

Carmel Convent School, Chandigarh
Pre-board, January 2023
Science

Class X

Date: 19.01.2024

MM: 80

Time: 3 hr

General Instructions:

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

Section A

1. Burning Magnesium ribbon is brought in the gas jar of carbon dioxide. Which of the following is correct?
- (i) It keeps on burning
 - (ii) It gets extinguished
 - (iii) Although CO₂ is non-supporter of combustion but burning magnesium breaks CO₂ into carbon and oxygen, oxygen helps in burning.
 - (iv) Carbon dioxide is supporter of combustion.
- a. (i) and (iv)
 - b. (i) and (iii)
 - c. (i) and (ii)
 - d. (iii) and (iv)
2. An element with atomic number _____ will form a basic oxide.
- a. 7 (2,5)
 - b. 17 (2,8,7)
 - c. 14 (2,8,4)
 - d. 11(2,8,1)
3. Tomato is a natural source of
- a. Acetic acid
 - b. Citric acid

- c. Tartaric acid
- d. Oxalic acid

4. Mild non-corrosive basic salt is

- a. $\text{Ca}(\text{OH})_2$
- b. NaCl
- c. NaOH
- d. NaHCO_3

5. Reaction between X and Y forms a compound Z. X loses electron and Y gains electron. Which of the properties are not shown by Z

- a. Has high melting point
- b. Has strong forces of attraction
- c. Conducts electricity in solid state
- d. Occurs as solid

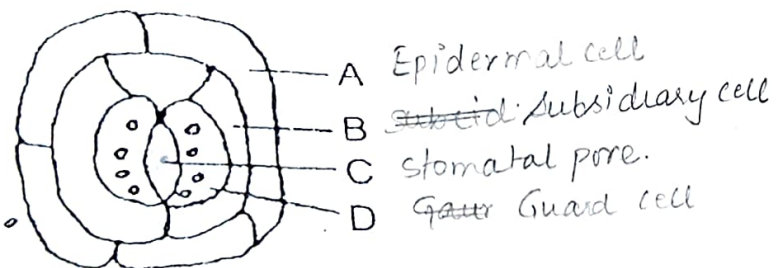
6. Silver article turns black when kept in open for few days due to the formation of

- a. H_2S
- b. AgS
- c. AgSO_4
- d. Ag_2S

7. Generally food is broken and absorbed within the body of organisms. In which of the following organisms is it done outside the body?

- a. *Amoeba*
- b. Mushroom
- c. Paramecium
- d. Lice

8.



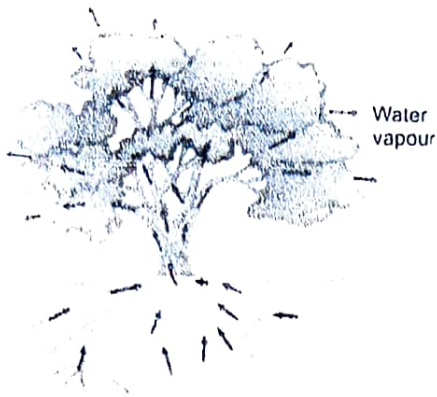
Massive amount of gaseous exchange takes place in the leaves through

- a. A
- b. B
- c. C
- d. D

9. Reflex arc is formed by

- a. Muscle \rightarrow brain \rightarrow receptor
- b. Muscle \rightarrow spinal cord \rightarrow receptor
- c. Receptor \rightarrow brain \rightarrow muscles
- d. Receptor \rightarrow spinal cord \rightarrow muscles

10



Identify the process and its significance from the above diagram:

- Evaporation: maintains water content in the leaves
- Transpiration: creates a suction force for ascent of sap
- Excretion: helps in removal of wastes
- Translocation: helps in transferring material from one cell to another

11. If the offspring in F₁ generation is 'aa' what possible combination of parental genotype have produced this genotype:

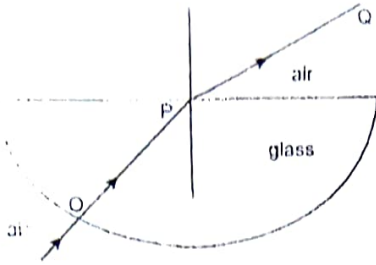
- AA and aa
- Aa and AA
- Aa and Aa
- AA and AA

12. This plant hormone is responsible for the ripening of fruits

- Cytokinins
- Auxin
- Ethylene
- Gibberellins

13. Which of the following can make a parallel beam of light when light from a point source is incident on it?

- Concave mirror as well as convex lens.
- Convex mirror as well as concave lens.
- Two plane mirrors placed at 90° to each other.
- Concave mirror as well as concave lens.



The angle of incidence from air to glass at the point O on the hemispherical glass slab is

- (a) 45° (b) 0°
 (c) 90° (d) 180°

14.

15. Carbohydrates in the plants are stored in the form of

- a. Glycogen
 b. Starch
 c. Glucose
 d. Maltose

16. An element M has 50% of electrons filled in the third shell as in the second shell. The atomic number of M is:

- a. 10
 b. 12
 c. 14
 d. 18

Assertion and Reasoning

- a) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.
 b) If both Assertion and Reason are true and the Reason is not the correct explanation of the Assertion.
 c) If Assertion is true but the Reason is false.
 d) If ~~both Assertion and Reason are false~~
 is false is true

17. **Assertion (A):** Silver bromide decomposition is used in black and white photography.
Reason (R): Light provides energy for this exothermic reaction.

18. **Assertion (A):** When pea plants (pureline) having round yellow seeds are crossed with pureline plants having wrinkled green seeds, then all pea plants obtained in F₁ generation bear wrinkled green seeds.

Reason (R): Round and yellow seeds are dominant to wrinkled and green seeds.

19. **Assertion(A):** The strength of the magnetic field produced at the centre of a current carrying circular coil increases on increasing the radius of the circular coil.

Reason (R): Magnetic field strength is inversely proportional to the radius of the circular coil.

20. **Assertion :** Aquariums are self-sustaining ecosystems.

Reason: There are no microbes to clean water in aquariums, therefore, it needs to be regularly cleaned.

Section B

21. Write the electron dot structures of magnesium and chlorine and show the formation of magnesium chloride by the transfer of electrons.

22. Name a STD transmitted by

- a. Bacteria
- b. Virus

23. Give reason:

- a. Veins have valves
- b. Arteries have thick elastic walls

Or

What are the fundamental units of

- a. Respiration in humans?
- b. Excretion in humans?

24. Refractive index of water with respect to air is 1.33 and that of diamond is 2.42.

(i) In which medium does the light move faster, water or diamond?

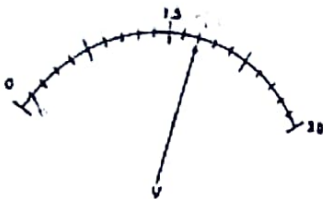
(ii) What is the refractive index of diamond with respect to water?

25. Consider the scale of a voltmeter shown in the diagram and answer the following questions:

(i) What is the least count of the voltmeter?

(ii) What is the reading shown by the voltmeter?

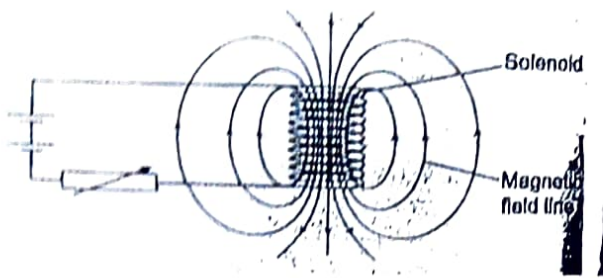
(iii) If this voltmeter is connected across a resistor of 20 Ω , how much current is flowing through the resistor?



Or

Circuit contains a battery, a variable resistor and a solenoid. The figure below shows the magnetic field pattern produced by the current in the solenoid.

- (a) State how the magnetic field pattern indicates regions where the magnetic field is stronger.
- (b) What happens to the magnetic field when the current in the circuit is reversed?



26. Energy transfer is said to be unidirectional whereas biochemical transfer is said to be cyclic. Why?

Section C

27. Samples of four metals A, B, C and D were taken and added to the following solution one by one. The results obtained have been tabulated as follows.

Metal	Iron (II) sulphate	Copper (II) sulphate	Zinc sulphate	Silver nitrate
A	No reaction	Displacement		
B	Displacement		No reaction	
C	No reaction	No reaction	No reaction	Displacement
D	No reaction	No reaction	No reaction	No reaction

Use the table above to answer the following questions about metals A, B, C and D.

- (i) Which is the most reactive metal?
 (ii) What would you observe when metal B is added to a solution of copper (II) sulphate?
 (iii) Arrange the metals A, B, C and D in the order of decreasing reactivity.
28. An element 'M' with electronic configuration 2 8 3 combines separately with Cl^- , SO_4^{2-} anions. Write the chemical formulae of the compounds formed. Predict with the suitable reason the nature of the bond formed by element 'M' in general. How will the electrical conductivity of the compounds formed vary with respect to 'M'?

OR

A reddish-brown metal 'X', when heated in air, gives a black compound 'Y', which when heated in presence of H_2 gas gives 'X' back. 'X' is refined by the process of electrolysis; this refined form of 'X' is used in electrical wiring.

Identify 'X' and 'Y'. Draw a well-labeled diagram to represent the process of refining 'X'.

29. Draw a neat and well labelled diagram to show chemotropism in plants.

Or

Explain how coiling of the tendrils take place in pea plant.

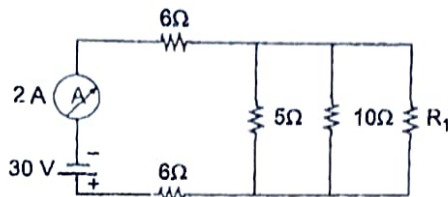
30. Justify with the help of a flow diagram that the sex of the child is determined by what it receives from the father.

31. If the image formed by a lens for all positions of the object placed in front of it is always virtual, erect and diminished, state the type of the lens. Draw a ray diagram in support of your answer.

If the numerical value of focal length of such a lens is 20 cm, find its power in new cartesian sign conventions.

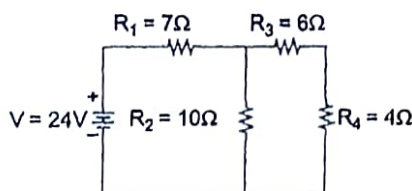
Or

You have two lenses A and B of focal lengths +10 cm and -10 cm respectively. State the nature and power of each lens. Which of the two lenses will form a virtual and magnified image of an object placed 8 cm from the lens? Draw a ray diagram to justify your answer.



In the above circuit, if the current reading in the ammeter A is 2A, what would be the value of R_1 ?

OR



Calculate the total resistance of the circuit and find the total current in the circuit.

33. A stationary charge is placed in a magnetic field. Will it experience a force? Give reason to justify your answer.

(i) On what factors does the direction of force experienced by a conductor when placed in a magnetic field depend?

(ii) Under what conditions is the force experienced by a current carrying conductor placed in a uniform magnetic field maximum?

(iv) Name and state the rule which gives the direction of force experienced by a current carrying conductor placed in a magnetic field.

Section D

34.(a) Draw the structures for the following compounds

1) 2-Methylpentane

2) Hexanoic acid

3) Propane 1,2-diol

(b) list three physical properties of covalent compounds and give reason for each.

Or

- (a) Atom of an element contain six electrons in its valence shell this element is the major component of air it exist as a diatomic molecule
1. Identify the element
 2. Show the bond formed between the two atoms
 3. Write the nature of the bond.

(b) With the help of a diagram explain the cleansing action of soap.

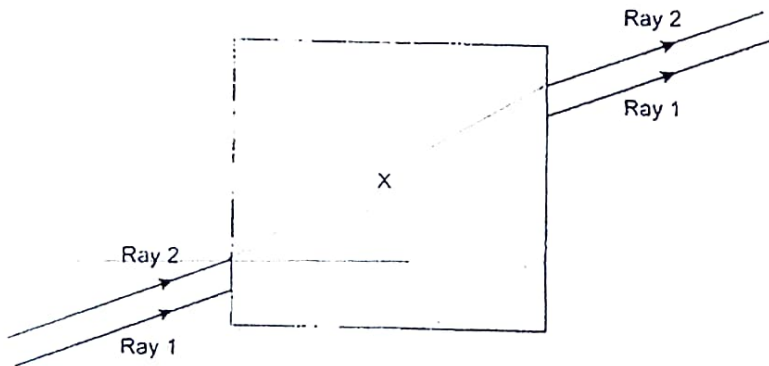
35. Answer the following:

- a. What is the effect of errors during DNA copying on the reproduction process?
- b. How does the amount of DNA remain constant through each new generation?
- c. Which organ is the trading post between the foetus and the mother?
- d. Which glands provide a medium and nutrition to the sperms?
- e. Which part of the plant gets converted into
 - i. Fruit
 - ii. Seed

Section E

36. Case Study

Noor, a young student, was trying to demonstrate some properties of light in her Science project work. She kept 'X' inside the box (as shown in the figure) and with the help of a laser pointer made light rays pass through the holes on one side of the box. She had a small butter-paper screen to see the spots of light being cast as they emerged.



I. What could be the 'X' that she placed inside the box to make the rays behave as shown?

- | | |
|-----------------------|----------------------------------|
| (a) a converging lens | (b) a parallel-sided glass block |
| (c) a plane mirror | (d) a triangular prism |

II. She measured the angles of incidence for both the rays on the left side of the box to be 48.6° .

She knew the refractive index of the material 'X' inside the box was 1.5. What will be the approximate value of angle of refraction?

- a. 45°
- b. 30°
- c. 40°
- d. 60°

(use the value: $\sin 48.6^\circ \sim 0.75$)

III. Her friend noted the following observations from this demonstration:

- (i) Glass is optically rarer than air.
- (ii) Air and glass allow light to pass through them with the same velocity.
- (iii) Air is optically rarer than glass.
- (iv) Speed of light through a denser medium is faster than that of a rarer medium.
- (v) The ratio: sin of angle of incidence in the first medium to the ratio of sin of angle of refraction in the second medium, gives the refractive index of the second material with respect to the first one.

Which one of the combination of the above statements given below is correct?

- (a) (ii), (iv) and (v) are correct
- (b) (iii) and (iv) are correct
- (c) (i), (iv) and (v) are correct
- (d) (iii) and (v) are correct

IV. If the object inside the box was made of a material with a refractive index less than 1.5 then the

- (a) lateral shift of the rays would have been less.
- (b) lateral shift of the rays would have been more.
- (c) lateral shift of the rays would remain the same as before.
- (d) there is not enough information to comment on any of the above statements

V. Which of the following statements is not true for scattering of light?

- (a) Colour of the scattered light depends on the size of particles of the atmosphere.
- (b) Red light is least scattered in the atmosphere.
- (c) Scattering of light takes place as various colours of white light travel with different speed in air.
- (d) The fine particles in the atmospheric air scatter the blue light more strongly than red. So the scattered blue light enters our eyes.

SECTION E

37. Given below are the hints given by the quiz master in a quiz.

- (i) Substance 'C' is used as a preservative.
- (ii) 'C' has two carbon atoms; 'C' is obtained by the reaction of 'A' in presence of alkaline Potassium permanganate followed by acidification.
- (iii) Misuse of 'A' in industries is prevented by adding Methanol, Benzene, and pyridine to 'A'.
- (iv) 'F' is formed on heating 'A' in presence of conc Sulphuric acid.
- (v) 'F' reacts with Hydrogen gas in presence of Nickel and Palladium catalyst.

Based on the above hints answer the following questions

- a) Give the IUPAC names of A and F.
- b) Illustrate with the help of chemical equations the changes taking place. ($A \rightarrow C$ and $A \rightarrow F$)

OR

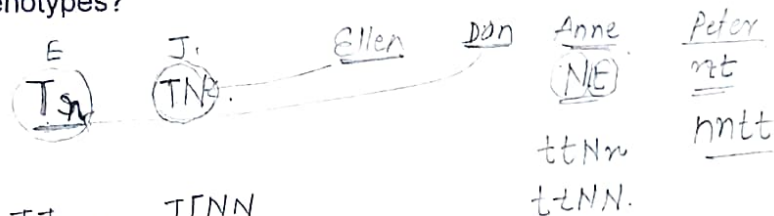
- ✓ Name the chemical reactions which occur in steps 2 and 5. Identify the compounds formed in these steps if 'A' is replaced with its next homologue.

38. Case Study

Elizabeth is married to John, and they have four children. Elizabeth has a straight nose (recessive) and is able to roll her tongue (dominant). John is also able to roll his tongue, but he has a convex (Roman) nose (dominant). Of their four children, Ellen is just like her father, and Dan is just like his mother. The other

children—Anne, who has a convex nose, and Peter, who has a straight nose—are unable to roll their tongues. Please answer the following questions about this family.

- I. What are the genotypes of Elizabeth and John?
- II. What are the genotypes of Anne and Peter with respect to these traits?
- III. Elizabeth's father was a straight-nosed roller, while her mother was a convex-nosed non-roller. What can you figure out about their genotypes?
- IV. John's father was a straight-nosed roller, while his mother was a convex-nosed roller. What were their genotypes?

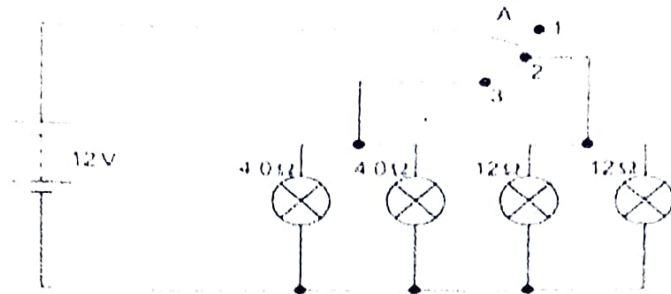


$Ttnn$ $TtNn$
 $Ttnn$ $TtNn$
 $TtNn$

$Ttnn$ $ttNN$
 $Ttnn$ $ttNn$

$TtNn$ $TtNN$
 $TtNn$ $TtNn$
 $TtNn$

$T \rightarrow$ Roller Tongue.
 $t \rightarrow$ non Roller Tongue.
 $N \rightarrow$ Convex Nose
 $n \rightarrow$ Straight Nose



Vinita and Ahmed demonstrated a circuit that operates the two headlights and the two sidelights of a car, in their school exhibition. Based on their demonstrated circuit, answer the following questions.

(i) State what happens when switch A is connected to

a) Position 2

b) Position 3

(ii) Find the potential difference across each lamp when lit.

(iii) Calculate the current

a) in each $12\ \Omega$ lamp when lit.

b) In each $4\ \Omega$ lamp when lit.

OR

(iv) Show, with calculations, which type of lamp, $4.0\ \Omega$ or $12\ \Omega$, has the higher power.

—The End—