10th STD

PUBLIC EXAMINATION APRIL - 2024

Reg. No.

Part - III

Science (With Answers)

Time Allowed : 3.00 Hours] **[Maximum Marks:** 75

Instructions : 1. Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.
2. Use **Blue** or **Black** ink to write and underline and pencil to draw diagrams.

Note : This question paper contains **four** parts.

PART - I

Note: (i) Answer **all** the questions. **(12 × 1 = 12)**
(ii) Choose the most appropriate answer from the given **four** alternatives and write the option code and the corresponding answer.

1. The endarch condition is the characteristic feature of :
(a) Root (b) Stem
(c) Leaves (d) Flowers

2. TFM in soaps represents _____ content in soap.
(a) Mineral (b) Vitamin
(c) Fatty matter (d) Carbohydrate

3. The value of Universal Gas Constant :
(a) 3.81 J mol^{-1} K^{-1}
(b) 8.03 J mol^{-1} K^{-1}
(c) 1.38 J mol^{-1} K^{-1}
(d) 8.31 J mol^{-1} K^{-1}

4. Kilowatt hour is the unit of :
(a) resistivity
(b) conductivity
(c) electrical energy (d) electrical power

5. An enzyme which cuts DNA is :
(a) Protease
(b) Restriction endonuclease
(c) DNA Ligase (d) RNAase

6. One mole of any substance contains _____ molecules.
(a) 6.023×10^{23} (b) 6.023×10^{-23}
(c) 3.0115×10^{23} (d) 12.046×10^{23}

7. Which one is referred as "Master gland"?
(a) Pineal gland (b) Pituitary gland
(c) Thyroid gland (d) Adrenal gland

8. Which among the following is not the characteristic of anemophilous plants?
(a) the flowers produce enormous amount of pollen grains.
(b) the stigmas are large and protruding.
(c) the flowers are brightly coloured, have smell and nectar.
(d) pollen grains are small and dry.

9. Inertia of a body depends on :
(a) Weight of the object
(b) Acceleration due to gravity of planet
(c) Mass of the object
(d) Both (a) and (b)

10. Which is the correct sequence of blood flow?
(a) Ventricle ⟶ Atrium ⟶ Vein ⟶ Arteries
(b) Atrium ⟶ Ventricle ⟶ Vein ⟶ Arteries
(c) Atrium ⟶ Ventricle ⟶ Arteries ⟶ Vein
(d) Ventricle ⟶ Vein ⟶ Atrium ⟶ Arteries

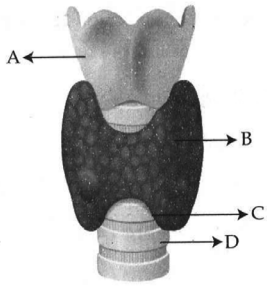
11. Which of the following is not an "element + element ⟶ compound" type reaction?
(a) $C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$
(b) $2K_{(s)} + Br_{2(l)} \longrightarrow 2KBr_{(s)}$
(c) $2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$
(d) $4Fe_{(s)} + 3O_{2(g)} \longrightarrow 2Fe_2O_{3(s)}$

12. Cancer of the epithelial cell is called as _____.
(a) Leukaemia (b) Sarcoma
(c) Carcinoma (d) Lipoma

PART - II

Note: Answer **any seven** questions. Question No. **22** is **compulsory.** **(7 × 2 = 14)**

13. What is coefficient of apparent expansion?
14. Why is tungsten metal used in bulbs but not used as fuse wires?
15. What is rust? Give the equation for the formation of rust.
16. What is stage?
17. Why is sinoatrial node called as pacemaker of heart?
18. What are the parts of the hind brain?
19. Identify the parts A, B, C, and D in the given figure.



20. What is colostrum? How is milk production hormonally regulated?
21. What is metastasis?
22. If the pH of a solution is 4.5, find the value of its pOH.

PART - III

Note: Answer **any seven** questions. Question No. **32** is **compulsory.** **(7 × 4 = 28)**

23. Explain the various types of inertia with examples.
24. (a) Write any three features of natural and artificial radioactivity.
    (b) Name any two devices, which are working on the heating effect of current.
25. (a) What happens when $MgSO_4.7H_2O$ is heated? Write the appropriate equation.
    (b) Define : Solubility.
26. (a) What is Respiratory Quotient?
    (b) Why should the light dependent reaction occur before light independent reaction during photosynthesis?
27. Write the dental formula of rabbit.
28. (a) Why is Euploidy considered to be advantageous to both plants and animals?
    (b) Classify Neurons based on its structure.
29. How are Arteries and Veins structurally different from one another?
30. Define Ethnobotany and write its importance.
31. (a) What are the consequences of deforestation?
    (b) State the applications of DNA finger printing technique.
32. (a) Name the acid that renders Aluminium passive. Why?
    (b) Calculate the number of moles in 1.51×10^{23} molecules of NH_4Cl.

PART - IV

Note : Answer **all** the questions. Draw diagrams wherever **necessary.** **(3 × 7 = 21)**

33. (a) (i) What are the uses of convex lens?
    (ii) Define dispersion of light.
    (iii) Why are traffic signals red in colour?
    (iv) What is the least count of travelling microscope?

    (OR)

    (b) (i) What is an echo?
    (ii) State two conditions necessary for hearing an echo.
    (iii) What are the medical applications of echo?
    (iv) How can you calculate the speed of sound using echo?
34. (a) (i) Under same conditions of temperature and pressure, if you collect 3 litre O_2, 5 litre of Cl_2 and 6 litre of H_2.
    (A) Which has the highest number of molecules?
    (B) Which has the lowest number of molecules?
    (ii) Give the salient features of 'Modern Atomic theory'.

    (OR)

    (b) (i) How do detergents cause water pollution?
    (ii) An organic compound 'A' is widely used as a preservative and has the molecular formula $C_2H_4O_2$. This

compound reacts with ethanol to form a sweet smelling compound 'B', then

(A) Identify the compound 'A'.

(B) Write the chemical equation for its reaction with ethanol to form compound 'B'.

(C) Name this process.

35. (a) (i) What are synthetic auxins? Give an example.

(ii) With a neat labelled diagram, describe the parts of the typical angiospermic ovule.

(OR)

(b) (i) Who is called the "Father of Indian Green Revolution"?

(ii) Differentiate between out-breeding and in-breeding.

(iii) Differentiate between Type-I and Type-II Diabetes mellitus.

Answers

PART - I

1. (b) Stem
2. (c) Fatty matter
3. (d) 8.31 J mol^{-1} K^{-1}
4. (c) electrical energy
5. (b) Restriction endonuclease
6. (a) 6.023×10^{23}
7. (b) Pituitary gland
8. (c) the flowers are brightly coloured, have smell and nectar.
9. (c) Mass of the object
10. (c) Atrium → Ventricle → Arteries → Vein
11. (c) $2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$
12. (c) Carcinoma

PART - II

13. **Co-efficient of apparent expansion :**

(i) The ratio of the apparent rise in the volume of the liquid per degree rise in temperature to its unit volume.

(ii) It's SI unit is K^{-1}.

14. (i) Tungsten has high melting point, it can bear high heat for glowing.

(ii) But in fuse wire, the wire will not melt when a large amount of current is passed through it, but the appliance will get damaged.

15. When iron is exposed to moist air, it forms a layer of brown hydrated ferric oxide on its surface. This compound is known as rust.

$4Fe + 3O_2 + x\ H_2O \longrightarrow 2Fe_2O_3.xH_2O$(rust)

16. **Satge :**

(i) Stage is the background appearing when we open the scratch window.

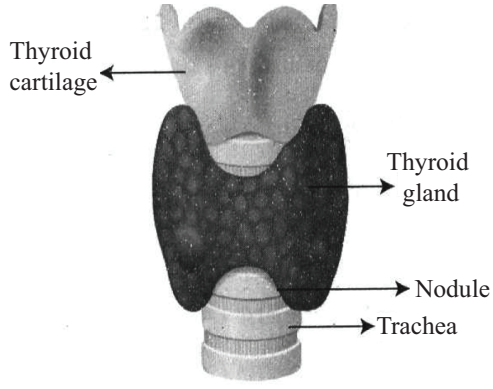
(ii) The background will most often be white. We can change the background colour as we like.

17. (i) Sino-atrial node called as the "pacemaker" of heart because it is capable of initiating impulse, which can stimulate the heart muscles to contract.

(ii) The impulse from this node spreads as a wave of contraction over the right and left atrial wall pushing the blood through the atrioventricular values into the ventricles.

18. It is formed of three parts cerebellum, pons and medulla oblongata.

19.



20. (i) The first fluid which is released from the mammary gland after child birth is called colostrum.

(ii) Milk production from alveoli of mammary glands is stimulated by prolactin secreted from the anterior pituitary.

(ii) The ejection of milk is stimulated by posterior pituitary hormone oxytocin.

21. **Metastasis :**
(i) The cancerous cells migrate to distant parts of the body and affect new tissues.
(ii) This process is called metastasis.

22. **Solution:**
$pH + pOH = 14$
$pOH = 14 - 4.5 = 9.5$
$pOH = 9.5$

PART - III

23. Inertia is of three types
(i) Inertia of rest (ii) Inertia of motion (iii) Inertial of direction
(i) **Inertia of rest :** The resistance of a body to change its state of rest is called inertia of rest. **Eg:** When you vigorously shake the branches of a tree some of the leaves and fruit are detached and they fall down.
(ii) **Inertia of motion :** The resistance of a body to change its state of motion is called inertia of motion. **Eg :**An athlete runs some distance before jumping. Because, this will help him jump longer and higher.
(iii) **Inertia of direction :** The resistance of a body to change its direction of motion is called inertia of direction. **Eg :** When you make a sharp turn while driving a car, you tend to lean sideways.

24. **(a)**

Sl. No	Natural radioactivity	Artificial radioactivity
1	Emission of radiation by self-disintegration of nucleus	Emission of radiation by disintegration of nucleus through induced process.
2	Alpha, beta and gamma radiations are emitted.	Mostly elementary particles such as neutron, positron, etc. are emitted.
3	It is a spontaneous process.	It is an induced process.

(b) Electric iron box, electric toaster.

25. **(a)** When magnesium sulphate heptahydrate crystals are gently heated, it loses seven water molecules, and becomes anhydrous magnesium sulphate.

$$\underset{\text{(Magnesium sulphate heptahydrate)}}{MgSO_4.7H_2O} \underset{\text{Cooling}}{\overset{\text{Heating}}{\rightleftharpoons}} \underset{\text{(Anhydrous Magnesium sulphate)}}{MgSO_4 + 7H_2O}$$

(b) Solubility is defined as the number of grams of a solute that can be dissolved in 100g of a solvent to form its saturated solution at a given temperature and pressure.

$$\text{Solubility} = \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100$$

26. **(a) Respiratory quotient :**

(i) Respiratory quotient is the ratio of volume of carbon dioxide liberated and the volume of oxygen consumed during respiration.

$$RQ = \frac{\text{Volume of } CO_2 \text{ liberated}}{\text{Volume of } O_2 \text{ consumed}}$$

(b) (i) The light independent reactions use the end products ATP and $NADPH_2$ of the light dependent reactions.

(ii) Light independent reactions use the energy (ATP) derived from light dependent reactions.

(ii) Hence the light dependent reaction occurs before the light independent reaction.

27. **Dental formula of rabbit :**

$$(I\ \frac{2}{1}, C\ \frac{0}{0}, PM\ \frac{3}{2}, M\ \frac{3}{3}) = \frac{2033}{1023}.$$

It is written as 2033 / 1023.

28. **(a)** (i) Euploid plants often result in increased fruit and flower size. Therefore it is advantageous for them.

(ii) The euploid animals are sterile.

(b) Structure of Neuron :

The neurons may be of different types based on their structure and functions.

Structurally the neurons may be of the following types :

(i) **Unipolar neurons :** Only one nerve process arises from the cyton which acts as both axon and dendron.

(ii) **Bipolar neurons :** The cyton gives rise to two nerve processes of which one acts as an axon while another as a dendron.

(iii) **Multipolar neurons :** The cyton gives rise to many dendrons and an axon.

29.

S. No	ARTERIES	VEINS
1	Distributing vessel	Collecting vessel
2.	Pink in colour	Red in colour
3.	Deep location	Superficial in location
4.	Blood flow with high pressure	Blood flow with low pressure
5.	Internal valves are absent	Internal valves are present

30. **Ethnobotany and its importance :**

(i) Ethnobotany is the study of a region's plants and their practical uses through the traditional knowledge of the local culture of people.

Importance of Ethnobotany :

(i) It provides traditional uses of plant.

(ii) It gives information about certain unknown and known useful plants.

(iii) The ethnomedicinal data will serve as a useful source of information for the chemists, pharmacologists and practitioners of herbal medicine.

(iv) Tribal communities utilize ethnomedicinal plant parts to treat disease.

31. **(a) consequences of deforestation :**

Deforestation gives rise to ecological problems like floods, drought, soil erosion, loss of wild life, extinction of species, imbalance of biogeochemical cycles, alteration of climatic conditions and desertification.

(b) Applications of DNA finger printing technique.

(i) DNA finger printing technique is widely used in forensic applications like crime investigation such as identifying the culprit.

(ii) It is also used for paternity testing in case of disputes.

(iii) It also helps in the study of genetic diversity of population, evolution and speciation.

32. **(a)** Dilute or concentrated nitric acid does not attack aluminium, but it renders aluminium passive due to the formation of an oxide film on its surface.

(b) 1.51×10^{23} molecules of NH_4Cl

$$\text{No. of moles} = \frac{\text{Number of molecules}}{\text{Avogadro number}} = \frac{1.51 \times 10^{23}}{6.023 \times 10^{23}} = 0.25 \text{ mole}$$

PART - IV

33. **(a)**

(i) Uses of convex lenses :

(a) Convex lenses are used as camera lenses.

(b) Used as magnifying lenses.

(c) Used in making microscope, telescope and slide projectors.

(d) Used to correct the defect of vision called hypermetropia.

(ii) Dispersion of light :

(a) When a beam of white light or composite light is refracted through any transparent media such as glass or water, it is split into its component colours.

(b) This phenomenon is called as dispersion of light.

(iii) Traffic signals red in colur :

(a) Red has the longest wavelength so it is scattered the least by atmospheric particles.

(a) As a result whether it is fog or smoke, red light passes comparatively easily through them.

(iv) The least count of travelling microscope is 0.01mm.

(OR)

(b) **(i)** **Echo:** An echo is the sound reproduced due to the reflection of the original sound from various rigid surfaces.

(ii) Conditions necessary for hearing an echo:

(a) The minimum time gap between the original sound and echo must atleast 0.1 s.

(b) The minimum distance required to hear an echo is 17.2 m.

(iii) The medical applications of echo:

(a) Used in obstetric ultrasonography,

(b) To create real-time visual images of the developing embryo or fetus in the mother's uterus.

(iv) Calculate the speed of sound using echo:

$$\text{Speed of sound} = \frac{\text{Distance travelled}}{\text{Time taken}} = \frac{2d}{t}$$

34.

(a) **(i)** **(A)** 6 litre of H_2

(B) 3 litre of O_2

(ii) An atom is no longer indivisible :

(a) Atoms of the same element may have different atomic mass. **Eg:** isotopes $_{17}Cl^{35}$, $_{17}Cl^{37}$.

(b) Atoms of different elements may have same atomic masses. **Eg:** Isobars $_{18}Ar^{40}$, $_{20}Ca^{40}$.

(c) Atoms of one element can be transmuted into atoms of other elements.

(d) Atom is no longer indestructible discovery of artificial transmutation.

(e) Atoms may not always combine in a simple whole number ratio. **Eg :** Glucose $C_6H_{12}O_6$.

(f) Atom is the smallest particle that takes part in a chemical reaction.

(g) Mass of an atom can be converted into energy. $E = mc^2$.

(OR)

(b) **(i)** **Detergents cause water pollution :**

Some detergents having a branched hydrocarbon chain are not fully biodegradable by micro-organisms present in water. So, they cause water pollution.

(ii) **(A)** Ethanoic acid (acetic acid).

(B) $CH_3COOC_2H_5$ (Ethyl acetate).

$$\underset{\text{Ethanol}}{C_2H_5OH} + \underset{\text{Ethanoic acid}}{CH_3COOH} \xrightarrow{\text{conc.}H_2SO_4} \underset{\text{Ethyl ethanoate}}{CH_3COOC_2H_5} + H_2O$$

(C) Esterification.

35.

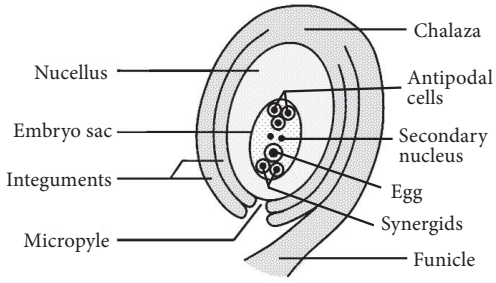
(a) **(i)** **Synthetic auxins with examples:**

(a) Artificially Synthesized Auxins that have properties like auxins are called as synthetic auxins.

(b) **Eg:** 2, 4 D (2,4 Dichlorophenoxy Acetic Acid)

(ii) The parts of a typical angiospermic ovule.

(a) The main part of the ovule is the nucellus which is enclosed by two integuments leaving an opening called as micropyle.



Structure of an Ovule

(b) The ovule is attached to the ovary wall by a stalk known as funiculus. Chalaza is the basal part.

(c) The embryo sac contains seven cells and eight nuclei located within the nucellus.

(d) Three cells at the micropylar end form the egg apparatus and the three cells at the chalaza end are the antipodal cells.

(e) The remaining two nuclei are called polar nuclei found in the centre.

(f) In the egg apparatus one is the egg cell (female gamete) and the remaining two cells are the synergids.

(OR)

(b) (i) Dr. M. S. Swaminathan is called the "Father of Indian Green Revolution"

(ii)

S. No.	Outbreeding	Inbreeding
1.	It is the breeding of unrelated animals.	It refers to the mating of closely related animals within the same breed for about 4-6 generations.
2.	The hybrids are stronger and vigorous than their parents.	It helps to accumulate superior genes and eliminate undesirable genes.
3.	**Eg.:** Mule	**Eg.:** Sheep Hissar die

(iii)

Factors	Type I - Insulin dependent diabetes mellitus (IDDM)	Type II - Non-insulin dependent diabetes mellitus (NIDDM)
Prevalence	10 - 20%	80 - 90%
Age of Onset	Juvenile onset (< 20 years)	Maturity onset(> 30 years)
Body weight	Normal or Underweight	Obese
Defect	Insulin deficiency due to destruction of β-cells	Target cells do respond to insulin
Treatment	Insulin administration is necessary	Can be controlled by diet, exercise and medicine.

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