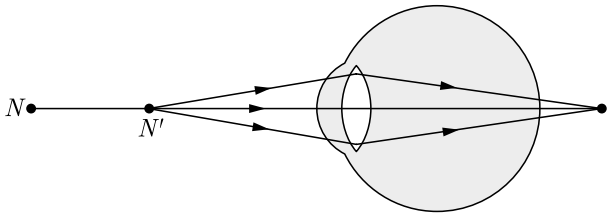


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OR

B. Give two reasons why the nichrome alloy is used for making the heating elements of electrical appliances.

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.

36. (i) What is meant by resistance of a conductor? Define its SI unit.
(ii) List two factors on which the resistance of a rectangular conductor depends.
(iii) How will the resistance of a wire be affected if its.
(1) length is doubled, and
(2) radius is also doubled ?
Give justification for your answer.

37. (i) What is the function of earth wire in electrical instruments?
(ii) Explain what is short circuiting an electric supply.
(iii) What is the usual current rating of the fuse wire in the line to feed
(a) Lights and fans?
(b) Appliances of 2kW or more power?

38. In a small town fair Amit took his friend and showed him a mirror in which his image showed upper half body very fat and lower body very thin. Amit's friend got upset but Amit explained him by showing his similar image in the mirror.
(i) Name two mirrors used in this fair shop.
(ii) Name the mirror in which the size of image is small.

39. Attempt either option A or B.
A. (i) What is a solenoid ? Draw the pattern of magnetic field lines around a current carrying solenoid.
(ii) What is the pattern of field lines inside a solenoid? What do they indicate ?
(iii) How is the magnetic field produced in a solenoid used ?

OR

B. A metallic coil, connected to a 220 V supply, has a resistance of 110 ohm (while hot). How long will it take for this coil to heat 1 kg of water from 20°C to 70°C ? Assume that whole of the heat produced by the coil is taken up by water. (Specific heat of water = 4186 J/kg°C)

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