



ANSWER KEY

GRADE: IX	SUBJECT: SCIENCE (086)	DATE: 10.02.2025	TIME: 3 HRS	MARKS: 80
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SECTION A

Q MULTIPLE CHOICE QUESTIONS:

(20Q X 1M = 20M)

I

- Which cell organelle contains digestive enzymes and helps in the digestion of cellular waste?
a. Golgi apparatus b. Endoplasmic reticulum c. Mitochondria d. **Lysosomes**
- Which structure is the gel-like substance present in a cell?
a. Nucleus b. Cell wall c. Cell membrane d. **Cytoplasm**
- Poultry farming undertaken to raise
i. egg production ii. Feather production iii. chicken meat iv. Milk production
a. **i and iii** b. i and ii c. ii and iii d. iii and iv
- The chemical symbol for calcium is
a. C b. Cu c. **Ca** d. K
- What is the chemical formula of sodium carbonate?
a. **Na₂CO₃** b. NaHCO₃ c. NaCO₃ d. Na₂HCO₃
Which of the following causes the temperature of a substance to remain constant while it is undergoing a
6 change in its state?
a. **Latent heat** b. Lattice energy c. Loss of heat d. None of these
- What is the physical state of matter in which particles have the least kinetic energy?
a. **Solid** b. Liquid c. Gas d. Plasma
- Which of the following mixture shows Tyndall effect?
a. mixture of copper sulphate and water. b. **mixture of water and milk.**
c. mixture of water and alcohol d. mixture of water and sugar.
- Which of the following are not chemical changes?
a. **freezing of water** b. Growth of a plant
c. Rusting of iron d. Burning of a candle.
- 10 Atoms with same atomic number but different mass number are called as
a. Isobars b. **Isotopes** c. Isotones d. Triads
- 11 In the case of moving body
a. Displacement > Distance b. Displacement < Distance
c. **Displacement ≤ Distance** d. Displacement ≥ Distance
- 12 If no overall effect of forces on an object then forces are
a. Unbalanced forces b. **Balanced forces** c. Frictional forces d. Gravitational forces
- 13 A person pushes a wall with a force of 500 N. What is the reaction force applied by the wall?
a. 250N b. 100N c. 0 N d. **500N**

14 Weight is:

- a. The amount of matter in an object
- b. **The force exerted on an object due to gravity**
- c. The same as mass
- d. The force exerted on an object due to buoyancy

15 The gravitational force between two bodies does not depend on

- a. **the medium between two bodies**
- b. their separation
- c. the product of their masses
- d. None of the above

A car is accelerated on a leveled road and attains a velocity 4 times of its initial velocity. In this process, the kinetic energy of the car

- a. Becomes twice to that of the initial
- b. Becomes four times to that of the initial
- c. Remains the same
- d. **Becomes 16 times to that of the initial**

17 Which of the following is an example of potential energy?

- a. water flowing in a river
- b. a stretched bow
- c. a rolling bat
- d. heat from the sun

DO AS DIRECTED – Q.18 - Q.20 ASSERTION - REASONING BASED QUESTIONS:

These consist of two statements -Assertion (A) and Reasoning (R).

Answer these questions selecting the appropriate option given below:

- a. Both Assertion(A) and Reason (R) are true and Reason(R) is the correct explanation of the Assertion (A).
- b. Both Assertion(A) and Reason(R) are true and Reason(R) is not the correct explanation of the Assertion(A).
- c. Assertion (A) is true, but Reason (R) is false.
- d. Assertion (A) is false, but Reason (R) is true.

18 Assertion: Most of plant tissues are dead.

Reason: Due to sedentary existence of plants, dead cells provide mechanical strength more easily than live ones and need less maintenance.

Ans :a. **Both Assertion(A) and Reason (R) are true and Reason(R) is the correct explanation of the Assertion**

19 Assertion: An object can have constant speed but variable velocity.

Reason: velocity changes due to change in direction, though speed is same.

Ans: a. **Both Assertion(A) and Reason (R) are true and Reason(R) is the correct explanation of the Assertion (A).**

20 Assertion: Bell do not produces sound inside the vacuum.

Reason: Sound is generated by the process of vibration.

Ans :a. **Both Assertion(A) and Reason (R) are true and Reason(R) is the correct explanation of the Assertion (A).**

SECTION B

Q VERY SHORT ANSWER TYPE QUESTIONS:

(6Q X2M=12M)

II.

21 **Explain any two types of epithelial tissues.**

Ans: **Squamous Epithelium:** This type of tissue has cells with a wider length than their height. They are

mainly found in the lining of the mouth, esophagus, alveoli of lungs including blood vessels.

a. Cuboidal Epithelium: This type of tissue has similar width and height i.e they are mainly cube-shaped.

Columnar Epithelium: This type of tissue is taller in height than width i.e column-like shape. They are further classified into two types i.e ciliated columnar epithelium and glandular columnar epithelium

22 Explain the terms with examples: a. Saturated solution b. Suspension

Answer: Saturated solution: In a given solvent when no more solute can dissolve further at a given temperature is called saturated solution.

Suspension: It is a heterogeneous mixture in which the solute particles are big enough to settle down, e.g., chalk-water, paints, etc.

23 Differentiate between homogeneous and heterogeneous mixtures with examples.

Answer:

Homogeneous mixtures	Heterogeneous mixtures
<ul style="list-style-type: none">● It has uniform composition.● No visible boundaries of separation.● They consist of only one phase. Example: sugar + water → sugar solution.	It does not have a uniform composition. Shows visible boundaries of separation. They consist of more than one phase. Example: sugar + sand

24 If a thunder heard by a man 4 seconds after the lighting is seen ,how far is the lightening from the man?(Speed of sound in air=330m/s)

Distance of the lightning = speed × time

Distance=330 m/s×4 s=1320 m

25 Explain why, school bags are provided with wide straps to carry them.

Wide straps reduce pressure on the shoulders because pressure is inversely proportional to the area. This makes it comfortable to carry heavy loads.

26 What are the advantages of organic farming?

Ans: Economical: In organic farming, no expensive fertilisers, pesticides, or HYV seeds are required for the plantation of crops. Therefore, there is no extra expense.

Good return on Investment: With the usage of cheaper and local inputs, a farmer can make a good return on investment.

High demand: There is a huge demand for organic products in India and across the globe, which generates more income through export.

Nutritional: As compared to chemical and fertiliser-utilised products, organic products are more nutritional, tasty, and good for health.

Environment-friendly: The farming of organic products is free of chemicals and fertilisers, so it does not harm the environment.

SECTION C

Q SHORT ANSWER TYPE QUESTIONS:

(7Q X 3M = 21M)

II

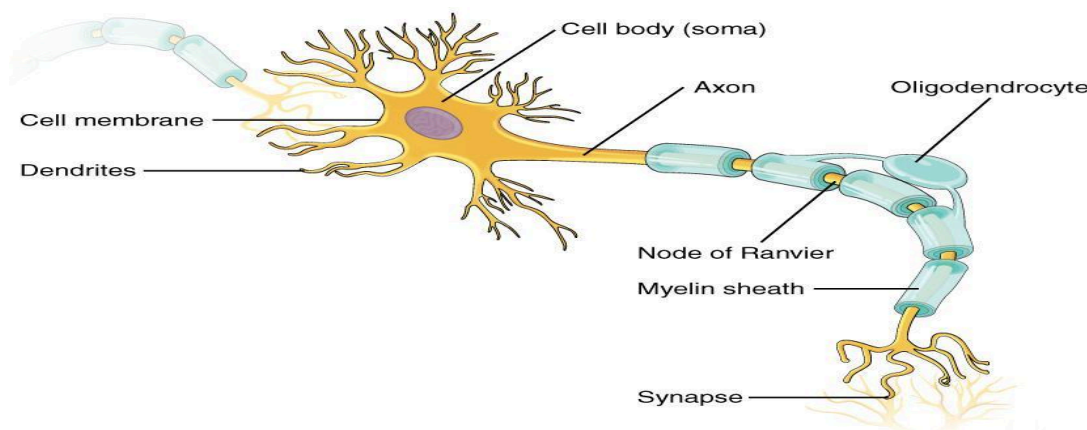
27 How prokaryotic cell is different from eukaryotic cell? (any 3)

Feature	Prokaryotic Cells	Eukaryotic Cells
Number of Cell	Prokaryotic cells are always single-celled organisms.	Eukaryotic cells can be single-celled or multicellular.
Size	They are small, usually between 0.2 μm and 2.0 μm .	These cells are larger, typically 10 μm to 100 μm .
Wall	Prokaryotic cells have a cell wall with a complex structure.	Eukaryotic cells may have a cell wall, but it is simpler.
Nucleus	They do not have a nucleus; instead, DNA is in a nucleoid region.	They have a well-defined nucleus containing the DNA.
Ribosomes	Ribosomes are smaller in size and scattered in the cytoplasm.	Ribosomes are larger and more structured.
DNA Structure	The DNA is circular and floats freely in the cell.	The DNA is linear and found inside the nucleus.
Mitochondria	Mitochondria are not present in these cells.	Mitochondria are present and help in energy production.
Cytoplasm	The cytoplasm is present, but it does not have organelles.	Cytoplasm contains organelles with specific functions.
Endoplasmic Reticulum	These cells do not have an endoplasmic reticulum.	These cells have an endoplasmic reticulum.
Plasmids	Small DNA molecules called plasmids are commonly found.	Plasmids are very rare in these cells.
Lysosome	Lysosomes are not found in prokaryotic cells.	Lysosomes are present in these cells.
Division	Prokaryotic cells divide by binary fission.	Eukaryotic cells divide through mitosis.
Flagella	The flagella are small and simple in structure.	The flagella are larger and more complex.

roduction	Reproduction is always asexual in prokaryotic cells.	These cells can reproduce asexually or sexually.
mples	Examples include bacteria and archaea.	Examples include plants, animals, fungi and protozoa.

28 Explain structure of a neuron with the help of a labeled diagram.

The neurons are the cells in the brain or nervous system. It is composed of a cell body and an axon. The cell body is also called as the cyton. There are the prominent nucleus and Nissl's granules in the cell body. There are short brush-like structures arising from the cell body called as dendrite. The axon is a long extension of the cell body ending in a bunch of branches. The axon is covered by a fatty layer known as myelin sheath. There are certain regions where the myelin sheath is absent called as nodes of Ranvier. At the end of axon there are the nerve fibres.



29 Write a short note on fish culture.

30 i. What is meant by the term chemical formula?

Answer: The chemical formula of the compound is a symbolic representation of its composition, e.g., chemical formula of sodium chloride is NaCl (1M)

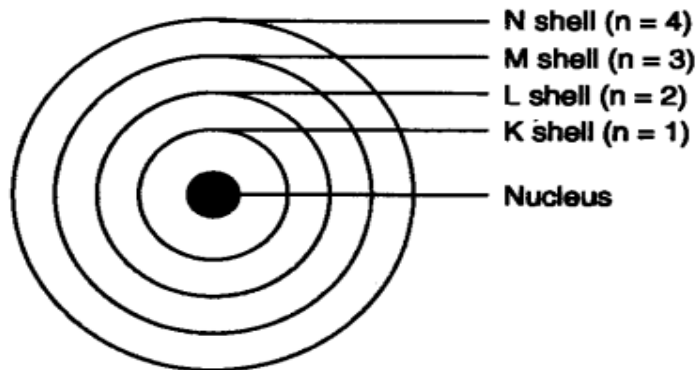
ii. Write down the chemical formulae of a. Aluminium chloride b. Magnesium hydroxide (2M)

Answer: The chemical formula for aluminum chloride is $AlCl_3$ and the chemical formula for magnesium hydroxide is $Mg(OH)_2$

31 Describe Bohr's model of the atom with a diagram.

Answer: Bohr's model of the atom

- (1) Atom has nucleus in the centre.
- (2) Electrons revolve around the nucleus.
- (3) Certain special orbits known as discrete orbits of electrons are allowed inside the atom.
- (4) While revolving in discrete orbits the electrons do not radiate energy.
- (5) These orbits or shells are called energy levels.
- (6) These orbits or shells are represented by the letters K, L, M, N or the numbers $n = 1, 2, 3, 4$



Bohr's model

32 Define

- i) Uniform speed
- ii) Average speed

i) **Uniform Speed:** When an object covers equal distances in equal intervals of time.

ii) **Average Speed:** Total distance traveled divided by the total time taken.

iii) A bus covers a distance of 250 km from Delhi to Jaipur towards west in 5 hours in the morning and returns to Delhi in the evening covering the same distance of 250 km in the same time of 5 hours. Find average speed of the bus for whole journey.

iii) **Average Speed for the Journey:**

$$\text{Total Distance} = 250 + 250 = 500 \text{ km}$$

$$\text{Total Time} = 5 + 5 = 10 \text{ hours}$$

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}} = \frac{500}{10} = 50 \text{ km/h}$$

OR

32 Solve:

- i) _____ is a measure of the inertia of a body.
- ii) Momentum is a _____ quantity. Its unit is _____.
- iii) Calculate the momentum of a toy car of mass 200g moving with a speed of 5 cm/s.

33 Ans:

- i) **Mass** _____ is a measure of the inertia of a body.
- ii) Momentum is a **Vector** _____ quantity. Its unit is **kg.m/s** _____.
- iii) Calculate the momentum of a toy car of mass 200g moving with a speed of 5 cm/s.

$$\text{Momentum } p = m \times v$$

$$p = 0.2 \times 0.05$$

$$p = 0.01 \text{ kg.m/s}$$

i) State Universal law of gravitation.

Every particle attracts every other particle with a force directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

ii) Calculate the force of gravitation due to earth on a ball of 2kg mass lying on the ground. (Mass of earth = 6×10^{24} kg ; Radius of earth = 6.4×10^3 km ; $G = 6.7 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$)

Answer below

$$\begin{aligned}
 F &= \frac{G \cdot m_1 \cdot m_2}{r^2} \\
 &= \frac{6.7 \times 10^{-11} \cdot 6 \times 10^{24} \cdot 2}{(6.4 \times 10^6)^2} \\
 &= 19.6 \text{ N}
 \end{aligned}$$

QI LONG ANSWER TYPE QUESTIONS:

(3Q X 5M = 15M)

V

34 a. Explain different cropping patterns. (3M)

Cropping patterns : To improve the yield of crops by complete utilization of nutrients and prevent pest control, we should use different cropping patterns which are as follows :

(i) Mixed cropping : It refers to the sowing of two or more different crops together in the same field, e.g., wheat and gram. Wheat crops decrease the fertility of soil on the other hand gram crops support it by fixing atmospheric nitrogen with the help of nitrogen fixing bacteria. By this way of cropping we can save time and labour and improve the fertility of soil. Some of the mixed cropping practices are wheat-mustard, millet + cowpea, cotton + mungbean.

(ii) Intercropping : It is growing of two or more crop simultaneously on the same field in a definite row pattern. It means few rows of one crop and adjoining to that few rows of another crop. By this way of cropping, we may get better yield of both crop e.g., soyabean + maize.

(iii) Crop rotation : If the same crop is grown every year in the same field, then the fertility of the soil decreases. To avoid this situation, we use crop rotation. It stores the fertility of the soil. So crop rotation is the process of growing two or more types of crops alternately in the same field. Based on duration, crop rotation is applied for various crop combination.

Ever since man settled down in a place to start a social and cultural life, he began cultivating crops. Nearly all the present day crop plants were developed by pre historic man by altering the wild ancestral species.

The present day plants are improved varieties and have been produced by careful artificial selection and plant breeding practices. Thus,

The science of improvement of plants by improving their genetic potentialities is called plant breeding.

Plant breeding techniques:

There are four main plant breeding techniques. They are :

- **Introduction** : The seeds of a plant with some special features are brought from some place and grown in a new place. This is called introduction. If the plant species survives, it is selected for further cultivation.
- **Selection** : It is the oldest method of crop improvement even carried out by the pre historic human beings. Individual plants or group of plants having desirable characters like disease resistance, product quality, high yields, etc are selected eliminating the undesirable ones.
- **Hybridization** : It is a technique of plant breeding in which the two plants having desired characters are made to cross and develop seeds. The pollen grains of one plant (selected as male) are collected for pollination. The stigma of another plant (selected as female) is dusted with the pollen grains of male plant. After pollination, the fusion of desired male and female gametes results in hybrid embryo having characters of both the plants. The seeds of this plant are collected and grown in the fields.

There are various types of hybridizations. They are:

- **Intravarietal hybridization** : It is between the two plants of same variety.
- **Intervarietal hybridization** : It is between two plants belonging to different varieties but same species.
- **Interspecific hybridization** : It is between the different species of the same genus.
- **Intergeneric hybridization** : It is between different genera.

Recombinant DNA technology or Genetic Engineering : The above mentioned methods of crop

improvement (such as selection and hybridization) involves the complete genome of plants. The latest recombinant DNA technology involves transfer of one or more genes from one plant to another. The plant in which the foreign gene has been introduced is called transgenic plant or genetically modified organism / plant (GMO).

35 a. Differentiate between electron and neutron.

Answer:

Electrons	Protons	Neutrons
1. Negatively charged.	Positively charged	No charge
2. Mass is negligible $\left(\frac{1}{1800}\right)$ times of protons.	Mass is 1 a.m.u.	Mass is 1 a.m.u.
3. Get attracted towards +ve charge.	Get attracted towards -ve charge.	Do not get attracted, as they are neutral
4. Present outside the nucleus	Present in the nucleus	Present in the nucleus of an atom

ii. If bromine atom is available in the form of say, two isotopes $^{79}_{35}\text{Br}$ (49.7%) and $^{81}_{35}\text{Br}$ (50.3%), calculate the average atomic mass of bromine atom. (2M)

Answer:

The average atomic mass of bromine atom

$$\begin{aligned}
 &= \left(79 \times \frac{49.7}{100}\right) + \left(81 \times \frac{50.3}{100}\right) \\
 &= 39.263 + 40.743 \\
 &= 80.006 \text{ u}
 \end{aligned}$$

36i. Define Frequency and wavelength of wave. (1M)

Frequency: Number of oscillations per second (Hz).

Wavelength: Distance between two consecutive crests or troughs (m)

ii. What is Echo? State two applications of Echo.

Echo: An echo is the repetition of a sound wave after it reflects off a surface and returns to the listener

Applications:

Measuring distances (e.g., SONAR).

Checking flaws in materials.

iii. A sound wave travels at a speed of 339 m s^{-1} . What is the frequency of the wave if its wavelength is 1.5 cm ? Will it be audible?

The correct option is **D 22600 Hz**

Given speed (V) = 339m/s ; λ = 0.0015 m; f =?

Now we know, $V = f\lambda$

$$\Rightarrow f = \frac{V}{\lambda} = \frac{339}{0.0015} = 22600 \text{ Hz}$$

(2M)

SECTION E

Q CASE BASED QUESTION:

(3Q X 4M = 12M)

V

37A few layers of cells beneath the epidermis are generally simple permanent tissue. Parenchyma is the most common simple permanent tissue. It consists of relatively unspecialized cells with thin cell walls. They are living cells. Collenchyma allows bending of various parts of the plant-like tendrils and stems of climbers without breaking. Sclerenchyma tissue makes the plant hard and stiff. We have seen the husk of a coconut. It is made of sclerenchymatous tissue. They are long and narrow as the walls are thickened due to lignin. This tissue is present in stems, around vascular bundles, in the veins of leaves and in the hard covering of seeds and nuts.

1. The flexibility in plants is due to _____

Ans: collenchyma

ii. What is the function of sclerenchyma?

Ans: The main function of sclerenchyma is to provide mechanical support and strength to the plants. They provide structural support to the plant organs. They form protective coverings around nuts and seeds. They are also a part of vascular bundles and form conductive tissues.

iii. Explain the structure of sclerenchyma cell/tissue.

Ans: Sclerenchyma tissue, when mature, is composed of dead cells that have heavily thickened walls containing lignin and a high cellulose content (60%–80%), and serves the function of providing structural support in plants

iv. How simple permanent tissue different from complex permanent tissue?

Ans: Simple tissues are made up of only one type of cells, which look like each other. On the other hand, complex tissues are made up of more than one type of cells. Parenchyma, collenchyma and sclerenchyma are examples of simple plant tissue, whereas xylem and phloem are examples of a complex tissue.

38 The word 'matter' refers to everything in the universe that has mass and takes up space. States of matter are generally described on the basis of qualities that can be seen or felt. Three states of matter can be found in daily life: solid, liquid and gas. Matter that feels hard and maintains a fixed shape is called a solid, matter that feels wet and maintains its volume but not its shape is called a liquid. Matter that can change both shape and volume is called a gas.

Read the given passage carefully and answer the following questions

i. As the solid melts to form liquid:

a. intermolecular forces of attraction decrease

b. the kinetic energy of particles increases

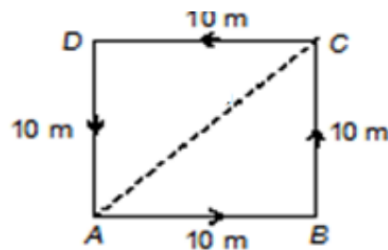
c. intermolecular distance increases

d. All of the above

ii. 'Gases are easily compressed but liquids cannot be compressed.' What can be inferred from this statement?

a. The forces of attraction between gas particles are stronger than that between liquid particles.

- b. The gas particles are spaced further apart than liquid particles.
 - c. The gas particles have less energy than liquid particles.
 - d. The gas particles move more rapidly than liquid particles.
- iii. Which one of the following statements is wrong for gases?
- a. Gases do not have a definite shape and volume.
 - b. Volume of the gas is equal to the volume of the container confining the gas.
 - c. Confined gas exerts uniform pressure on the walls of container in all directions.
 - d. Mass of the gas cannot be determined by weighing a container in which it is enclosed.
- iv. Which of the following describes the liquid phase?
- a. It has a definite shape and a definite volume.
 - b. It has a definite shape but not definite volume.
 - c. It has a definite volume but not a definite shape.
 - d. It has neither a definite shape nor a definite volume.
- 39 Answer the following questions by observing the following diagram:



- i. What is the displacement, when the particle moves from point A to D? (1M)
- a. 20m
 - b. 10m
 - c. 30m
 - d. 40m
- ii. What is the displacement, when the particle moves from point A to C through A-B-C? (1M)
- a. 10m
 - b. 20m
 - c. $20\sqrt{2}$ m
 - d. $10\sqrt{2}$ m
- iii. Find distance and displacement covered when the particle moves in path ABCDA i.e. start from A and ends at A? (2M)
- a. distance 40m; displacement 40m towards B
 - b. distance 40m; displacement 20m towards A
 - c. distance 40m; displacement 0m towards A
 - d. distance 40m; displacement 10m towards A