CLASS X - SCIENCE

✤ General Instruction

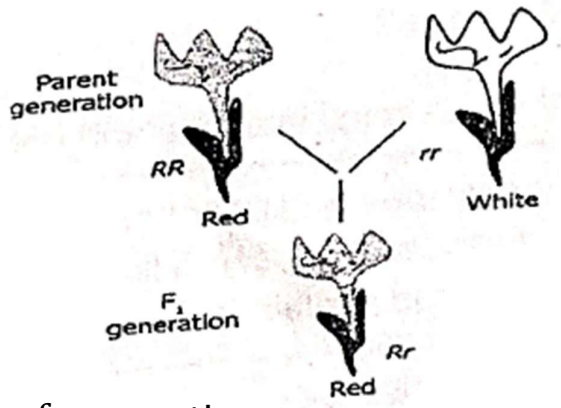
(1) This question paper consists of 39 question in 3 section. Section A in Biology, Section B is Chemistry and Section C is Physics.

(2) All question are compulsory. However , an Internal choice is provided in some question. A student is expected to attempt only one of these questions.

SECTION-A (BIOLOGY)

1. Which of the following statements correctly differentiates aerobic and Anaerobic respiration?
   (a) Both release equal amounts of energy.
   (b) Aerobic respiration occurs in mitochondria while anaerobic in cytoplasm.
   (c) Anaerobic respiration requires oxygen.
   (d) Aerobic respiration forms lactic acid as an end product.
2. Which of the following organisms exhibit autotrophic mode of nutrition?
   (a) Yeast, Amoeba, Cuscuta
   (b) Mushroom, Paramecium, Green Algae
   (c) Green Algae, Grass, Cactus
   (d) Human, Eagle, Tiger
3. Which of the following statements about tropic movements in plants is incorrect?
   (a) Roots show positive geotropism.
   (b) Stem shows positive phototropism.
   (c) Tendrils show positive hydrotropism.
   (d) Roots show positive hydrotropism.
4. In a food chain, the initial organism is usually :.
   (a) photosynthetic (b) herbivore
   (c) saprophytic (d) parasitic
5. The sexually transmitted disease which is caused by bacteria is:
   (a) diarrhoea (b) AIDS
   (c) gonorrhoea (d) genital herpes
6. The inheritance of color trait in flower is as shown. R and r denote two.

different genes for colour. Which law of Mendel can be explained using the image?



(a) Only Law of segregation
(b) Only Law of independent assortment
(c) Law of segregation and Law of dominance
(d) Law of segregation and Law of independent assortment

7. Ozone forms by combination of free oxygen atoms and oxygen molecules. How do free oxygen atoms form at higher levels of atmosphere? $O_2 \rightarrow O + O$
   (a) by splitting of molecular oxygen into free oxygen atoms in the presence of low energy UV radiations
   (b) by splitting of a molecular oxygen into free oxygen atoms in presence of high energy UV radiations
   (c) by the combination of two molecular oxygen in the presence of high energy UV radiations
   (d) by the combination of two free oxygen atoms in the presence of lower energy UV radiations

The following two questions consist of two statements - Assertion (A) and Reason (R). Answer these questions by 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.

8. Assertion (A): The phenotype of an organism is always determined by its genotype.
   Reason (R): Genotype represents the genetic makeup of an organism that controls its traits.
9. Assertion (A): The amount of energy available to the next trophic level

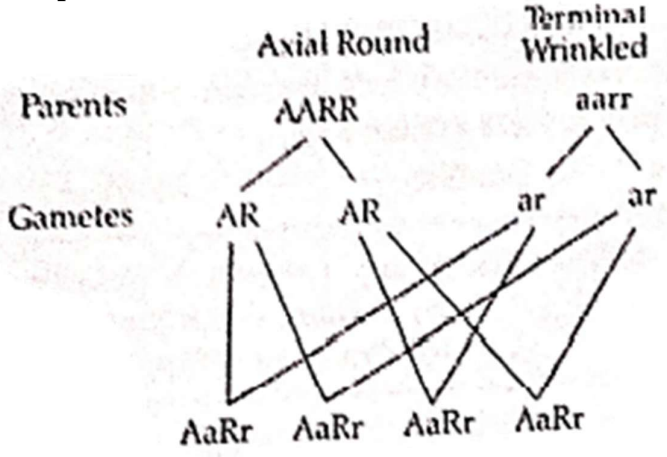
decreases at each level.

Reason (R): Energy is lost to the surroundings as heat during metabolic processes.

10. A group of students studied the growth of yeast cells in sugar (glucose) solution under aerobic and anaerobic conditions. They observed that gas bubbles formed only in the flask without air supply and the smell of alcohol developed.
    Answer the following questions:
    (i) Name the process occurring in the flask without air supply.
    (ii) Write the word equation for the reaction.
11. <u>Attempt either subpart A or B.</u>
    A. Explain why arteries have thicker walls than veins. What will happen if the arterial walls become thin like veins?

    OR

    B. Why are villi present in the small intestine and not in the stomach? Explain.
12. It is said that when harmful pesticides enter our body as well as in the bodies of other organisms. They get accumulated and beyond a limit cause harm and damage to our organs. Name the phenomenon and explain it.
13. In animals, hormones can be secreted by one organ and can act on multiple organs. Justify this statement by explaining the effect of a single animal hormone on three organs.
14. Given below is a schematic diagram showing Mendel's experiment on sweet pea plants having axial flowers with round seeds (AARR) and terminal flowers with wrinkled seeds(aarr). Study the same and answer the questions that follows:



(i) Give the phenotype of F1 progeny. Anial, Round
(ii) Give the phenotype of F2 progeny produced upon by the self-

pollination of F1 progeny. Axial Round, Axial wrinkled, Terminal Round, Terminal

(iii) Give the phenotypic ratio of F2 progeny. 9:3:3:1

15.. Attempt either subpart A or B.

A. (i) What role do digestive enzymes play in the alimentary canal?

(ii) How are fats digested in our bodies? Where does this process take place?

(iii) What is the need to have a transport system in complex organisms?

OR

B. If a plant is kept covered with a polythene sheet, we notice some water drops on the inner side of the sheet after some time. What are they due to?

(i) Name and define the process.

(ii) What is the significance of this process in plants and in nature?

(iii) How does this process help in upward movement of water from roots to leaves?

16. Attempt either option A or B

A1. Draw labelled diagram to show the following parts in an embryo of a pea seed:
Cotyledon, Plumule, Radical

A2. Distinguish between cross-pollination and self-pollination. Mention the site and product of fertilization in a flower.

OR

B1. A student observed a permanent slide showing asexual reproduction in Hydra. Draw labelled diagram in proper sequence of the observations that must have been made by the student. Name the process of reproduction also.

B2. (a) Write the function of following parts in human female reproductive system:
(i) Oviduct (ii) Uterus

(b) Describe in brief the structure and function of placenta.

SECTION B-CHEMISTRY

17. In the reaction of aqueous solution of barium chloride with aqueous solution of sodium sulphate, the aqueous solution formed will be of-
    (a) $BaCl_2$ (b) $BaSO_4$ (c) Na_2SO_4 (d) NaCl
18. The chemical formula of bleaching powder is:
    (a) $CaOCl_2$ (b) $CoCl_2$ (c) $Ca(OH)_2$ (d) $CaCO_3$
19. 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) Gaunge (d) Flux
20. An aqueous solution of salt 'X' turns blue litmus paper red. The salt 'X' could be:
    (a) Sodium Acetate (b) Sodium Chlroide
    (c) Ammonium Chloride (d) Potassium Sulphate (K_2SO_4)
21. An element 'X' is soft and can be easily cut with a knife. It reacts explosively with cold water. The element 'X' is most likely:
    (a) Magnesium (b) Almunium
    (c) Potassium (d) Iron
22. A hydrocarbon has the molecular formula C_2H_6. It belongs to the homologous series of:
    (a) Alkanes (b)Alkenes
    (c) Alkynes (d) Alcohols
23. When copper turnings are dried to silver nitrate solution, a blue coloured solution is formed after some time. It is because copper:
    (a) I and II (b) II and III
    (c) (I) and (III) (d) II and IV

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24. Assertion (A): Soaps are not effective cleansing agents in hard water.
    Reason (R): Soaps form insoluble precipitates (scum) on reaction

with calcium and magnesium ions present in hard water.

25. A. (i) When Ritvik measured the pH of saliva (before meal), he found it to be around 7.4 (neutral). However, the pH of saliva (after meal) was in the range of 5.1 - 5.5 (slightly acidic). Why is there such a shift in the pH value before and after meal? Explain briefly.

(ii) What do you understand by the term synthetic indicators? Which of the following is a synthetic indicator combined with its correct colour changing characteristic in a basic medium?

1. Methyl orange; Yellow
2. Turmeric extract; Green
3. Clove oil; Blue
4. Cabbage extract; Colourless

26. <u>Attempt either option A or B.</u>

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? Give any one property of this chemical bond.

OR

B. (i) What is the process called when iron articles are coated with a layer of zinc? Give one more method to prevent rusting.

(ii) Explain why this process protects iron from rusting, even if the zinc coating is broken.

27. A student sets up an apparatus for the reaction of zinc granules with dilute sulphuric acid.

(a) What would the student observe happening near the surface of the zinc granules?

(b) Name the gas evolved in this process. How can it's presence be tested in the laboratory?

(c) If the student touches the bottom of the flask after the reaction starts, what change in temperature would be felt? Justify your answer.

28. Raghu is a skilled painter. He mixed a white coloured powder, compound X with water. The compound X reacted vigorously with water to produce a compound Y and a large amount of heat. Then, Raghu used the compound Y for white washing the walls.
Customer was not satisfied with the work of Raghu as walls were not shining. But Raghu guaranteed him that the walls would shine after 2-

3 days and after 3 days of whitewash, the walls became shiny.
Read the above passage carefully and give the answer to the following questions:

(a) Name the compound X, that Rahul mixed with water. Also, write it's common name.
(b) Name the compound Y, that Rahul got after mixing X with water. Also write it's common name.
(c) What type of reaction has occurred here?
(d) Write the chemical reaction responsible for shiny finish of the walls.

29. <u>Attempt either option A or B.</u>

A. An organic compound 'A' has the molecular formula C_2H_2O and is a common solvent and the active ingredient in alcoholic beverages. When 'A' is warmed with alkaline potassium permanganate solution, it gets converted to an organic acid 'B'. When 'A' and 'B' are heated together in the presence of a few drops of concentrated sulphuric acid, a new compound 'C' with a fruity smell is formed.
(a) Identify the compounds 'A', 'B', and 'C'.
(b) Write the balanced chemical equation for the conversion of 'A' to 'B'.
(c) What is the general name for the process of formation of 'C'?
(d) Draw the electron dot structure for compound 'A'.
(e) What is the role of concentrated sulphuric acid in the formation of 'C'?

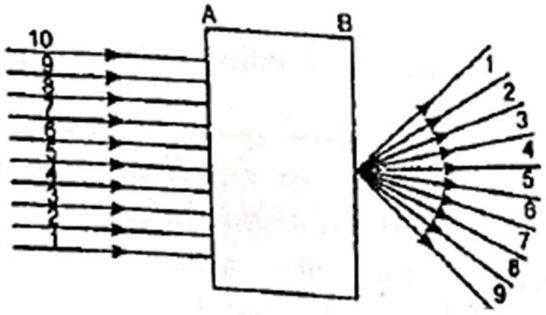
OR

B. (a) Carbon is an element that forms the basis for all life. It belongs to Group 14 of the periodic table and exhibits unique properties. State two properties of carbon responsible for the existence of a large number of organic compounds.
(b) What is observed when ethanol reacts with sodium? Write a balanced chemical equation for the reaction.
(c) What do you mean by saponification reaction? Give a chemical reaction.
(d) Give any one advantage of soaps over detergents.
(e) (i) Name the following compound: C_2H_2OH

(ii) Draw the e' dot structure of Ethyne.

SECTION C- PHYSICS (25 marks)

30. A beam of light is incident through the holes on side A and emerges out of the holes on the other face of the box as shown in the Figure. Which of the following could be inside the box?



(a) Concave lens (b) Rectangular glass slab
(c) Prism (d) Convex lens

31. When light rays enter the eye, most of the refraction occurs at the
(a) crystalline lens (b) outer surface of the cornea
(c) iris (d) pupil

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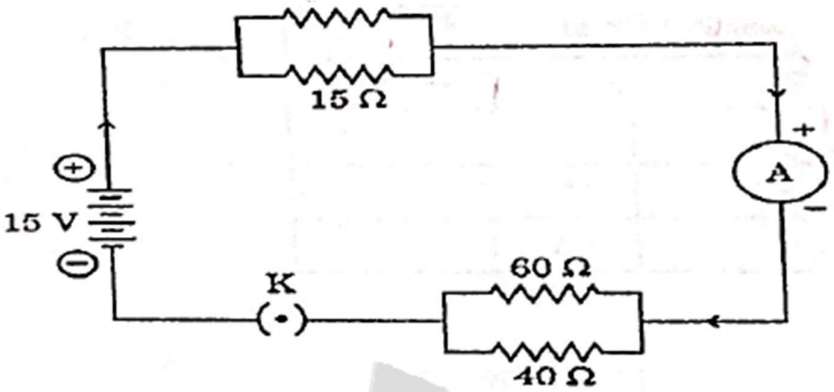
32. Assertion (A): Myopia is the defect of the eye in which only nearer objects are seen by the eye.
Reason (R): The eye ball is elongated.
33. A convex lens forms a real and inverted image of a needle at a distance of 50 cm from it. Where is the needle placed in front of the convex lens if the image is equal to the size of the object? Also, find the power of the lens.
34. An electric oven of 2 kW power rating is operated in a domestic electric circuit (220 V) that has a current rating of 5 A. What result do you expect? Explain.
35. a) Give reasons:

i)Stars twinkle but planets do not.

ii)The sky appears dark instead of blue to an astronaut.

b) What happens to the image distance in the eye when we increase the distance of an object from the eye? Why?

36.



Calculate the values of the following:

(a) The total resistance of the circuit.

(b)The total current drawn from the source.

(c) Potential difference across the parallel combination of 10 and 15 resistors

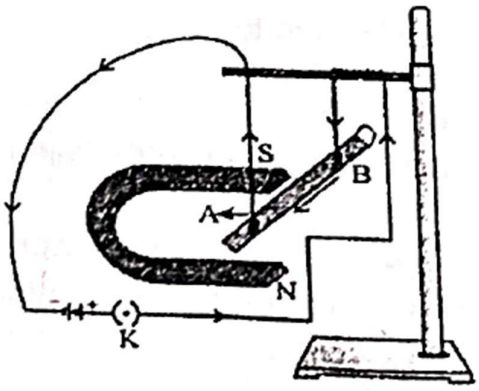
37. a) How do you think the displacement of rod AB (shown in the figure) will be affected if

(i) current in rod AB is increased

(ii) a stronger horse-shoe magnet is used

(iii) length of the rod AB is increased

(iv) The battery is reversed.



b) How can we increase the strength of an electromagnet?

38. The ability of a medium to refract light is also expressed in terms of its optical density. Optical density has a definite connotation. It is not the same as mass density. We have been using the terms 'rarer medium'

and 'denser medium'. It actually means 'optically rarer medium' and 'optically denser medium', respectively. In comparing two media, the one with the larger refractive index is optically denser medium than the other. The other medium of lower refractive index is optically rarer. The absolute refractive index of a few mediums is given below in the table.. Answer the following questions based on it.

Material Mediam	Refractive Index
Air	1.0008
Ice	1.31
Water	1.33
Alcohol	1.36
Kerosene	1.44
Fused Quartz	1.44
Turghenting Oil	1.47
Benzene	1.50
Crown Glass	1.52
Canada Balsam	1.53
Rock Salt	1.54
Carbon Disulphide	1.63
Dense Flint Glass	1.65
Ruby	1.71
Sapphire	1.77
Diamond	2.424

a) Name the medium which has lowest and highest optical density?
b) You are given kerosene, turpentine and water. In which of these does the light travel fastest? Why?
c) How is absolute refractive index related to the speed of light?
d) Draw a ray diagram to show the ray of light passing obliquely from water to alcohol.

39. A. (a)What are the advantages of connecting electrical devices in parallel with the battery instead of connecting them in series?
(b) State Ohm's law. Write it's mathematical expression. Represent it graphically.
(c) What is the commercial unit of energy? How is it related to the SI unit of energy?

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