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10th STD

Govt. Supplementary Examination
September - 2020

Part - III
SCIENCE
Question Paper with Answers

Time : 3.00 hours. 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 pencil to draw diagrams.

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 eye defect 'Presbyopia' can be corrected by :
   a) Convex lens b) Concave lens
   c) Convex mirror d) Bifocal lenses

2. The value of Avogadro number is _____/mol.
   a) 6.023×10^{-23} b) 6.024×10^{24}
   c) 6.023×10^{23} d) 6.024×10^{-24}

3. Identify the non-aqueous solution.
   a) Sodium chloride in water
   b) Glucose in water
   c) Copper sulphate in water
   d) Sulphur in carbon disulphide

4. An electric heater of resistance 5 Ω is connected to an electric source. If a current of 6 A flows through the heater. find the amount of heat produced in 5 minutes.
   a) 48000 J b) 54000 J
   c) 45000 J d) 84000 J

5. $C_2H_5OH + 3O_2 \rightarrow 2CO_2 + 3H_2O$ is :
   a) Reduction of ethanol
   b) Combustion of ethanol
   c) Oxidation of ethanoic acid
   d) Oxidation of ethanal

6. Which is formed during anaerobic respiration?
   a) Carbohydrate b) Ethyl Alcohol
   c) Acetyl CoA d) Pyruvate

7. Who is regarded as the "Father of Modern Physiology"?
   a) His-Atrio b) William Harvey
   c) Karl Landsteiner d) Edward C. Kendal

8. Node of Ranvier is found in _____
   a) Muscles b) axons
   c) dendrites d) cyton

9. _____ is found abundantly in liquid endosperm of coconut.
   a) Auxin b) Cytokinin
   c) Gibberellins d) Ethylene

10. We can cut the DNA with the help of :
    a) Scissors
    b) Restriction enzymes c) Knife
    d) DNA ligases

11. Match the following :

(1) Polyvinyl chloride	(i) Affects brain development in children
(2) Cadmium	(ii) Affects the growth of reproductive system
(3) Lead	(iii) Asthmatic bronchitis
(4) Chromium	(iv) Neural damage

    a) (1)-(i), (2)-(iii), (3)-(iv), (4)-(ii)
    b) (1)-(ii), (2)-(i), (3)-(iii), (4)-(iv)
    c) (1)-(iii), (2)-(ii), (3)-(iv), (4)-(i)
    d) (1)-(ii), (2)-(iv), (3)-(i), (4)-(iii)

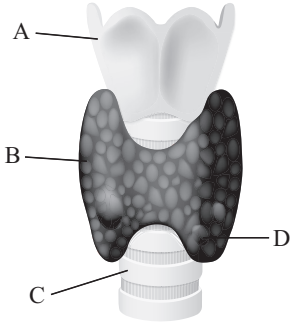
12. Find the correct pair.

a) Acrocentric	-	(i)	The centromere is found near the centre of the chromosome with two unequal arms
b) Sub metacentric	-	(ii)	The centromere is found on the proximal end.
c) Metacentric	-	(iii)	The centromere occurs in the centre of the chromosome and forms two equal arms.
d) Telocentric	-	(iv)	The centromere is found at one end with a short arm and a long arm.

PART - II

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

13. Write short notes on gears.
14. Mention two cases in which there is no Doppler effect in sound.
15. Define co-efficient of real expansion and mention its unit.
16. Write a reaction which is used for the identification of alcohol.
17. Name the three types of neurons and find its location.
18. Identify the parts A, B, C and D in the given figure.



19. How can you determine the age of fossils?
20. State the applications of DNA fingerprinting technique.
21. What is "Stage" in Scratch editor?
22. A beam of light passing through a diverging lens of focal length 0.3 m appears to be focused at a distance 0.2 m behind the lens. Find the position of the object.

PART - III

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

23. Describe rocket propulsion.
24. What are the uses of Simple microscope?
25. a) What do you understand by the term 'Ultrasonic waves'?
    b) What are the medical applications of echo?
26. What are the methods of preventing Corrosion?
27. Differentiate soaps and detergents.
28. Differentiate between Monocot root and Dicot root.
29. Draw the external structure of human heart and label the parts.
30. Define Ethnobotany and write its importance.
31. Explain about Gene Therapy.
32. (a) A solution was prepared by dissolving 25 g of sugar in 100 g of water. Calculate the mass percentage of solute.
    (b) True or false (If false give the correct statement).
    (i) In our daily life, solution of syrups, mouth wash, antiseptic solutions, household disinfectants etc., the concentration of ingredients of solution is expressed as w/w.
    (ii) In Oinments, antacids, soaps etc., the concentration of solution is expressed as v/v.

PART - IV

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

33. a) Explain about domestic electric circuits.

(OR)

b) Compare the properties of alpha, beta and gamma radiations.

34. a) (i) Give the salient features of "Modern atomic theory".
    (ii) Write any two applications of "Avogadro's Law".

(OR)

b) (i) Explain single displacement reaction with examples.
    (ii) Explain the types of double displacement reactions with examples.

35. a) (i) Why are the rings of cartilage found in trachea of rabbit?
    (ii) Write a note on UTI.

(OR)

b) (i) what is the biological significance of DNA?
    (ii) What precautions can be taken for preventing heart diseases?
    (iii) Mention any two approaches for protection of an Abused child.

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Answers

PART - I

1. (d) Bifocal lenses
2. (c) 6.023×10^{23}
3. (d) Sulphur in carbon disulphide
4. (b) 54000 J
5. (b) Combustion of ethanol
6. (b) Ethyl Alcohol
7. (b) William Harvey
8. (b) axons
9. (b) Cytokinin
10. (b) Restriction enzymes
11. (d) (1)-(ii), (2)-(iv), (3)-(i), (4)-(iii)
12. a-(iv), b-(i), c-(iii), d-(ii).

PART - II

13. **Gears :** A gear is a circular wheel with teeth around its rim. It helps to change the speed of rotation of a wheel by changing the torque and helps to transmit power.

14. **Conditions for no Doppler effect :**
    (i) When source(S) and listener (L) both are at rest.
    (ii) When S and L move in such a way that distance between them remains constant.

15. **Coefficient of real expansion** is defined as the ratio of the true rise in the volume of the liquid per degree rise in temperature to its unit volume. The **SI unit** of coefficient of real expansion is K^{-1}.

16. Ethanol is oxidised to ethanoic acid with alkaline $KMnO_4$ or acidified $K_2Cr_2O_7$

$$CH_3CH_2OH \xrightarrow[2(O)]{K_2Cr_2O_7/H^+} \underset{\text{Ethanoic acid}}{CH_3COOH} + H_2O$$

During this reaction, the orange colour of $K_2Cr_2O_7$ changes to green. Therefore, this reaction can be used for the **identification of alcohol**.

17. **The three types of neurons & locations :**

Unipolar Neurons : Found in early embryos but not in adult.

Bipolar Neurons : Found in retina of eye and olfactory epithelium of nasal chambers.

Multipolar Neurons : Found in cerebral cortex of brain.

18. **A :** Thyroid cartilage
    B : Thyroid gland
    C : Trachea
    D : Nodule

19. (i) The **age of fossils** is **determined by radioactive elements** present in it.
    (ii) They may be carbon, uranium, lead or potassium. It is used in paleobotany and anthropology for determining the age of human fossils and manuscripts.

Radioactive carbon (C^{14}) dating method :

(i) Carbon consumption of animals and plants stops after death and since then, only the decaying process of C^{14} occurs continuously.
(ii) The time passed since death of a plant or animal can be calculated by measuring the amount of C^{14} present in their body.

20. (i) **DNA fingerprinting technique** is widely used in forensic applications like crime investigation such as **identifying the culprit**. It is also used for paternity testing in case of disputes.
    (ii) It also helps in the study of genetic diversity of population, evolution and speciation.

21. (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.

22. $f = -0.3$ m, $v = -0.2$ m

$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$\frac{1}{u} = \frac{1}{v} - \frac{1}{f}$$

$$\frac{1}{u} = \frac{1}{-0.2} - \frac{1}{-0.3} = \frac{-10}{6}$$

$$u = \frac{-6}{10} = -0.6 \text{ m.}$$

PART - III

23. (i) **Propulsion of rockets** is based on law of conservation of linear momentum as well as Newton's III law of motion.

(ii) Rockets are filled with a fuel (either liquid or solid) in the propellant tank.

(iii) When the rocket is fired, this fuel is burnt and a hot gas is ejected with a high speed from the nozzle of the rocket producing a huge momentum.

(iv) To balance this momentum, an equal and opposite reaction force is produced in the combustion chamber, which makes the rocket project forward.

(v) While in motion, the mass of the rocket gradually decreases, until the fuel is completely burnt out. Since, there is no net external force acting on it, the linear momentum of the system is conserved.

(vi) The mass of the rocket decreases with altitude, results in the gradual increase in velocity of the rocket.

(vii) At one stage, it reaches a velocity, which is sufficient to just escape from the gravitational pull of the Earth. This velocity is called escape velocity.

24. **Uses of Simple microscope :**

(i) Used by watch repairers and jewellers.

(ii) Used to read small letters clearly.

(iii) Used to observe parts of flower, insects etc.

(iv) Used to observe finger prints in the field of forensic science.

25. a) **Ultrasonic waves :**

(i) Sound wave with frequency greater than 20 kHz.

(ii) Human ear cannot detect these waves.

(iii) Certain creatures like mosquito, dogs, bats, dolphins can detect these waves.

(iv) E.g.: waves produced by bats.

b) **The medical applications of echo:**

Used in obstetric ultrasonography, to create real-time visual images of the developing embryo or fetus in the mother's uterus.

26. **Methods of preventing corrosion :**

Alloying :

(i) The metals can be alloyed to prevent from the process of corrosion.

(ii) E.g: Stainless Steel

Surface Coating: It involves application of a protective coating over the metal. It is of the following types:

(a) **Galvanization:** It is the process of coating zinc on iron sheets by using electric current.

(b) **Electroplating:** It is a method of coating one metal over another metal by passing electric current.

(c) **Anodizing:**

(i) It is an electrochemical process.

(ii) It converts the metal surface into a decorative, durable and corrosion resistant.

(iii) Aluminium is widely used for anodizing process.

(d) **Cathodic Protection:**

(i) It is the method of controlling corrosion of a metal surface protected is coated with the metal which is easily corrodible.

(ii) The easily corrodible metal is called Sacrificial metal to act as anode ensuring cathodic protection.

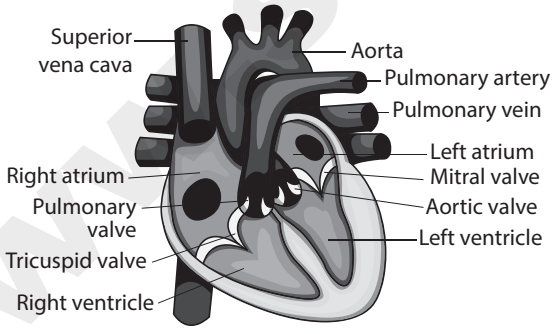
27.

Soap	Detergent
It is a sodium salt of long chain fatty acids.	It is sodium salt of sulphonic acids.
The ionic part of a soap is $-COO^- Na^+$.	The ionic part in a detergent is $-SO_3^- Na^+$.
It is prepared from animal fats or vegetable oils.	It is prepared from hydrocarbons obtained from crude oil.
Its effectiveness is reduced when used in hard water.	It is effective even in hard water.
It forms a scum in hard water.	Does not form a scum in hard water.
It has poor foaming capacity.	It has rich foaming capacity.
Soaps are biodegradable.	Most of the detergents are non-biodegradable.

28.

S. No.	Tissues	Monocot Root	Dicot Root
1.	Number of Xylem	Polyarch	Tetrarch
2.	Cambium	Absent	Present (During secondary growth only)
3.	Secondary Growth	Absent	Present
4.	Pith	Present	Absent
5.	Conjunctive Tissue Ex.	Sclerenchyma Maize	Parenchyma Bean

29.



External structure of human heart

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

(ii) The term Ethnobotany was coined by J. W. Harshberger in 1895 to include the study of plants used by the primitive and aboriginal 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 like bark, stem, roots, leaves, flower bud, flowers, fruits, seeds, oils, resins, dyes, gum for the treatment of diseases like diarrhoea, fever, headache, diabetes, jaundice, snakebites, leprosy, etc.

31. **Gene Therapy :**

(i) Gene therapy refers to the replacement of defective gene by the direct transfer of functional genes into humans to treat genetic disease or disorder.

(ii) The genetic makeup of the 'patient' cell is altered using recombinant DNA technology. It was first successfully implemented in 1990.

(iii) **Somatic gene therapy** is the replacement of defective gene in somatic cells.

(iv) **Germ line gene therapy** replacement of defective gene in germ cell (egg and sperm).

(v) Gene therapy conducted till date has targeted only somatic (non-reproductive) cells. Correction of genetic defects in somatic cells may be beneficial to the patient but the corrected gene may not be carried to the next generation.

32. a) Mass of the solute = 25 g

Mass of the solvent = 100 g

$$\text{Mass percentage} = \frac{\text{Mass of the solute}}{\text{Mass of the solution}} \times 100$$

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

$$= \frac{25}{25+100} \times 100 = \frac{25}{125} \times 100 = 20\%$$

b) (i) **False.** In our daily life, solution of syrups, mouth wash, antiseptic solutions, household disinfectants etc, the concentration of ingredients of solution is expressed as **v/v**.

(ii) **False.** In Oinments, antacids, soaps etc, the concentration of solution is expressed as **w/w**.

PART - IV

33. a) **Domestic electric circuits :**

(i) The first stage of domestic circuit is to bring the power supply to the main-box from a distribution panel, such as a transformer. The important components of the mainbox are (i) a fuse box and (ii) a meter.

(ii) The meter is used to record the consumption of electrical energy. The fuse box contains either a fuse wire or a miniature circuit breaker (MCB).

(iii) The function of the fuse wire or a MCB is to protect the house hold electrical appliances from overloading due to excess current.

(iv) The electricity is brought to houses by two insulated wires,

- red insulation – 'live wire'
- black insulation – 'neutral wire'

(v) The electricity supplied to house is having an electric potential of 220 V.

(vi) Both, the live wire and the neutral wire enter into a box where the main fuse is connected with the live wire.

(vii) After the electricity meter, these wires enter into the main switch, which is used to discontinue the electricity supply whenever required.

(viii) After the main switch, these wires are connected to live wires of two separate circuits.

- 5A rating – used to run the electric appliances with a lower power rating. Eg: Tube lights, bulbs and fans.
- 15A rating – used to run electric appliances with a high power rating. Eg: A/C, refrigerators, electric iron and heaters.

(ix) All the circuits in a house are connected in parallel, so that the disconnection of one circuit does not affect the other circuit.

(x) Parallel connection supplies an equal voltage.

Hint : Domestic electric current are those circuits used in household.

(OR)

b)

Properties	α rays	β rays	γ rays
What are they?	Helium nucleus ($_2He^4$) consisting of two protons and two neutrons.	Electrons ($_{-1}e^0$), basic elementary particle of 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 time 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. They can penetrate through thin metal foil.	Have a very high penetrating power greater than that of β rays. They can penetrate through thick metal blocks.
Effect of electric and magnetic field	Deflected by both the fields. (in accordance with Fleming's left hand rule)	Deflected by both the fields; but the direction of deflection is opposite to alpha rays. (in accordance with Fleming's left hand rule)	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) **Main postulates of Modern Atomic theory :**

(i) **An atom is no longer indivisible :**

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

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

(iii) Atoms of one element can be transmuted into atoms of other elements. Atom is no longer indestructible discovery of artificial transmutation.

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

(v) Atom is the **smallest particle that take part in a chemical reaction**.

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

b) (ii) **Applications of Avogadro's Law :**

(i) It explains Gay-Lussac's law.

(ii) It helps in the determination of atomicity of gases.

(iii) Molecular formula of gases can be derived using Avogadro's law.

(OR)

b) (i) **Single Displacement Reactions :**

(i) It is a reaction between an element and a compound. When they react, one of the elements of the compound-reactant is replaced by the element-reactant to form a new compound and an element.

(ii) The general schematic representation of a single displacement reaction is given as:

(iii) 'A' displaces element 'B' from the compound 'BC' and hence a single displacement reaction occurs. If zinc metal is placed in hydrochloric acid, hydrogen gas is evolved.

(iv) Here, hydrogen is displaced by zinc metal and zinc chloride is formed.

$Zn_{(s)} + 2HCl_{(aq)} \rightarrow ZnCl_{2(aq)} + H_{2(g)}$

$Fe_{(s)} + CuSO_{4(aq)} \rightarrow FeSO_{4(aq)} + Cu_{(s)}$

(v) If an iron nail is placed in an aqueous solution of copper (II) sulphate as, the iron displaces copper from its aqueous solution and the so formed copper deposits over the iron nail.

(vi) Let us consider the following two reactions:

$2NaCl_{(aq)} + F_{2(g)} \rightarrow 2NaF_{(aq)} + Cl_{2(g)}$

$2NaF_{(aq)} + Cl_{2(g)} \rightarrow 2NaCl_{(aq)} + F_{2(g)}$

(vii) The first reaction involves the displacement of chlorine from NaCl, by fluorine. In the second reaction, chlorine displaces fluorine from NaF. Out of these two, the second reaction will not occur.

(viii) Because, fluorine is more active than chlorine and occupies the upper position in the periodic table.

(ix) So, in displacement reactions, the activity of the elements and their relative position in the periodic table are the key factors to determine the feasibility of the reactions. More active elements readily displace less active elements from their aqueous solution.

(ii) There are two major classes of **double displacement reactions**. They are

Precipitation Reactions:

(i) When aqueous solutions of two compounds are mixed, if they react to form an insoluble compound and a soluble compound, then it is called precipitation reaction.

(ii) Eg: When the clear aqueous solutions of potassium iodide and lead (II) nitrate are mixed, a double displacement reaction takes place between them.

$Pb(NO_3)_{2(aq)} + 2KI_{(aq)} \rightarrow PbI_{2(s)} + 2KNO_{3(aq)}$

Neutralization Reactions:

(i) Acid reacts with the base to form a salt and water.

(ii) It is called **neutralization reaction** as both acid and base neutralise each other.

Acid + Base → Salt + Water

$HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$

35. a) (i) Trachea is the wind pipe. Tracheal walls are supported by rings of cartilage which help in the free passage of air.

(ii) **Urinary Tract Infection (UTI) :**

Many diseases affect both women and men, but a few diseases occur at a higher frequency in woman. Woman are susceptible to UTI from the bacteria that are present on skin, rectum or vagina. This will enter the urethra, before moving upwards. The types of UTI are:

1. **Cystitis or Bladder infection**
   Bacteria lodged in the urinary bladder thrive and multiply leading to **inflammation**. It is most common in the age group of 20 to 50.
2. **Kidney Infection**
   The bacteria can travel from the urinary bladder and upward to ureter and a**ffect one or both the kidneys**. It also **infects the blood stream** and leads to serious life-threatening complications.
3. **Asymptomatic Bacteriuria**
   The bacteria present in the urinary bladder which may not show any symptoms.

(OR)

b)(i) **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.

(ii) **Precautions to be taken to prevent heart diseases :**

1. Diet Management:

(i) Reduction in the intake of calories, low saturated fat and cholesterol rich food, low carbohydrates and common salt are some of the dietary modifications.

(ii) Diet rich in poly unsaturated fatty acids (PUFA) is essential.

(iii) Increase in the intake of fibre diet, fruits and vegetables, protein, minerals and vitamin are required.

2. Physical activity:

Regular exercise, walking and yoga are essential for body weight maintenance

3. Addictive substance avoidance :

Alcohol consumption and smoking are to be avoided.

(iii) **Approaches for protection of an abused Child :**

1. **Child Helpline:** The Child Helpline provides a social worker who can assist the child by providing food, shelter and protection.
2. **Family support:** The victimized child should be supported by the family members. They should be provided with proper care and attention to overcome their sufferings.

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