

CLASS X (2019-20)
SCIENCE (CODE 086)
SAMPLE PAPER-12

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

1. State two reasons for the need of conservation of forest and wildlife. [1]

Ans :

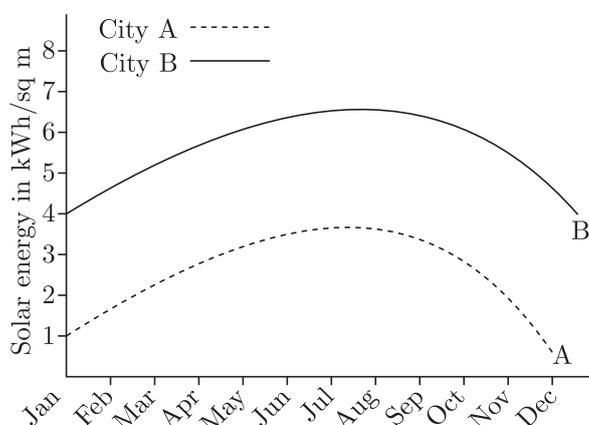
Forest and wildlife are:

- (a) essential for the restoration of ecological balance; and
 - (b) necessary for the economical development.
2. List two characteristic properties of the images formed by plane mirrors. [1]

Ans :

- (a) Virtual
 - (b) Erect
 - (c) Laterally inverted
 - (d) Same size as of the object
3. Answer question numbers 3.1-3.4 on the basis of your understanding of the following paragraph and the related studied concepts.

Sun is the most important source of heat and energy for life on the earth. Solar radiations are capable of producing heat or generating electricity. India is gifted with vast solar energy potential. About 5,000 trillion kWh energy is incident over our land per year with most parts receiving 4-7 kWh per sq m per day. Solar energy is expected to become increasingly attractive as a renewable energy source because of its inexhaustible supply and its non-polluting nature. Solar power in India is a fast developing industry. Telengana currently has 1300 MW installed capacity of solar power and presently is the highest solar power generator in our country.



- 3.1 Which is the ultimate source of almost all our sources of energy? [1]

Ans : Sun

- 3.2 Why is Sun called a renewable source of energy? [1]

Ans : Solar energy is being produced continuously in nature and will never get exhausted. Hence it is called renewable source of energy.

or

Write one disadvantage of most renewable energy sources. [1]

Ans : Disadvantage: Weather dependency, high installation cost

- 3.3 Which process converts solar energy into chemical energy in nature? [1]

Ans : Photosynthesis

- 3.4 Based on the data represented in graph given alongside, which of the two cities - A or B would be an ideal location for establishing a solar panel farm and why? [1]

Ans : City B is receiving approximately 4 kWh/sq m of solar energy per day. Hence it is the ideal place to establish a solar panel farm.

4. Question numbers 4.1-4.4 are based on two tables given below. Study these tables related to haemoglobin levels and answer the questions that follow.

Table A: Haemoglobin level chart

given below.

- (a) Both A and R are true and R is the 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) A is false but R is true.

13. Assertion : It is advisable to add water to acid and not acid to water and keeping the solution continuously stirred.

Reason : The process of dissolving an acid into water is a highly exothermic process. [1]

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

14. Assertion : Positive charge inside the cell always goes from positive terminal to the negative terminal.

Reason : Positive charge inside the cell may go from negative terminal to the positive terminal.

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

or

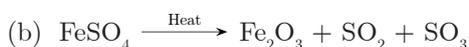
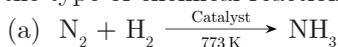
Assertion : Resistivity of material may change with temperature.

Reason : Resistivity is a material property & independent on temperature.

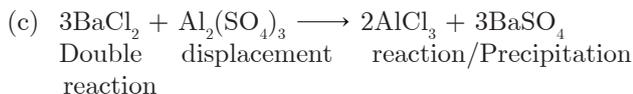
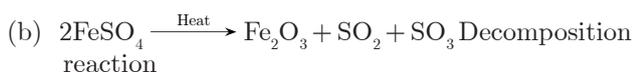
Ans : (c) A is true but R is false.

Section B

15. Balance each of the following equations and identify the type of chemical reaction represented by it.



Ans :



16. What is water of crystallisation? Name and give the formula of two salts which contain water of crystallisation. [3]

Ans :

- Water of crystallisation:** It is the fixed number of water molecules bonded to each formula unit of a salt in its crystalline form.
- Two salts —
 - (a) Sodium sulphate decahydrate ($\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$)
 - (b) Magnesium sulphate heptahydrate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$)

17. The elements of the second period of Modern Periodic Table along with their atomic number are given below. B(5), Be(4), O(8), N(7), Li(3), C(6), F(9)

- (a) Arrange these elements in the same order as they are in the periodic table.
 (b) Which element has the (i) largest and (ii) smallest atom?

(c) Why does the atomic radius change as we move from left to right across a period? [3]

Ans :

- (a) Li, Be, B, C, N, O, F
 (b) (i) Largest—Li (lithium);
 (ii) Smallest—F (fluorine)
 (c) This is due to the increase in nuclear charge which tends to pull the electrons closer to the nucleus and thus reducing the size of the atom.

or

Three elements A, B and C have atomic numbers 7, 8 and 9 respectively.

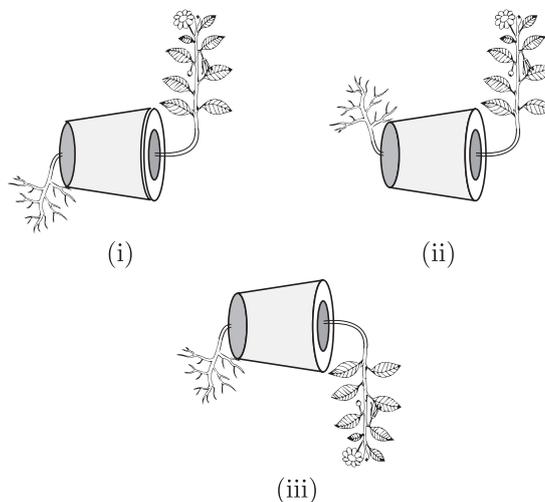
- (a) What would be their positions in the Modern Periodic Table (state group number and period number of each)?
 (b) Arrange A, B and C in the decreasing order of their atomic radius.
 (c) Which of the three elements is most reactive and why? [3]

Ans :

- (a) A(7) – (2, 5) 2nd period; fifteenth group
 B(8) – (2, 6) 2nd period; sixteenth group
 C(9) – (2, 7) 2nd period; seventeenth group
 (b) $A > B > C$
 (c) Because of its smallest size the element C can easily gain electrons, hence it is the most reactive amongst A, B and C.

18. (a) How does phototropism occur in plants?

(b) Among figures (i), (ii) and (iii), which appears more accurate and why? [3]



Ans :

- (a) Phototropism is a tropic movement shown by plants in response to light. When the plants are exposed to light, auxin is produced at the shoot tip. The auxin diffuses towards the darker or shady side of the shoot and makes the cells on that side to become longer. This enlargement of cells causes the shoot tip to bend towards the light.
 (b) Fig (i) is more accurate as plant shows correct geotropism. Roots are positively geotropic so grow downwards and shoots are negatively geotropic, so grow upwards.

19. What is the need for a system of control and coordination in an organism? [3]

Ans :

The body of higher animals are not only complex but consists of several organ systems. Therefore, for the proper synchronisation of the functions of various body organs, a system of control and coordination is utmost important. In the absence of a coordinating system the organism will not be able to stay healthy. Lack of control and coordination will lead to several diseases and this will ultimately cause death of the multicellular organisms.

20. List two reasons to justify the selection of garden pea plants by Mendel for his experiments. Distinguish between dominant genes and recessive genes. [3]

Ans :

1. Two reasons:
 - (a) Pea plant is small in size, easy to grow and has a short life cycle.
 - (b) Large number of true breeding varieties of pea plants are available.
 - (c) Both self and cross pollination are possible with pea plants.
2. Genes which are able to express themselves in the presence of their alleles are called dominant genes whereas the genes which are not able to express themselves in the presence of their alleles are called recessive genes.

or

Define genetics. Why is decrease in the number of surviving tigers a cause of concern from the point of view of genetics? Explain briefly. [3]

Ans :

1. Genetics: It is the branch of science that deals with the study of heredity and variation.
 2. Decrease in the number of surviving tigers will lead to little recombinations and consequently lesser variations. Variation is very vital for the better survival chances of a species. If any natural calamity occurs and kills this small number of surviving tigers, they can become extinct.
21. What is meant by power of accommodation of the eye? A person is unable to see distinctly the objects placed beyond 6 m. Name the defect of vision he is suffering from. List two possible causes of this defect and write the nature of lens generally prescribed by the doctors for its correction. [3]

Ans :

1. Power of accommodation of the eye is the ability of an eye to adjust its focal length in order to focus sharply the rays of light coming from distant as well as nearby objects on the retina.
2. The person is suffering from myopia or short sightedness.
3. Myopia arises due to (a) excessive curvature of eye lens, and/or (b) elongation of the eye ball.
4. Myopia is corrected by using a diverging/concave lens of appropriate focal length/power.

or

Why do stars twinkle but not the planets? [3]

Ans :

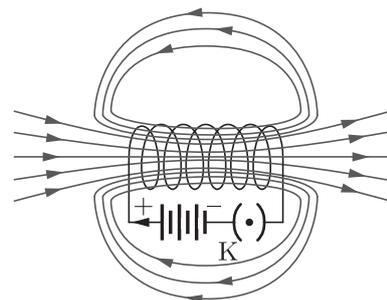
The twinkling of a star is due to atmospheric refraction of starlight. The optical density (or the refractive index) of the atmosphere in a given region keeps on changing because of the changes in temperature and pressure. Notably, the apparent position of the star also fluctuates. These are the reasons why the star appears brighter sometimes and fainter at some other time which gives the twinkling effect.

A planet does not twinkle because it is much closer to the Earth and may be considered a collection of a large number of point-sized sources of light. The total variation in the amount of light entering our eyes from all the individual point-sized sources will average out to be zero thereby nullifying the twinkling effect.

22. (a) What is a solenoid?
 (b) Sketch the pattern of magnetic field lines in and around a current-carrying solenoid.
 (c) How can you determine the north pole of a current-carrying solenoid with the help of a bar magnet? [3]

Ans :

- (a) A solenoid can be defined as a long coil of many circular turns of insulated metal wire wrapped closely in the shape of a cylinder.
- (b) Pattern of magnetic field lines



- (c) North pole of a current carrying solenoid can be determined with the help of a bar magnet. The end of the solenoid which attracts south pole of the given bar magnet but repels its north pole is the magnetic north pole of the solenoid.

23. An electron beam enters a uniform magnetic field at right angles to it. State the direction in which this electron beam will deflect. State the principle we use to determine the direction of force experienced by the electron beam. What would happen if instead of electron beam, alpha particles enter the magnetic field with same velocity? [3]

Ans :

1. The electron beam will deflect in a direction perpendicular to the plane of paper, directed upwards, i.e., north using the Fleming's left hand rule.
2. Principle: Fleming's left hand rule
3. Statement of the rule: Stretch the forefinger, the middle finger and the thumb of your left hand mutually perpendicular to each other. If the forefinger shows the direction of the magnetic field and the middle finger in the direction of the current, then the thumb will point towards

the direction of force experienced by the current carrying conductor.

4. If, instead of an electron beam, alpha particles enter with the same velocity and in the same direction, they will deflect in the direction opposite to that of the electron beam, i.e. in a direction perpendicular to the plane of paper, directed downwards.

24. What are the limitations in obtaining energy from (a) wind (b) wave and tidal energy? [3]

Ans :

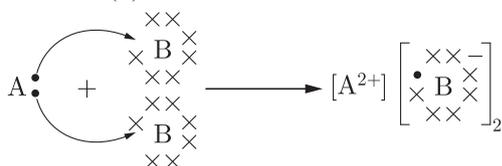
- (a) **Wind energy:** Limitations of harnessing wind energy are as follows:
- Wind energy farms can be established only at those places where wind blows for the greater part of a year.
 - The minimum required speed of wind has to be higher than 15 km/h.
 - Back-up facility is required for the time when wind is not available.
 - Large areas of land are required for setting up the plant.
 - These plants need a high level of maintenance.
- (b) **Wave energy and Tidal energy:** Limitations of harnessing these energies are as follows:
- The setting up of plants to harness wave energy and tidal energy is very costly.
 - The locations where these forms of energy can be harnessed are very limited.
 - These forms of energy can only be harnessed if the tides and waves are very strong.

Section C

25. (a) List two differences between metal and non-metal on the basis of their chemical properties.
- (b) In the formation of a compound AB₂, atom A donates one electron each to two atoms of B. If the atomic numbers of A and B are 12 and 9 respectively, show the electron-dot structures of A and B and the formation of AB₂. Name the bond formed in the compound and list three properties of the compound formed by such bonding. [5]

Ans :

- (a) Two differences between metal and non-metal are:
- Metals form basic oxides whereas non-metals form acidic oxides.
 - Metals displace hydrogen from dilute acids whereas non-metals do not displace hydrogen from dilute acids.
 - Metals have tendency to donate electrons whereas non-metals have tendency to receive electrons.
- (b) • Electronic configuration of A(12) = 2, 8, 2; and B(9) = 2, 7



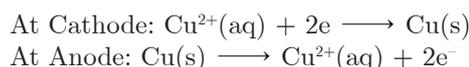
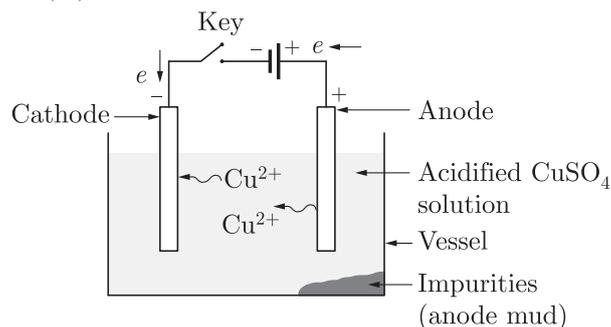
- The nature of bond formed in AB₂ is ionic.
- Properties of ionic compounds:
 - Have high melting and boiling points
 - Generally soluble in water and insoluble in organic solvents
 - Conduct electricity in molten state

or

- (a) Write the steps involved in the extraction of pure metals in the middle of activity series from their carbonate ores.
- (b) How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper. [5]

Ans :

- (a) Sequence of steps involved in the extraction of pure metals in the middle of the activity series are:
- Calcination/Roasting
 - Reduction
 - Purification
- (b) (i) Roasting of sulphide ore of copper
- $$2\text{Cu}_2\text{S}(\text{s}) + 3\text{O}_2(\text{g}) \xrightarrow{\text{Heat}} 2\text{Cu}_2\text{O}(\text{s}) + 2\text{SO}_2(\text{g})$$
- (ii) $2\text{Cu}_2\text{O}(\text{s}) + \text{Cu}_2\text{S}(\text{s}) \xrightarrow{\text{Heat}} 6\text{Cu}(\text{s}) + \text{SO}_2(\text{g})$
- (iii) Electrolytic Refining



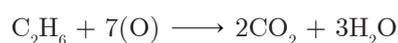
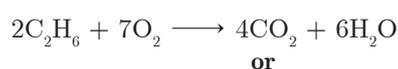
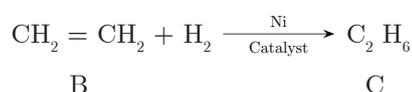
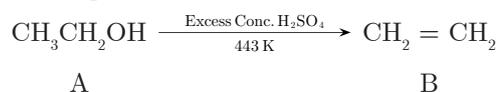
26. An organic compound A on heating with conc. H₂SO₄ forms another compound B. The compound B on addition of hydrogen in the presence of nickel catalyst forms a saturated compound C. One molecule of C on combustion in air forms two molecules of CO₂ and three molecules of H₂O. Identify A, B and C and write chemical equations for the reactions involved. [5]

Ans :

On the basis of information given in the question the compounds are identified as:

A: Ethanol (C₂H₅OH); B: Ethene (CH₂ = CH₂); C: Ethane (C₂H₆)

Chemical equations for the reactions are

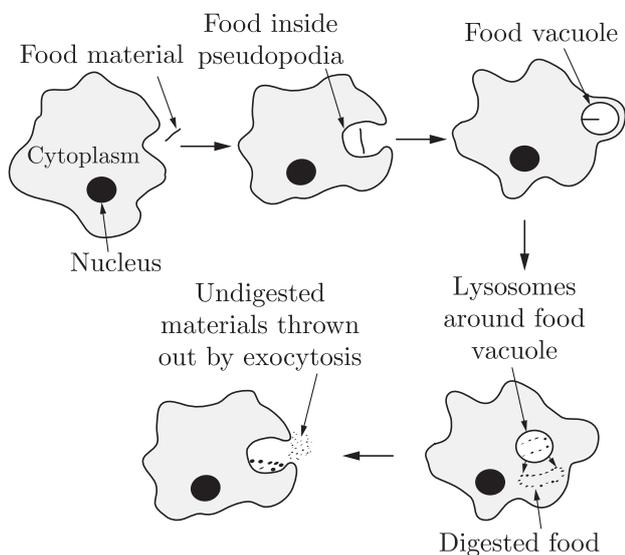


27. (a) What is nutrition? List its two basic modes.
 (b) With the help of labelled diagram explain the process of nutrition in a unicellular eukaryotic organism. [5]

Ans :

- (a) **Nutrition:** It is a process by which living beings procure food for obtaining energy and body building materials.
 (b) Two basic modes of nutrition—autotrophic and heterotrophic

Both amoeba and paramoecium are unicellular organisms. Amoeba feeds on microscopic plants and animals that float on water. As shown in the figure it engulfs the food by surrounding it with the help of pseudopodia, forming a food vacuole. Inside the food vacuole, complex substances are broken down into simpler units which then diffuse into the cytoplasm. The remaining undigested material is moved to the surface of the cell and thrown out.



or

- (a) Give reason for the following:
 (i) Rings of cartilage are present in trachea.
 (ii) Lungs always contain a residual volume of air.
 (b) Name the property that causes tendril to circle around the object. Explain how it happens and how is plant benefited by it. [5]

Ans :

- (a) (i) These rings of cartilage prevent trachea from collapsing.
 (ii) This is so that there is sufficient time for absorption of oxygen and the release of carbon dioxide.
 (b) The property of the plants that causes tendrils to circle around the support is called thigmotropism. When a tendril comes into contact with its support, the contact acts as a stimulus and the side of the tendril, which is opposite to the side of contact, grows at a faster rate than the contact side. The cells on the contact side compresses and enhances the curving response. Therefore, the non-contact side begins to elongate faster than the rest of the tendril, while the contact

side actually compresses. This causes the tendril to curve towards the site of contact and in this manner tendril coil around a support.

28. (a) Define the term reproduction.
 (b) How are more copies of DNA created by the cell?
 (c) During sexual reproduction, if copies of DNA from two individuals combine and then this will double the amount of DNA in the daughter organism. How is this problem solved by the organisms? [5]

Ans :

- (a) Reproduction is the process in which the parent organism of a particular species is able to produce more offsprings of its own type. An organism is able to give birth to organisms similar to itself by creating a new copy of DNA.
 (b) In the reproducing cell, more copies of DNA are made by the replication of DNA molecule. The two copies of DNA formed in the nucleus of a cell separate and each copy moves into the new cellular apparatus formed by the division of the cell. In this manner, the daughter cells receive the same blue print for the body design as that of the parent.
 (c) The problem can be solved by the process of meiosis or reduction division in which the daughter cell (gametes) receives only half the number of chromosomes compared to the germ cells. The two gametes fuse to restore original number of chromosomes.

29. (a) List in tabular form two differences between real and virtual images formed by lenses.
 (b) An object placed 45 cm from a lens forms an image on a screen 90 cm on the other side of the lens. Use the lens formula to determine the nature and focal length of the lens. What is the size of the image, if the object is 5 cm in height? [5]

Ans :

- (a) Difference between a real image and virtual image formed by lenses:

	Real image	Virtual image
(i)	Refracted rays actually meet at a point in case of a real image.	Refracted rays appear to diverge from a point in case of a virtual image.
(ii)	Real images can be obtained on a screen.	Virtual images cannot be obtained on a screen.
(iii)	Real image is an inverted image.	Virtual image is an erect image.

- (b) Here $u = -45$ cm; $v = +90$ cm; $h_o = 5$ cm, $f = ?$; $h_i = ?$

Lens formula,
$$\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$$

$$= \frac{1}{90 \text{ cm}} - \frac{1}{(-45 \text{ cm})}$$

$$= \frac{1}{90} + \frac{1}{45}$$

$$f = + 30 \text{ cm}$$

Here +ve sign of focal length signifies that the lens is convex/converging.

$$\frac{h_i}{h_o} = \frac{v}{u}$$

$$h_i = \frac{v}{u} \times h_o$$

$$= \frac{90}{-45} \times 5 = - 10 \text{ cm}$$

Here -ve sign signifies that the image is inverted.

or

- (a) Name the types of mirror(s) that should be used,
 - (i) as a rear view mirror; (ii) by the dentists. Also mention the reason(s) of their use.
- (b) An object of size 4 cm is placed at a distance of 25 cm from a concave mirror of focal length 15 cm. Use mirror formula to determine the position and nature of the image. Also find the size of the image formed. [5]

Ans :

- (a) (i) Convex mirror, as it always gives erect and diminished image with a wider field of view of the traffic behind the vehicle.
- (ii) Concave mirror, as it gives erect and magnified image of the tooth placed close to the mirror which helps the dentist in examining the teeth.
- (b) Here $u = -25 \text{ cm}$; $f = -15 \text{ cm}$; $h_o = 4 \text{ cm}$; $v = ?$; $h_i = ?$

Mirror formula, $\frac{1}{f} = \frac{1}{v} + \frac{1}{u}$

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

$$= \frac{1}{(-15 \text{ cm})} - \frac{1}{(-25 \text{ cm})}$$

$$= \frac{1}{(-15)} + \frac{1}{25}$$

$$v = - 37.5 \text{ cm}$$

Here negative-ve sign signifies that the image is in front of the mirror and is real.

$$\frac{h_i}{h_o} = - \frac{v}{u}$$

$$\Rightarrow h_i = - \frac{v}{u} \times h_o$$

$$= - \frac{-37.5}{-25} \times 4 = - 6 \text{ cm}$$

Here -ve sign of h_i signifies that the image is inverted.

30. (a) Define electric power. A device of resistance R is connected across a source of voltage V and draws a current I. Derive an expression for power in terms of current and resistance.
- (b) An electric bulb is connected to a 200 V generator. The current is 0.5 A. What is the power of the bulb? [5]

Ans :

- (a) The rate at which electric energy is consumed is called electric power.

$$\text{Power} = \frac{\text{Work done}}{\text{Time}}$$

$$= \frac{V \times Q}{t}$$

or,

$$P = V \times I \quad \left(\because \frac{Q}{t} = I \right)$$

∴

$$P = I^2 R \quad \left(\because V = IR \right)$$

(b) Power of the bulb = VI

$$= 200 \text{ V} \times 0.5 \text{ A} = 100 \text{ W}$$

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