CLASS IX (2019-20)
SCIENCE (CODE 086)
SAMPLE PAPER-5

Time : 3 Hours **Maximum Marks : 80**

General Instructions :

(i) The question paper comprises of three sections-A, B and C. Attempt all the sections.
(ii) All questions are compulsory.
(iii) Internal choice is given in each sections.
(iv) All questions in Section A are one-mark questions comprising MCQ, VSA type and assertion-reason type questions. They are to be answered in one word or in one sentence.
(v) All questions in Section B are three-mark, short-answer type questions. These are to be answered in about 50-60 words each.
(vi) All questions in Section C are five-mark, long-answer type questions. These are to be answered in about 80-90 words each.
(vii) This question paper consists of a total of 30 questions.

SECTION -A

DIRECTION : For question numbers 1 and 2, two statements are given- one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

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

1. Assertion (A) : If we push a massive truck parked along the roadside, it will not move.
Reason (R) : Two opposite and equal forces acted on two bodies in contact cancel each other. [1]

Ans : (b) Both A and R are true but R is not correct explanation of A.

2. Assertion (A) : Molecular mass of water (H_2O) is 18 g.
Reason (R) : Atomic mass of a hydrogen atom is 2 g and atomic mass of an oxygen atom is 14 g. [1]

Ans : (c) A is true but R is false.

3. Which of the following micro-organisms is present in the root nodules of leguminous plants ? [1]
(a) Azotobacter (b) Nitrosomonas
(c) Rhizobium (d) Pseudomonas

Ans : (c) Rhizobium

or

The two forms of oxygen found in the atmosphere are :
(a) Ozone and carbon dioxide
(b) Oxygen and carbon dioxide
(c) Ozone and oxygen
(d) Water and oxygen

Ans : (c) Ozone and oxygen

4. What is the S.I. unit of momentum ? [1]
(a) kgms (b) $mskg^{-1}$
(c) $kgms^{-1}$ (d) $kg(ms)^{-1}$

Ans : (c) $kgms^{-1}$

5. Which of the following is not a perfectly in elastic collision ? [1]
(a) Capture of an electron by proton.
(b) Man jumping on to a moving cart.
(c) Collision between glass balls.
(d) A bullet fired into a block of wood such that it is embedded in the wood.

Ans : (c) Collision between glass balls.

6. Who is known as Father of Taxonomy ? [1]
(a) Linnaeus (b) Darwin
(c) Mendel (d) Watson

Ans : (a) Linnaeus

7. If the temperature of a place is increasing, then the rate of evaporation at that place [1]
(a) Decreases (b) Increases
(c) Remains same (d) None of the above

Ans : (b) Increases

8. If you live in an over crowded and poorly ventilated house, it is possible that you may suffer from one of the following diseases. Which one ? [1]
(a) Cancer (b) AIDS
(c) Air borne disease (d) Cholera

Ans : (c) Air borne disease

9. If the force applied on the body displaces it in the opposite direction of applied force, then the work done is : [1]
(a) Positive (b) Negative
(c) Zero (d) Data is inadequate

Ans : (b) Negative

or

Which Newton's law is applicable in the case of swimming ? [1]

(a) Law of gravitation (b) Newton's first law
(c) Newton's second law (d) Newton's third law

Ans : (b) Newton's first law

10. A long tree has several branches. The tissue that helps in the sideways conduction of water in the branches is [1]
(a) Collenchyma (b) Xylem parenchyma
(c) Parenchyma (d) Xylem vessels

Ans : (d) Xylem vessels

or

The tissue present in the lining of kidney tubules and ducts of salivary glands is
(a) Squamous epithelium tissue
(b) Glandular epithelium tissue
(c) Cuboidal epithelium tissue
(d) Columnar epithelium tissue

Ans : (c) Cuboidal epithelium tissue

11. What was the limitation of J. J. Thomson's atomic model ? [1]

Ans :

It didn't explain the arrangement of electrons in an atom.

12. In what direction does the buoyant force on an object fully immersed in a liquid act ? [1]

Ans :

The drection of bouyanet force on an object is upwards.

13. Answer question numbers 13.1–13.4 on the basis of your understanding of the following paragraph and the related studied concepts.

Michael was having dinner with his family on the occasion of Christmas. When it was the time for dessert, Michael became curious. When he saw that the dessert was plum pudding, he became happy because he had learned about a similar term in his chemistry class on that day.

13.1 Correlate the plum pudding with hat Michael studied in his chemistry class. [1]

Ans : The model proposed by J. J. Thomson was called as plum pudding model.

13.2 Why did the name "plum pudding" originate? [1]

Ans : The electrons in a sphere of positive charge were like currants (dry fruits) in a spherical Christmas pudding.

13.3 Give the postulates of the model discussed here.[1]

Ans : Postulates of J. J. Thomson's atomic model :

(i) An atom consists of a positively charged sphere and the electrons are embedded in it.
(ii) The negative and positive charges are equal in magnitude. So, the atom as a whole is electrically neutral.

13.4 Give one drawback of the atomic model discussed here. [1]

Ans : Thomson's atomic model failed to explain how the positive charge holds on the electrons inside the atom, therefore it failed to explain an atom's stability.

14. Questions 14.1 to 14.4 are based on the Table A. Study this table and answer the following questions.

Table A : 6 person and their serum osmolality levels

Person	Serum Osmolality (mmol/kg)
A	260
B	243
C	220
D	280
E	276
F	315
G	342

Table B : Range for normal and dangerous levels of serums osmolali of a person's blood

Situation	Serum osmolality (mmol/kg)
Should visit the doctor	<275
Normal range	275–295
Should visit the doctor	>295

Osmolality can be used to measure the amount of solute dissolved in a solution.If the level of solute of a solution is higher than the concentration of solute inside of the cell, water will flow out of the cell during osmosis. If the level of solute outside the cell is lower than the levels of solute inside of the cell, water will flow into the cell.

14.1 If we place a red blood cell (osmolality is 280 mmol/kg) in the serum of person F, will the plasma flow into the cell or out of the cell ? [1]

Ans : As the osmolality of the cell is lesser than the serum, plasma will flow out of the red blood cell.

14.2 Which person (refer A and B) should visit the doctor ? [1]

Ans : A, B, C, F and G.

14.3 Define osmosis. [1]

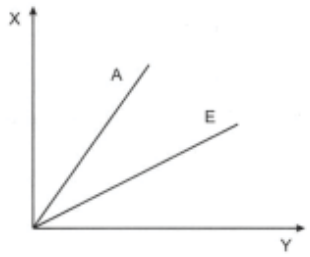
Ans : Osmosis is the movement of water from a region of higher concentration to a region of lower concentration through a selectively permeable membrane.

14.4 What is the difference between diffusion and osmosis ? [1]

Ans : No selectively permeable membrane is involved.

SECTION - B

15. The velocity, time graph of two bodies A and B travelling along the $+x$ direction are given in the figure. [3]



(a) Are the bodies moving with uniform acceleration ?

(b) Which body is moving with greater acceleration ? Give reasons.

Ans :

(a) Yes, the bodies are moving with uniform acceleration because the graph of velocity time graph is linear or a straight line.

(b) The body A is moving with a greater acceleration than body B because the graph of A has a larger slope than the graph of B.

16. Give any two uses of isotopes. [3]

Ans :

Two uses of isotopes are as follows :

(a) An isotope of uranium is used as a fuel in nuclear reactors.

(b) An isotope of cobalt is used in the treatment of cancer.

17. Why are manures and fertilisers used in the fields? [3]

Ans :

Manure helps in enriching soil with nutrients and organic matter and increasing the soil fertility. The bulk of organic matter in manure helps in improving the soil structure.

Fertilisers are used to ensure good vegetative growth (leaves, branches and flowers), giving rise to healthy plants by providing specific nutrients like nitrogen, phosphorous and potassium.

or

How do storage grain losses occur ?

Ans :

There are various biotic and abiotic factors responsible for the storage grain losses such as :

(a) **Biotic factors:** insects, rodents, bacteria, fungi, etc. feed on the grains

(b) **Abiotic factors:** Unfavorable conditions of humidity, temperature, wind, etc.

18. State Newton's third law of motion and also tell how it explains the walking of a man on the ground. [3]

Ans :

According to Newton's third law of motion, if a body A exerts a force F on the body B, then the body B exerts a force (F) on the body A and the forces act along the same line.

When a person walks on the ground, he pushes the ground with his feet, i.e., he applies a force on the ground. By Newton's third law, the ground applies a similar magnitude of force on the man but in the opposite direction. This force from the ground pushes him forward and helps him in walking.

19. What would happen if the plasma membrane ruptures or breaks down? [3]

Ans :

The rupture or breakdown of cell's plasma membrane indicates that cell is damaged and in such condition the lysosomes of the damaged cells may burst and the digestive enzymes present inside those lysosomes would digest their own cell. This will result into death of the cell.

20. A person holds a bundle of hay over his head and walks for 20 minutes and gets tired. Has he done some work for holding the bundle or not? Justify your answer. [3]

Ans :

When a person holds a bundle of hay over his head and walks for 20 minutes and gets tired he applies force in the upward direction and displacement of the bundle of hay is in forward direction which is perpendicular to the direction of the force applied on it.

We have, $W = F\,s\cos\theta$

$\theta = 90^\circ$

Therefore, $W = F \times s \times 0$

$W = 0$

or

Define average power.

Ans :

An agent may not be always able to perform same amount of work in a given period of time. In other words power of that agent may vary with time. Hence we can take average power in such situations. Average power is defined as average amount of work done by a body per unit time (i.e. total energy consumed divided by total time).

21. Which organisms are called primitive and how are they different from the so called advanced organisms? [3]

Ans :

Organisms that possess quite a simple structure and body design also hasn't changed much from their ancient predecessors even after a long period of evolution on Earth are called as primitive organisms. For example; bacteria and prokaryotes.

Advanced organisms have a complex body design, for example, trees and human beings.

22. What is crystallisation? Where is it used? Why is this better than simple evaporation technique? [3]

Ans :

Crystallisation is a process that separates a pure solid in the form of crystals from its solution. It is used to purify solids. For example; salt from sea water is purified using crystallization. It is a better technique than simple evaporation because:

(a) Some solids may decompose or get charred on heating in dryness during evaporation.
(b) On evaporation, some of the impurities still remained dissolved in the solution.

23. Explain how bats use ultrasonic waves to catch prey. [3]

Ans :

Bats search out prey and fly in dark night by emitting and detecting reflections of ultrasonic waves. The high pitched ultrasonic squeaks of the bat are reflected from the obstacles or prey and trapped by the bat's ears. The nature of reflection tells the bat where the obstacle or prey and how does it look like.

or

How is ultrasound used for cleaning ?

Ans :

Ultrasound is generally used to clean parts located in hard to reach places. For example; spiral tubes, odd shaped parts, electronic components, etc. Objects to be cleaned are placed in a cleaning solution and ultrasonic waves are sent into the solution. Due to the high frequency, the particles of dust, grease and dirt gets detached and drops out. The objects thus get thoroughly cleaned.

24. (a) Why is epidermis important for the plants ?
(b) Draw a rough diagram of collenchyma tissue and label it properly. [3]

Ans :

(a) Outer protective covering of the plants is called epidermis.
  (i) It is covered with a waterproof coating or layer called cuticle which reduces loss of water.
  (ii) It also consists of small pores called stomata which helps in the exchange of gases.

(b)

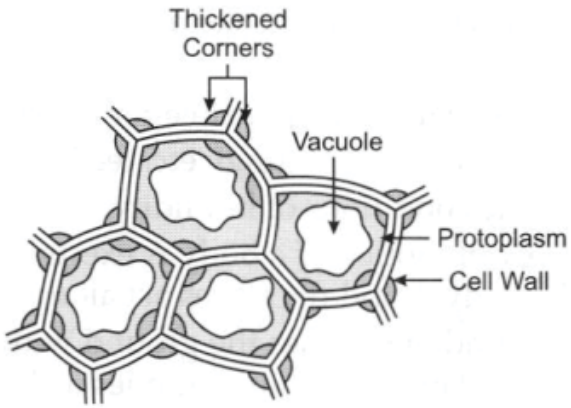


Fig: Collenchyma Tissue

SECTION - C

25. What is the importance of universal law of gravitation ? [5]

Ans :

The universal law of gravitation is important due to the following reasons:

(a) The law explains the force that binds us to the earth.
(b) This law describes the motion of the planet around the sun.
(c) This law justifies the formation of tides on earth due to moon and sun.
(d) This law gives reason for movement of moon around earth.

or

State the factors on which acceleration due to gravity depends.

Ans :

Acceleration due to gravity depends upon :

(a) **Height 'h' above the Earth :** The acceleration due to gravity decreases as we go higher because

$$g = \frac{GM}{R^2}$$

When, $R = R + h$

$$g = \frac{GM}{(R+h)^2}$$

So g will bw lesser.

(b) **Rotation of earth :** Since the earth rotates about its polar axis; the radius of the circle decreases as we move from the equator to the poles, acceleration due to gravity increases as we move from equator to poles.

(c) **Shape of earth :** The radius of the earth is more at the equator and less at poles so acceleration due to gravity increases as we move from equator to poles.

26. Describe the J. J. Thomson's model of atom. Also state the drawback of his model. [5]

Ans :

Thomson proposed the model of an atom to be similar to that of a Christmas pudding. The electrons in a sphere of positive charge were like currants (dry fruits) in a spherical Christmas pudding. We can also think of a watermelon, the positive charge in the atom is spread all over like the red edible part of the watermelon, while the electrons are studded in the positively charged sphere, like the seeds in the watermelon.

Thomson proposed that :

(a) An atom consists of a positively charged sphere and the electrons are embedded in it.
(b) The negative and positive charges are equal in magnitude. So, the atom as a whole is electrically neutral.

Drawbacks of Thomson's model :

(a) Thomson's atomic model failed to explain how the positive charge holds on the electrons inside the atom.
(b) It also failed to explain an atom's stability.
(c) The theory did not mention anything about the nucleus of an atom.
(d) It was unable to explain the scattering experiment of Rutherford.

27. Write the characteristics of kingdom Animalia. [5]

Ans :

(a) Animals are multicellular, eukaryotic organisms.

(b) Animal nutrition is heterotrophic. They lack in photosynthetic pigments.
(c) Animals don't have cell walls.
(d) Animals possess the power of locomotion.
(e) Most animals have a nervous system which is used to coordinate their body actions and response.
(f) In sexual reproduction, animals produce haploid male gametes (sperm) and female gametes.

or

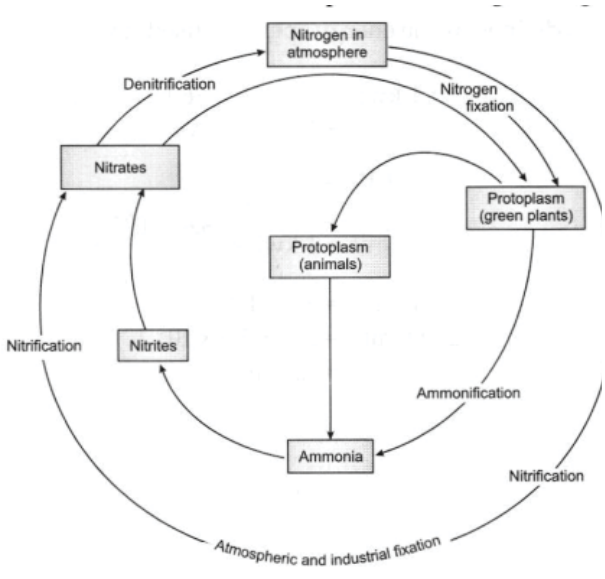
(a) Name the group of plants known as "Amphibians of plant world". Mention their four important characteristics.
(b) Give three points on how birds have adapted themselves to an aerial mode of life.

Ans :

(a) Bryophytes are the plants that live on land and in water so they are called amphibians of plant kingdom. These plants show the following character.
  (i) The plant body is either thallus like (thalloid) or leaf like (foliose).
  (ii) Truleaves and root sarelacking; the plants are anchored to the soil by means of filamentous rhizoids.
  (iii) Plant body is green and autotrophic.
  (iv) The vascular tissues are absent.
(b) Adaptations of birds to aerial mode of life :
  (i) Their body is covered with feathers.
  (ii) Forelimbs are modified into wings.
  (iii) They have hollow bones which helps them during the flight.

28. Describe the nitrogen cycle with appropriate diagrams. [5]

Ans :



Nitrogen is an essential nutrient for the survival of living beings. It is found in proteins like DNA and RNA. Nitrogen cannot be used directly from the atmosphere and have to be converted into nitrates and nitrites by certain Nitrogen fixing bacteria. These bacteria are found in the root nodules of legumes (plants that give us pulses).

Another method through which the nitrogen in the environment can be converted into nitrates or nitrates is the physical process of lightning. The high pressure and temperature during the lightning creates the nitrogen into oxides of nitrogen. These oxides then dissolve in water bodies, thus forming nitrous and nitric acids. Once nitrogen is converted into the useful form of nitrates and nitrites, they can be used further. Plants use them to produce amino acids, which are then used to make proteins. Other complex compounds that require nitrogen are also made by the plants through some complex biochemical process. These proteins and complex compounds are subsequently consumed by the animals. Once these plants and animals die and get buried in the soil, bacteria convert these proteins back to nitrates and nitrites. A certain kind of bacteria converts the proteins to elemental nitrogen, thus, completing a complete nitrogen cycle.

29. Differentiate between mixture and compounds by giving appropriate examples. [5]

Ans :

S. No.	Mixtures	Compounds
1.	Elements or compounds are mixed together to form a mixture	Elements chemically react to form new compounds.
2.	It has a variable composition	It has a fixed composition.
3.	It shows the properties of the constituent substances	The new substance has totally a new and different property
4.	The constituent particles can be separated by physical methods.	The constituents can be separated by chemical or electrochemical reactions.
5.	Example : Air, blood	Example : H_2S, $Ca(OH)_2$

or

What are colloids? What are its various properties ?

Ans :

Colloids are the heterogeneous mixture of substances in which the particle size is too small and cannot be seen by naked eyes.
(a) It is heterogeneous mixture, but appears homogeneous.
(b) The size of the particles is too small to be individually seen by naked eyes.
(c) They scatter a beam of light passing through it and makes its path visible.
(d) The particles of a colloid do not settle down when left undisturbed.

30. What do you understand by the units of electrical energy? How many joules of energy is consumed if the electrical meter shows 200 units of energy ? [5]

Ans :

Unit of electrical energy is defined as the energy spent (or used) by electrical appliance at the rate of 1 kw

for t hour.

$$1 \text{ kwh} = 1000 \text{ W} \times 3600 \text{ seconds}$$
$$= 3.6 \times 10^6 \text{ Ws}$$
$$1 \text{ W} = \frac{1 \text{ Joule}}{1 \text{ Second}}$$
$$1 \text{ Unit} = 1 \text{ kwh} = \frac{3.6 \times 10^6 \text{J} \times \text{s}}{\text{S}}$$
$$1 \text{ Unit} = 3.6 \times 10^6 \text{ J}$$

for 200 units,

$$200 \text{ Units} = 200 \times 3.6 \times 10^6 \text{ J}$$
$$= 72 \times 10^7 \text{ J}$$