10th STD

INSTANT SUPPLEMENTARY EXAM - JULY 2023

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. To project the rockets which of the following principle(s) is / are required?
   (a) Newton's third law of motion
   (b) Newton's law of gravitation
   (c) Law of conservation of linear momentum
   (d) Both (a) and (c)

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

3. If the radiation exposure is about 100 R, it may cause _____.
   (a) Skin disorder (b) Hair loss
   (c) Leukemia (d) Death

4. ____ is an important metal to form amalgam.
   (a) Ag (b) Hg
   (c) Mg (d) Al

5. Which of the following is hygroscopic in nature?
   (a) Ferric Chloride
   (b) Copper Sulphate Penta Hydrate
   (c) Silica Gel
   (d) None of the above

6. $H_{2(g)} + Cl_{2(g)} \rightarrow 2HCl_{(g)}$ is a
   (a) Decomposition Reaction
   (b) Combination Reaction
   (c) Single Displacement Reaction
   (d) Double Displacement Reaction

7. Casparian strips are present in the _____ of the root.
   (a) Cortex (b) Pith
   (c) Pericycle (d) Endodermis

8. A patient with blood group 'O' was injured in an accident and has blood loss. Which group of blood should be used by doctor for transfusion?
   (a) 'O' group (b) 'AB' group
   (c) 'A' or 'B' group (d) All blood group

9. There are _____ pairs of Cranial nerves and _____ pairs of Spinal nerves.
   (a) 12, 31 (b) 31,12
   (c) 12, 13 (d) 12, 21

10. Which of the following is referred as "Master Gland"?
    (a) Pineal gland (b) Pituitary gland
    (c) Thyroid gland (d) Adrenal gland

11. World 'No Tobacco Day' is observed on _____.
    (a) May 31 (b) June 6
    (c) April 22 (d) October 2

12. Which of the following is / are a fossil fuel?
    i. Tar ii. Coal iii. Petroleum
    (a) (i) only (b) (i) and (ii)
    (c) (ii) and (iii) (d) (i), (ii) and (iii)

PART - II

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

13. Define the unit of Current.
14. Name any three animals which can hear ultrasonic vibrations.
15. Define Relative atomic mass.
16. Name the simplest ketone and give its structural formula.
17. What does CNS stand for?
18. Define Triple fusion.
19. Draw and label the structure of 'Oxysomes'.
20. Why is Archaeopteryx considered to be a connecting link?
21. State the applications of DNA finger printing technique.
22. A charge of 12 Coulomb flows through a bulb in 5 seconds. What is the current through the bulb?

PART - III

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

23. State the Universal law of gravitation and derive its mathematical expression.
24. (i) State Boyle's law.
    (ii) Distinguish between real gas and ideal gas.
25. (i) Match the following:
    (a) Co - 60 - Age of Fossil
    (b) 1 - 131 - Function of Heart
    (c) Na - 24 - Cancer
    (d) C - 14 - Thyroid disease
    (ii) Use the analogy to fill in the blank:
    (1) Spontaneous Process : Natural Radioactivity, Induced process : _____
    (2) Nuclear Fusion : Extreme temperature, Nuclear Fission : _____
26. (i) What is rust? Give the equation for formation of rust.
    (ii) State two conditions necessary for rusting of iron.
27. Write notes on various factors affecting solubility.
28. Explain how neurons are classified based on its structure.
29. Write the events involved in the Sexual reproduction of a flowering plant.
    (a) State the types of first event.
    (b) Mention the advantages and the disadvantages of that event.
30. Write the importance of biotechnology in the field of medicine.
31. Write a note on EDITOR and its main parts.
32. Calculate the percentage of each element in Calcium Carbonate. ($CaCO_3$) (Atomic mass : Ca–40, C–12, O –16)

PART - IV

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

33. (a) (i) Draw a ray diagram to show the image formed by a convex lens when the object is placed between F and 2F.
    (ii) State Rayleigh's law of Scattering.
    (iii) Differentiate - Convex lens and Concave lens.

    (OR)

    (b) Compare the properties of Alpha, Beta and Gamma rays.
34. (a) (i) Write notes on :
    (1) Saturated Solution.
    (2) Unsaturated Solution.
    (ii) In what way hygroscopic substances differ from deliquescent substances?

    (OR)

    (b) (i) What is chemical equilibrium? What are its characteristics?
    (ii) Differentiate reversible and irreversible reactions.
35. (a) How is the structure of DNA organised? What is the biological significance of DNA?

    (OR)

    (b) (i) State the various routes by which transmission of human immuno deficiency virus (HIV) takes place?
    (ii) State the importance of rainwater harvesting?

Answers

PART - I

1. (d) Both (a) and (c)
2. (c) electrical energy
3. (c) Leukemia
4. (b) Hg
5. (c) Silica Gel
6. (b) Combination Reaction
7. (d) Endodermis
8. (a) 'O' group
9. (a) 12, 31
10. (b) Pituitary gland
11. (a) May 31
12. (c) (ii) and (iii)

PART - II

13. (i) The current flowing through a conductor is said to be one ampere, when a charge of one coulomb flows across any cross -section of a conductor, in one second.

    (ii) 1 ampere = $\frac{1\text{coulomb}}{1\text{second}}$

14. Dogs, Bats and Mosquitoes.

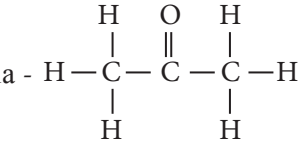
15. (i) Relative atomic mass of an element is the ratio between the average mass of its isotopes to $\frac{1}{12^{th}}$ part of the mass of a carbon-12 atom.

    (ii) It is denoted as A_r.

    (iii) It is otherwise called "Standard Atomic Weight".

16. Simplest Ketone is acetone

    Structural formula -

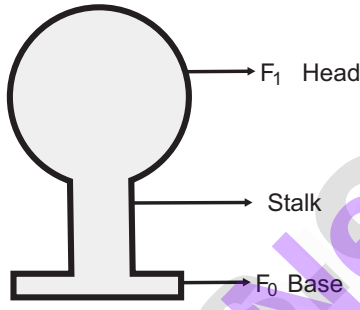


    (CH_3COCH_3)

17. Central Nervous System-CNS.

18. One sperm fuses with the egg and forms a diploid Zygote. The other sperm fuses with the secondary nucleus called Triple fusion.

19.



20. (i) Archaeopterxys had wings with feather like a bird.

    (ii) It had a long tail, clawed digits and conical teeth, like a reptile.

    (iii) So, Archaeopterxys is considered to be connecting link between reptiles and birds.

21. (i) DNA fingerprinting 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.

22. **Solution:**

    Charge Q = 12 C; time t = 5 sec

    To find : I

$$I = \frac{Q}{t}$$

$$I = \frac{12}{5} = 2.4\ A$$

$$I = \mathbf{2.4\ A}$$

PART - III

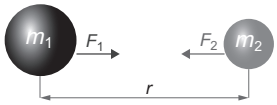
23. **Universal law of gravitation :**

(i) This law states that every particle of matter in this universe attracts every other particle with a force.

(ii) This force is directly proportional to the product of their masses and inversely proportional to the square of the distance between centers of these masses.

(iii) The direction of the force acts along the line joining the masses

Derivation :



Gravitational force between two masses

Let m_1 and m_2 be the masses of two bodies A and B placed at r metre apart in space

Force $F \mu m_1 \times m_2$

$F \mu 1/r^2$

On combining the above two expressions,

$$F \mu \frac{m_1 \times m_2}{r^2}$$

$$F = \frac{G m_1 \times m_2}{r^2} \text{ or } \frac{G m_1 m_2}{r^2}$$

Where G is universal gravitational constant. Its value in SI unit is 6.674×10^{-11} N m^2 kg^{-2}.

24. (i) When the temperature of a gas is kept constant, the volume of a fixed mass of gas is inversely proportional to its pressure. $P \propto 1/V$

(ii)

	Ideal gas	Real gas
(i)	Molecules or atoms of gases do not interact with each other.	Molecules or atom of gases interact with each other.
(ii)	It obey Boyle's law, Charles's law and Avagadro's law.	They do not obey Boyle's law, Charles's law and Avagadro's law.

25. (i) (a) Co - 60 - Cancer

(b) 1 - 131 - Thyroid disease

(c) Na - 24 - Function of Heart

(d) C - 14 - Age of Fossil

(ii) (1) Artificial radioactivity

(2) Room temperature

26. (i) 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.

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

(ii) The conditions necessary for rusting of iron are

(1) Moist air

(2) Presence of oxygen

(3) Presence of water.

27. There are three main factors that affect the solubility of a solute. They are:

(1) Nature of the solute and solvent :

(i) The nature of the solute and solvent plays an important role in solubility.

(ii) Common salt is a polar compound and dissolves readily in polar solvent like water.

(iii) Non-polar compounds are soluble in non-polar solvents. Eg: Sulphur dissolves in carbon disulphide.

(2) Effect of Temperature :

(i) Solubility of a solid solute in a liquid solvent increases with increase in temperature.

(ii) In endothermic process, solubility increases with increase in temperature.

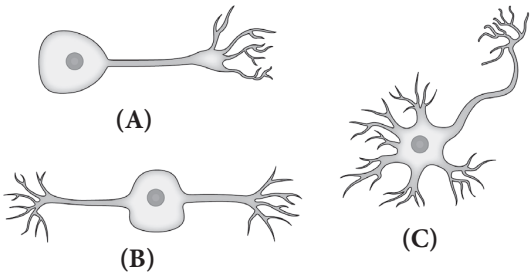
(iii) In exothermic process, solubility decreases with increase in temperature.

(3) Effect of Pressure:

(i) When the pressure is increased, the solubility of a gas in liquid increases.

(ii) (E.g) Carbonated beverages

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



Unipolar (A), Bipolar (B) and multipolar (C) neurons

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. Events involved in sexual reproduction in a flowering plants involves:

(a) Types of first event :

1. Self-pollination
2. Cross pollination

(b) Advantages of self-pollination:

(i) Self-pollination is possible in bi-sexual flowers.

(ii) Flowers do not depend on agents for pollination.

Disadvantages of self-pollination:

(i) The seeds are less in number.

(ii) The endosperm is minute.

Advantages of cross pollination:

(i) The seeds produced as a result of cross pollination, develop and germinate properly and grow into better plants.

(ii) More viable seeds are produced.

Disadvantages of cross-pollination:

(i) Pollination may fail due to distance barrier.

(ii) More wastage of pollen grains.

30. Using genetic engineering techniques medicinally important valuable proteins or polypeptides that form the potential pharmaceutical products for treatment of various diseases have been developed on a commercial scale.

Pharmaceutical products developed by rDNA technique :

(i) Insulin used in the treatment of diabetes.

(ii) Human growth hormone used for treating children with growth deficiencies.

(iii) Blood clotting factors are developed to treat haemophilia.

(iv) Tissue plasminogen activator is used to dissolve blood clots and prevent heart attack.

(v) Development of vaccines against various diseases like Hepatitis B and rabies.

31. The Scratch editor has three main parts: They are Stage, Sprite and Script editor.

Stage:

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

(ii) The background will most often be white.

Sprite:

(i) The characters on the background of a Scratch window are known as Sprite.

(ii) Usually a cat appears as a sprite when the Scratch window is opened.

Script editor / costume editor:

Where you edit your programs or your sprite's pictures.

32. **Solution:**

Molecular mass of $CaCO_3 = 40 + 12 + (3 \times 16)$ = **100 gram**

% of an element = $\frac{\text{Mass of an element in the compound}}{\text{Molecular Mass of compound}} \times 100$

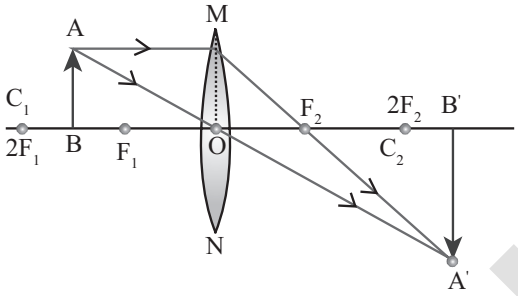
% of C in $CaCO_3 = \frac{12}{100} \times 100 =$ **12%**

% of O in $CaCO_3 = \frac{16 \times 3}{100} \times 100 =$ **48%**

% of Ca in $CaCO_3 = \frac{40}{100} \times 100 =$ **40%**

PART - IV

33. (a) **(i)**



(ii) (i) "The amount of scattering of light is inversely proportional to the fourth power of its wavelength".

(ii) Amount of scattering 'S' $\propto \frac{1}{\lambda^4}$

(iii)

S. No.	Convex Lens	Concave Lens
1.	Thicker in the middle than at edges.	Thinner in the middle than at edges.
2.	It is converging lens.	It is diverging lens.
3.	It is used to treat hypermeteropia.	It is used to treat myopia.

(OR)

(b)

Properties	α rays	β rays	γ rays
Particles	Helium nucleus ($_2He^4$) consisting of two protons and two neutrons.	Electrons ($_{-1}e^0$), basic elementary particle in all atoms.	Electromagnetic waves consisting of photons.
Charge	Positively charged particles. Charge of each alpha particle = +2e	Negatively charged particles. Charge of each beta particle = –e	Neutral particles. Charge of each gamma particle = zero
Ionising power	100 times greater than β rays and 10,000 times greater than γ rays	Comparatively low	Very less ionization power
Penetrating power	Low penetrating power (even stopped by a thick paper)	Penetrating power is greater than that of α rays.	Have a very high penetrating power greater than that of β rays.
Effect of electric and magnetic field	Deflected by both the fields.	Deflected by both the fields; but the direction of deflection is opposite to that for alpha rays.	They are not deflected by both the fields.
Speed	Ranges from 1/10 to 1/20 times the speed of light.	Can go up to 9/10 times the speed of light.	Travel with the speed of light.

34. **(a) (i)**

(1) **Saturated solution :** A solution in which no more solute can be dissolved in a definite amount of the solvent at a given temperature is called satured solution.

E.g. 36 g of sodium chloride in 100g of water at 25° C forms saturated solution.

(2) **Unsaturated solution :** Unsaturated solution is one that contains less solute than that of the saturated solution at a given temperature. E.g. 10 g or 20 g or 30 g of Sodium chloride in 100 g of water at 25° C forms an unsaturated solution.

(ii)

Hygroscopic substances	Deliquescence substances
when exposed to the atmosphere at ordinary temperature, they absorb moisture and do not dissolve.	when exposed to the atmospheric air at ordinary temperature, they absorb moisture and dissolve.
Hygroscopic substances do not change its physical state on exposure to air.	Deliquescent substances change its physical state on exposure to air.
Hygroscopic substances may be amorphous solids or liquids.	Deliquescent substances are crystalline solids.
E.g. Quick lime (CaO)	E.g. Potassium Hydroxide (KOH)

(OR)

(b) (i) **Chemical Equilibrium:** It is state of a reversible chemical reaction in which no change in the amount of the reactants and products takes place.

Rate of forward reaction = Rate of backward reaction

Characteristics of equilibrium :

(i) In a chemical equilibrium, the rates of the forward and backward reactions are equal.

(ii) The chemical equilibrium is a dynamic equilibrium, because both the forward and backward reactions continue to occur even though it appears static externally.

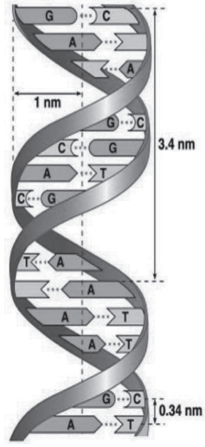
(iii) In physical equilibrium, the volume of all the phases remain constant.

(iv) The observable properties such as pressure, concentration, colour, density, viscosity etc., of the system remain unchanged with time.

(ii)

Reversible Reaction	Irreversible reaction
It can be reversed under suitable conditions	It cannot be reversed
Both forward and backward reactions take place simultaneously	It is unidirectional. It proceeds only in forward direction
It is relatively slow	It is fast

35 **(a)** **Structure of DNA:**



Watson and Crick model of DNA :

(i) DNA molecule consists of two polynucleotide chains.

(ii) These chains form a double helix structure with two strands which run anti-parallel to one another.

(iii) Nitrogenous bases in the centre are linked to sugar-phosphate units which form the backbone of the DNA.

(iv) Pairing between the nitrogenous bases is very specific and is always between purine and pyrimidine linked by hydrogen bonds.

(v) Hydrogen bonds between the nitrogenous bases make the DNA molecule stable.

(vi) Each turn of the double helix is 34 A° (3.4 nm). There are ten base pairs in a complete turn.

(vii) The nucleotides in a helix are joined together by phosphodiester bonds.

Significance of DNA :

(i) It is responsible for the transmission of hereditary information from one generation to next generation.

(ii) It contains information required for the formation of proteins.

(iii) It controls the developmental process and life activities of an organism.

(OR)

(b) (i) HIV is transmitted generally by

(i) Sexual contact with infected person.

(ii) Use of contaminated needles or syringes.

(iii) By transfusion of contaminated / infected blood or blood products.

(iv) From infected mother to her child through placenta.

(ii) Importance of rainwater harvesting:

(i) Rainwater harvesting helps to overcome the rapid depletion of groundwater levels.

(ii) To meet the increase demand of water.

(iii) Reduces flood and soil erosion

(iv) Water stored in ground is not contaminated by human and animal wastes and hence can be used for drinking purpose.

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