

10th STD Common Quarterly Question Paper - 2019 (with Answers)

SCIENCE

Time allowed : 15 mins + 2.30 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:** (1) Answer **all** the questions. (12 × 1 = 12)
(2) Choose the most suitable answer and write the code with the corresponding answer.

- In which of the following sport turning of effect of force used
 - swimming
 - tennis
 - cycling
 - hockey
- If a substance is heated or cooled, the change in mass of that substance is
 - positive
 - negative
 - zero
 - none of these
- SI unit of resistance is
 - mho
 - Joule
 - Ohm
 - Ohm metre
- The gram molecular mass of oxygen molecule is
 - 16g
 - 18g
 - 32g
 - 17g
- Chemical formula of rust is
 - $\text{FeO} \times \text{H}_2\text{O}$
 - $\text{FeO}_4 \times \text{H}_2\text{O}$
 - $\text{Fe}_2\text{O}_3 \times \text{H}_2\text{O}$
 - FeO
- Common name of copper (II) sulphate pentahydrate is
 - Green Vitriol
 - Blue vitriol
 - Gypsum
 - Epsom salt
- Kreb's cycle takes place in
 - chloroplast
 - mitochondrial matrix
 - stomata
 - inner mitochondrial membrane

- Rabbit do not have teeth.
 - incisors
 - canines
 - premolars
 - molars
- Bipolar neurons are found in
 - retina of eye
 - cerebral cortex
 - embryo
 - olfactory epithelium
- There are pairs of cranial nerves.
 - 12
 - 13
 - 31
 - 14
- The centromere is found at the centre of the Chromosome.
 - Telocentric
 - Metacentric
 - Sub-metacentric
 - Acrocentric
- Based on the food chain, pick out the odd one out. (plants -> grasshopper -> frog -> tiger -> snake)

PART - II

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

- State the principle of moments.
- Differentiate convex lens and concave lens.
- Define atomicity.
- True or False. If false give the correct statement:
 - Moseley's periodic table is based on atomic mass.
 - An alloy is a hetrogenous mixture of metals.
- Match the following:
 - Blue Vitriol - $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
 - Gypsum - CaO
 - Deliquescence - $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
 - Hygroscopic - NaOH
- Draw and label the structure of mitochondria.
- Write the dental formula of rabbit.
 - How is diastema formed in rabbit?

[515]

20. Which gland is called as the "master gland"? Give reason.

21. What are allosomes?

22. Calculate the resistance of a conductor through which a current of 2 A passes, when the potential difference between its ends is 30 V.

PART - III

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

23. State the universal law of gravitation and derive its mathematical expression.

24. a) List any five properties of light.

b) Write any two advantages of telescopes.

25. Derive the ideal gas equation.

26. Explain smelting process.

27. 'A' is blue coloured crystalline salt. On heating it loses blue colour and to give 'B'. When water is added; 'B' gives back to 'A'. Identify A and B write the equation.

28. Explain the male reproductive system of rabbit with a labeled diagram.

29. Enumerate the functions of blood.

30. Illustrate the structure and functions of brain.

31. a) Define triple fusion,

b) Draw and label the structure of neuron.

32. a) 1.5 g of solute is dissolved in 15 g of water to form a saturated solution at 298 K. Find out the solubility of the solute at the temperature.

b) What is meant by binary solution?

PART - IV

Note: 1. Answer all the question. (3 × 7 = 21)

2. Each question carries seven marks.

3. Draw diagram wherever necessary.

33. a) Explain the construction and working of a 'compound microscope'.

b) State Snell's law.

(OR)

a) Calculate the current and the resistance of a 100 W, 200 V electric bulb in an electric circuit.

b) Write three fundamental laws of gases.

34. a) Give the salient features of "modern atomic theory".

b) Calculate the number of moles in 27 g of Al.

(OR)

a) Name the acid that renders aluminium passive. Why?

b) In what way hygroscopic substances differ from deliquescent substances.

35. a) Classify neurons based on its structure.

b) Why is the colour of the blood red?

c) Name two layered protective covering of human heart.

(OR)

How is the structure of DNA organized? What is the biological significance of DNA?

★ ★ ★

Answers :

PART - I

- | | |
|--|---------------------|
| 1. (c) cycling | 2. (c) zero |
| 3. (c) ohm | 4. (c) 32 g |
| 5. (c) $\text{Fe}_2\text{O}_3 \times \text{H}_2\text{O}$ | 6. (b) Blue vitriol |
| 7. (b) mitochondrial matrix | 8. (b) canines |
| 9. (a) retina of eye | 10. (a) 12 |
| 11. (b) Metacentric | 12. Tiger |

PART - II

13. Principle of moments states that when a number of like or unlike parallel forces act on a rigid body and the body is in equilibrium, then the algebraic sum of moments in clockwise direction is equals to the algebraic sum of moments in anticlockwise direction.

Moment in clockwise direction = Moment in anticlockwise direction $\Rightarrow F_1 \times d_1 = F_2 \times d_2$

14.

	Convex Lens	Concave Lens
1.	A convex lens is thicker in the middle than at edges.	A concave lens is thinner in the middle than at edges
2.	It is converging	It is diverging
3.	It produces mostly real images	It produces a virtual image
4.	It is used to treat hypermeteropia	It is used to treat myopia

15. The number of atoms present in the molecule is called as its atomicity.

16. 1. Moseley's periodic table is based on atomic mass. **False.**

Correct Statement : Moseley's periodic table is based on **atomic number.**

2. An alloy is a heterogeneous mixture of metals. **False.**

Correct Statement : An alloy is a **homogeneous** mixture of metals.

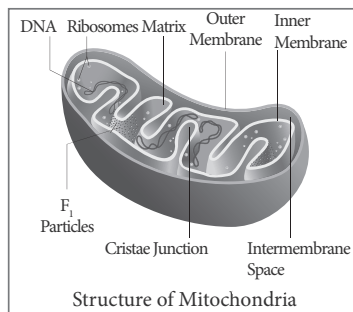
17. 1. Blue Vitriol - $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$

2. Gypsum - $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

3. Deliquescence - NaOH

4. Hygroscopic - CaO

18.



19. a) The dental formula of rabbit is $(I \frac{2}{1}, C \frac{0}{0}, PM \frac{3}{2}, H \frac{3}{3}) \frac{2033}{1023}$.

Here Canines are absent.

b) The gap between the incisors and premolar is called diastema. It helps in mastication and chewing of food.

20. The **pituitary gland** or **hypophysis** is called as the "master gland".

The pituitary gland forms the major endocrine gland in most vertebrates. It regulates and controls other endocrine glands and so is called as the "**Master gland**".

21. i) Allosomes are chromosomes which are responsible for determining the sex of an individual.

ii) They are also called as sex chromosomes or hetero - chromosomes.

iii) There are two types of sex chromosomes, X and Y- chromosomes.

22. Current through the conductor $I = 2 \text{ A}$,

Potential Difference $V = 30 \text{ V}$

From Ohm's Law: $R = \frac{V}{I}$.

Therefore, $R = \frac{30}{2} = 15 \Omega$

PART - III

23. **Newton's Universal law of gravitation :** This law states that every particle of matter in this universe attracts every other particle with a force. 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. The direction of the force acts along the line joining the masses

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

Force $F \propto m_1 \times m_2 \Rightarrow F \propto 1/r^2$

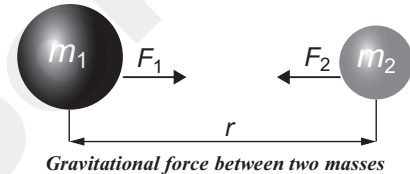
On combining the above two expressions,

$$F \propto m_1 \times m_2 / r^2$$

$$F = G m_1 \times m_2 / r^2 \text{ or } \frac{Gm_1m_2}{r^2}$$

Where G is universal gravitational constant.

Its value in SI unit is $6.674 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$.



24. a) i) Light is a form of energy.
ii) Light always travels along a straight line.
iii) Light does not need any medium for its propagation. It can even travel through vacuum.

iv) The speed of light in vacuum or air is,

$$c = 3 \times 10^8 \text{ ms}^{-1}.$$

v) Different coloured light has different wavelength and frequency.

vi) When light is incident on the interface between two media, it is partly reflected and partly refracted.

b) i) Elaborate view of the Galaxies, Planets, stars and other heavenly bodies.

ii) Camera can be attached for taking photograph for the celestial objects.

iii) Telescope can be viewed even with the low intensity of light.

25. i) The ideal gas equation is an equation, which relates all the properties of an ideal gas.

ii) An ideal gas obeys Boyle's law and Charles's law and Avogadro's law.

iii) According to Boyle's law, $PV = \text{constant}..$ (1)

iv) According to Charles's law, $V/T = \text{constant} ..$ (2)

v) According to Avogadro's law, $V/n = \text{constant}..$ (3)

vi) After combining equations (1), (2) and (3), we can write the following equation.

$$PV/nT = \text{constant} \quad \dots (4)$$

The above relation is called the combined law of gases.

vii) If we consider a gas, which contains μ moles of the gas, the number of atoms contained will be equal to μ times the Avogadro number, N_A .

i.e., $n = \mu N_A$.

viii) Using this value, equation (4) can be written as $PV / \mu N_A T = \text{constant}$

ix) The value of constant in the above equation is taken to be k_B , which is called as Boltzmann constant.

Its value is $1.381 \times 10^{-23} \text{ JK}^{-1}$.

x) Hence, we have the following equation:

$$PV / \mu N_A T = k_B$$

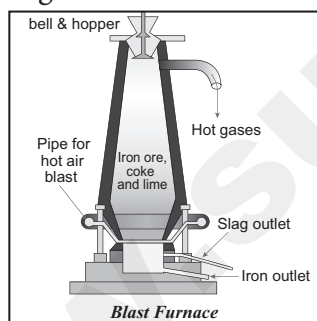
$$PV = \mu N_A k_B T$$

xi) Here, $\mu N_A k_B = R$, which is termed as universal gas constant whose value is $8.31 \text{ J mol}^{-1} \text{ K}^{-1}$.

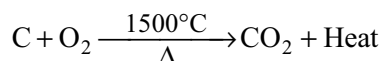
$$PV = RT \quad \dots (5)$$

This is called ideal **gas equation**. Ideal gas equation is also called as equation of state.

26. **Smelting (in a Blast Furnace)** : The charge consisting of roasted ore, coke and limestone in the ratio 8:4:1 is smelted in a blast furnace by introducing it through the cup and cone arrangement at the top. There are three important regions in the furnace.

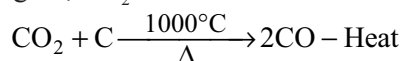


- (a) **The Lower Region (Combustion Zone)** - The temperature is at 1500°C . In this region, coke burns with oxygen to form CO_2 when the charge comes in contact with a hot blast of air.

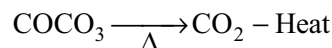


It is an exothermic reaction since heat is liberated.

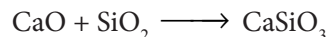
- (b) **The Middle Region (Fusion Zone)** - The temperature prevails at 1000°C . In this region, CO_2 is reduced to CO .



Limestone decomposes to calcium oxide and CO_2 .



These two reactions are endothermic due to absorption of heat. Calcium oxide combines with silica to form calcium silicate slag.



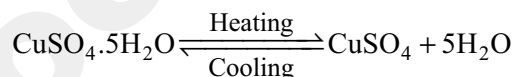
- (c) **The Upper Region (Reduction Zone)** - The temperature prevails at 400°C . In this region carbon monoxide reduces ferric oxide to form a fairly pure spongy iron.



The molten iron is collected at the bottom of the furnace after removing the slag.

The iron thus formed is called pig iron. It is remelted and cast into different moulds. This iron is called cast iron.

27.



Copper sulphate Pentahydrate (A) Blue	$\xrightleftharpoons[\text{Cooling}]{\text{Heating}}$	CuSO ₄ + 5H ₂ O Anhydrous Copper sulphate (B) White
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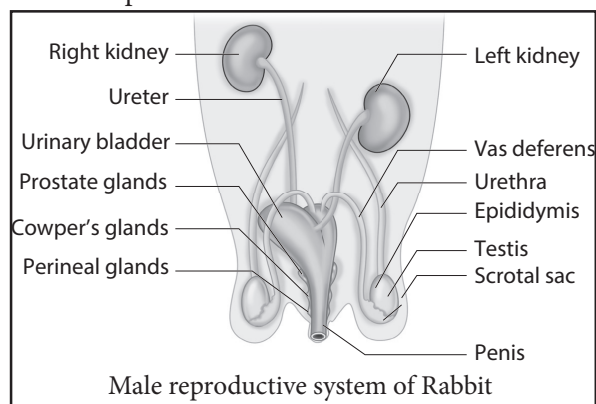
A - Copper sulphate pentahydrate

B - Anhydrous copper sulphate

28.

Male Reproductive system :

The male reproductive system of rabbit consists of a pair of testes which are ovoid in shape.



Testes are enclosed by scrotal sacs in the abdominal cavity.

Each testis consists of numerous fine tubules called **seminiferous tubules**.

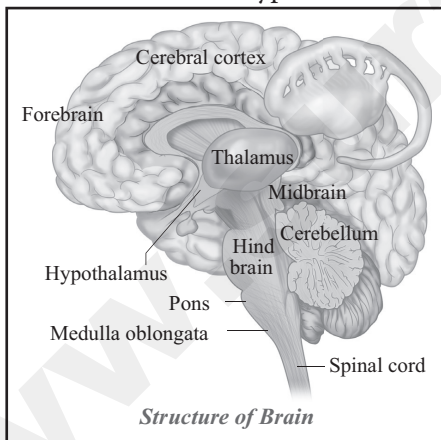
This network of tubules lead into a coiled tubule called **epididymis**, which lead into the sperm duct called **vas deferens**.

The vas deferens join in the urethra just below the urinary bladder. The urethra runs backward and passes into the penis.

There are three accessory glands namely **prostate gland, cowper's gland and perineal gland**. Their secretions are involved in reproduction.

29. i) Transport of respiratory gases.
 ii) Transport of digested food materials to the different body cells.
 iii) Transport of hormones.
 iv) Transport of nitrogenous excretory products like ammonia, urea and uric acid.
 v) It is involved in protection of the body and defense against diseases.
 vi) Blood acts as buffer and helps in regulation of pH and body temperature.
 vii) It maintains proper water balance in the body.
30. A human brain is formed of three main parts: (a) forebrain (b) midbrain and (c) hindbrain.

Forebrain : The forebrain is formed of **cerebrum** and **diencephalon**. The latter consists of dorsal thalamus and ventral hypothalamus.



Cerebrum : The cerebrum is responsible for the thinking, intelligence, consciousness, memory, imagination, reasoning and willpower.

Thalamus : Thalamus present in cerebral medulla is a major conducting centre for sensory and motor signalling. It acts as a **relay centre**.

Hypothalamus : It controls involuntary functions like hunger, thirst, sleep, sweating, sexual desire, anger, fear, water balance, blood pressure etc.

Midbrain : It control visual and auditory (hearing) reflexes.

Hindbrain : It is formed of three parts **cerebellum, pons** and **medulla oblongata**.

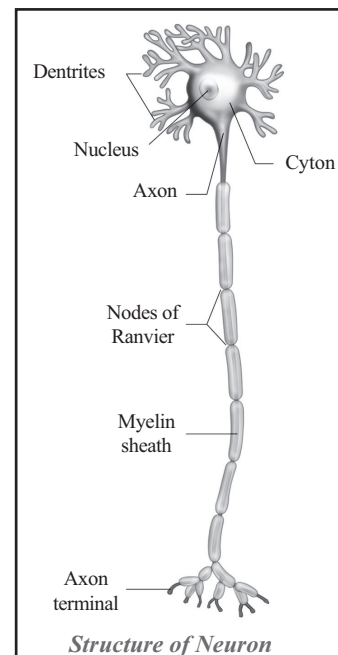
Cerebellum : It coordinates voluntary movements and also maintains body balance.

Pons : It relay signals between the cerebellum, spinal cord, midbrain and cerebrum. It controls respiration and sleep cycle.

Medulla Oblongata : It has cardiac centres, respiratory centres, vasomotor centres to control heart beat, respiration and contractions of blood vessels respectively. It also regulates vomiting and salivation.

- 31.a) i) During fertilization process in Angiosperms, the pollen grain produces two sperms.
 ii) One sperm, fuses with the egg and forms a diploid zygote.
 iii) Another sperm fuses with the secondary nucleus (2n) of the embryo sac and forms a triploid primary endosperm nucleus. This is called triple fusion.

b)



- 32.a) Mass of the solute = 1.5 g
 Mass of the solvent = 15 g
 Solubility of the solute

$$\begin{aligned} &= \frac{\text{Mass of the solute}}{\text{Mass of the solvent}} \times 100 \\ \text{Solubility of the solute} &= \frac{1.5}{15} \times 100 = 10 \text{ g} \end{aligned}$$

- b) Solutions which are made of one solute and one solvent (two components) are called binary solutions.

PART - IV

33. a) i) Compound microscope is used to see the tiny objects.
 ii) A compound microscope consists of two convex lenses. The lens with the shorter focal length is placed near the object, and is called as 'objective lens' or 'objective piece'.
 iii) The lens with larger focal length and larger aperture placed near the observer's eye is called as 'eye lens' or 'eye piece'. Both the lenses are fixed in a narrow tube with adjustable provision.

Working :

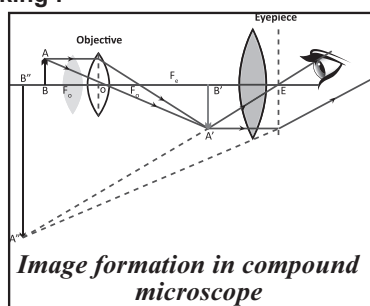


Image formation in compound microscope

- iv) The object (AB) is placed at a distance slightly greater than the focal length of objective lens ($u > f_o$). A real, inverted and magnified image (A'B') is formed at the other side of the objective lens. This image behaves as the object for the eye lens.
 v) The position of the eye lens is adjusted in such a way, that the image (A'B') falls within the principal focus of the eye piece. This eye piece forms a virtual, enlarged and erect image (A''B'') on the same side of object
- b) **Snell's law:** The ratio of the sine of the angle of incidence and sine of the angle of refraction is equal to the ratio of refractive indices of the two media.

$$\frac{\sin i}{\sin r} = \frac{\mu_2}{\mu_1}$$

(OR)

- a) Power $P = 100 \text{ W}$ and Voltage $V = 200 \text{ V}$
 Power $P = V I$

$$\therefore \text{Current, } I = \frac{P}{V} = \frac{100}{200} = 0.5 \text{ A}$$

$$\text{Resistance, } R = \frac{V}{I} = \frac{200}{0.5} = 400 \Omega$$

- b) The three fundamental laws which connect the relation between pressure, volume and temperature are as follows:

- 1) Boyle's Law
- 2) Charles's law
- 3) Avogadro's law

34. a) 'The main postulates of modern atomic theory' are as follows:

An atom is no longer indivisible :

- i) Atoms of the same element may have different atomic mass. Example - isotopes ${}_{17}\text{Cl}^{35}$, ${}_{17}\text{Cl}^{37}$.
- ii) Atoms of different elements may have same atomic masses. Example - Isobars ${}_{18}\text{Ar}^{40}$, ${}_{20}\text{Ca}^{40}$.
- 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 $\text{C}_6\text{H}_{12}\text{O}_6$.
- 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) 27 g of Al

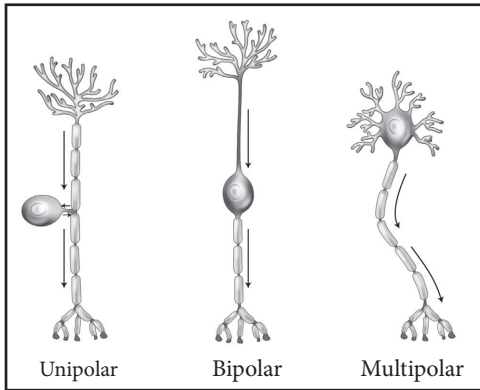
$$\text{No of moles} = \frac{\text{Mass}}{\text{Atomic Mass}} = \frac{27}{27} = 1 \text{ mole}$$

(OR)

- 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)

Deliquescence substances	Hygroscopic substances
Certain water soluble substances, when exposed to the atmosphere at ordinary temperature, absorb moisture from the atmospheric air and become moist or pasty or watery.	Certain substances, when exposed to the atmosphere at ordinary temperature, absorb moisture without dissolving it.
Deliquescent substances change its state on exposure to air.	Hygroscopic substances do not change its state on exposure to air.
Deliquescent substances are crystalline solids.	Hygroscopic substances may be amorphous solids or liquids.

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



Structurally the neurons may be of the following types :

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

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

Multipolar neurons : The cyton gives rise to many dendrons and an axon.

Types of Nerve Fibres : Nerve fibres are of two types based on the presence or absence of myelin sheath.

Myelinated nerve fibre : The axon is covered with myelin sheath

Non-myelinated nerve fibre : The axon is not covered by myelin sheath.

Myelinated and non-myelinated nerve fibres form the white matter and grey matter of the brain.

- b) Presence of red blood cells containing haemoglobin.
c) Pericardium.

(OR)

- b) **Structure of DNA :** The most widely accepted model of DNA is the double helical structure of James Watson and Francis Crick.

Chemical Composition of DNA molecule :

DNA is a large molecule consisting of millions of nucleotides. Hence, it is also called a polynucleotide. Each nucleotide consists of three components.

- i) A sugar molecules – Deoxyribose sugar.
ii) A nitrogenous base.

There are two types of nitrogenous bases in DNA.

They are

- (a) Purines (Adenine and Guanine)
(b) Pyrimidines (Cytosine and Thymine)

- iii) A phosphate group

Nucleoside and Nucleotide :

Nucleoside = Nitrogen base + Sugar

Nucleotide = Nucleoside + Phosphate

The nucleotides are formed according to the purines and pyrimidines present in them.

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.
★ Adenine (A) links Thymine (T) with two hydrogen bonds (A = T)
★ Cytosine (C) links Guanine (G) with three hydrogen bonds (C ≡ G)
This is called complementary base pairing.
v) Hydrogen bonds between the nitrogenous bases make the DNA molecule stable.
vi) Each turn of the double helix is 34 \AA (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.

★★★