

**SAMPLE PAPER TEST 03 FOR TERM-2 EXAM (2021-22)**  
**(ANSWERS)**

**SUBJECT: SCIENCE (086)**

**MAX. MARKS : 40**

**CLASS : X**

**DURATION: 2 HRS**

**General Instructions:**

1. All questions are compulsory.
2. The question paper has three sections and 15 questions. All questions are compulsory.
3. **Section–A** has 7 questions of 2 marks each; **Section–B** has 6 questions of 3 marks each; and **Section–C** has 2 case based questions of 4 marks each.
4. Internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

**SECTION – A**

**Questions 1 to 7 carry 2 marks each.**

1. The atomic radii of first group elements are given below:

Group I element	Atomic radii (pm)
Na	86
K	231
Rb	244
Cs	282

(a) State the reason behind the observed trend in the above elements.

(b) How does valency of an element vary across a period?

**Ans:** (a) In a group, as we move from top to bottom, the number of shells increases. Hence, the atomic radius increases.

(b) The valency of an element first increases and then decreases across a period.

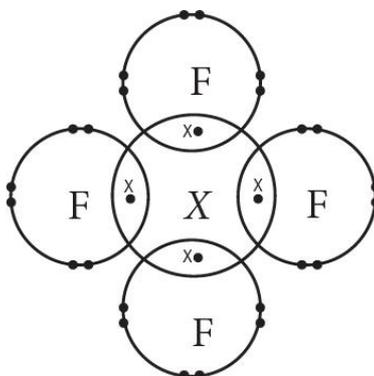
2. Name two organisms each which reproduce by fragmentation, regeneration and budding.

**Ans:** Fragmentation — Spirogyra and starfish

Regeneration — Hydra and Planaria

Budding — Hydra and yeast

3. The diagram below shows the electron arrangement in a compound formed between element X and fluorine.



(a) (i) What is the formula of this compound?

(ii) Is this an ionic or covalent compound? Give your reason.

(b) In which group of the periodic table can you find element X ?

**Ans:** (a) (i)  $\text{XF}_4$

(ii) It is a covalent compound.

The diagram shows that an atom of X shares four pairs of electrons with four atoms of fluorine to form the molecule  $\text{XF}_4$ . Sharing of electrons is a characteristic of covalent compound.

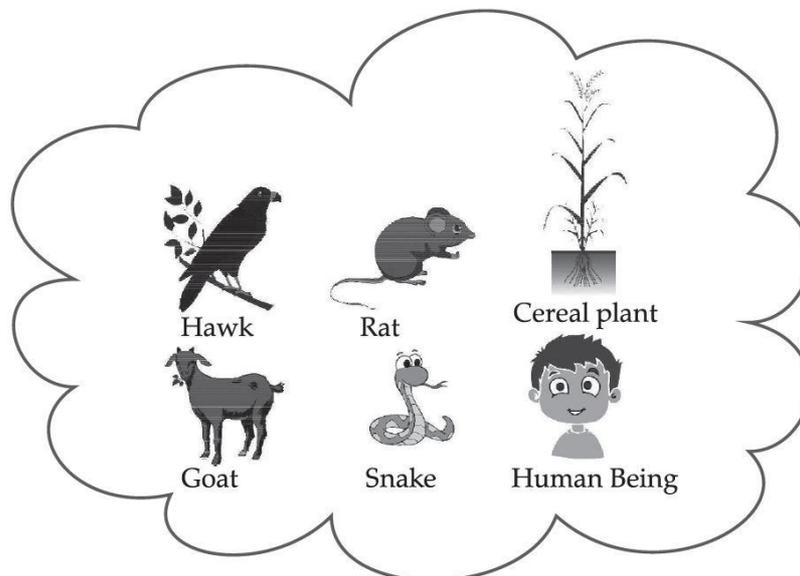
(b) Element X has four valence electrons hence, it belongs to group 14 of the periodic table.

4. (a) Write one main difference between asexual and sexual mode of reproduction.  
(b) Which species is likely to have comparatively better chances of survival-the one reproducing asexually or the one reproducing sexually? Justify your answer.  
**Ans:** (a) In sexual reproduction, two parents (of opposite sex) are involved whereas in asexual reproduction, only one individual parent is involved.  
(b) In sexual reproduction, male and female gamete formation takes place whereas in asexual reproduction, no gamete formation occurs. That is, sexual reproduction promotes diversity of characters in an offspring due to combination of genes which leads to variation whereas in asexual reproduction evolutionary change is not possible. Thus, sexually reproducing organisms have better chances of survival.
5. It is established that an electric current through a metallic conductor produces a magnetic field around it. Is there a similar magnetic field produced around a thin beam of moving:  
(a) alpha particle,  
(b) neutrons?  
Justify your answer.  
**Ans:** (a) Yes, alpha particles being positively charged constitute a current in the direction of motion and magnetic field is produced.  
(b) No. The neutrons being electrically neutral constitute no current and hence no magnetic field.

**OR**

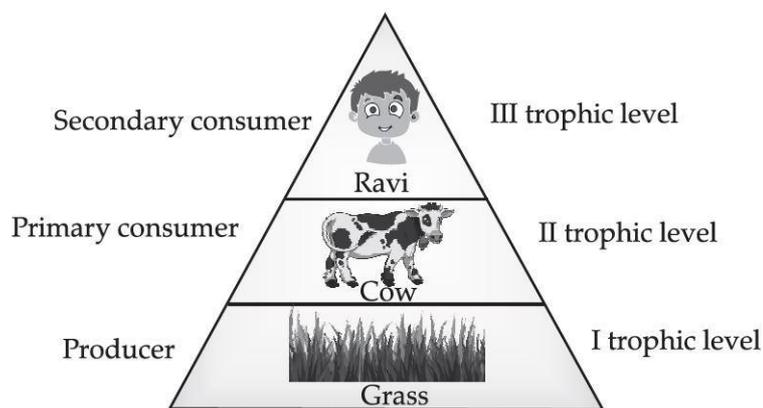
What are magnetic field lines? Justify the following statements: Magnetic field are closed curves.  
**Ans:** Magnetic field lines are curved imaginary lines used to show the magnetic field in a given region. It is taken by convention that the field lines emerges from North pole and merge at the South pole. Inside the magnet, the direction of field lines is from its South pole to its North pole. Thus, the magnetic field lines are closed curves.

6. Ravi is eating curd/yogurt. For this food intake, which trophic level of the food chain he has occupied?



Who will be at the first trophic level in the food chain? Justify your answer.

**Ans:** Ravi belongs to third trophic level. Grass/plants will be at the first trophic level. Curd is made from milk which is obtained from cow. Cow is a primary consumer that feeds on producer such as grass/plants. So, the grass/plants will be at the first trophic level as they are the producers. Cow feeds on them and occupies second trophic level. Consuming the product obtained from an organism at second trophic level makes Ravi occupy the third trophic level.



**OR**

Ecosystem is a community where all the living organisms interact with the nonliving constituents of the environment. Is an aquarium a complete ecosystem? Explain.

**Ans:** Yes, a balanced and large aquarium can be a complete ecosystem consisting of both biotic and abiotic components. Water, oxygen supply source, light source are abiotic factors, whereas aquatic plants, small animals and decomposers serve as biotic components.

7. Reema is doing a school project on evolution. She is confused in the scientific terms such as inheritance and heredity. Help her to find the correct answers for the scientific terms for the phenomena given below.

- (a) The mechanism by which variations are created and inherited  
 (b) The development of new type of organism formed from the existing ones.

**Ans:** (a) Genetics is the study of mechanism by which variations are created and inherited.

(b) Evolution is used for studying the development of new type of organisms from the existing ones.

**OR**

(a) Mendel selected garden pea plant as an experimental plant due to its advantage over other plants. Write any two selection criteria for selecting garden pea plant.

(b) What do you mean by a true breeding plant?

**Ans:** (a) The two selection criterias are as follows :

(i) Garden pea plant has short life cycle which makes it possible to study several generation in a short time period.

(ii) Garden pea plant shows several well defined contrasting characters such as plant height, pod and flower colour, etc.

(b) A true breeding plant is the one that when selffertilised, produces offspring with the same traits. They will be either homozygous dominant or homozygous recessive.

## **SECTION – B**

**Questions 8 to 13 carry 3 marks each.**

8. Two elements A and B belong to group 1 and 2 respectively in the same period. Compare them with respect to :

(a) the number of valence electrons (b) valency (c) metallic character (d) size of the atoms.

**Ans:** (a) Number of valence electrons in A = 1 and B = 2.

(b) Valency of A is one while B is two.

(c) Element A (group 1) is more metallic as compared to B (group 2).

(d) Element B (group 2) is smaller than element A (group 1) in size.

9. Give reason why carbon can neither form  $C^{4+}$  cations nor  $C^{4-}$  anions, but forms covalent compounds. Also, state the reason to explain why covalent compounds are bad conductors of electricity and have low melting and boiling points?

**Ans:** Carbon cannot form  $C^{4+}$  cation because removal of four electrons from a carbon atom would require a large amount of energy. Carbon cannot form  $C^{4-}$  anion because it would be difficult for the nucleus with 6 protons to hold on to 10 electrons. Hence, carbon atoms share electrons, forming covalent compounds.

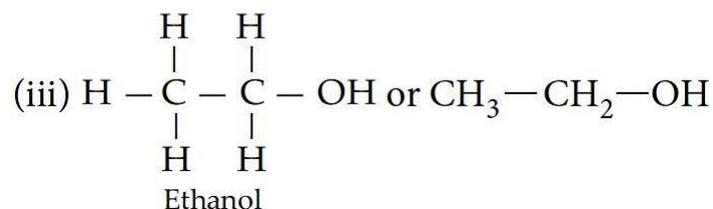
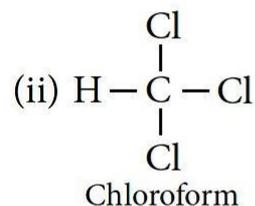
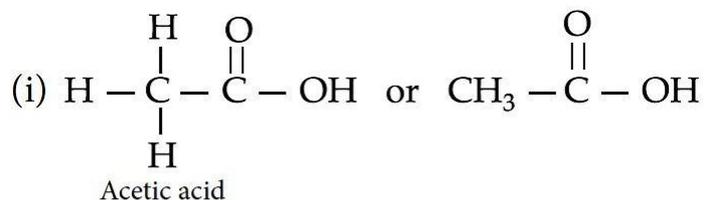
Covalent compounds do not form ions/charged particles and therefore do not conduct electricity. Inter-molecular forces of attraction are weak, hence they have low melting and boiling points.

**OR**

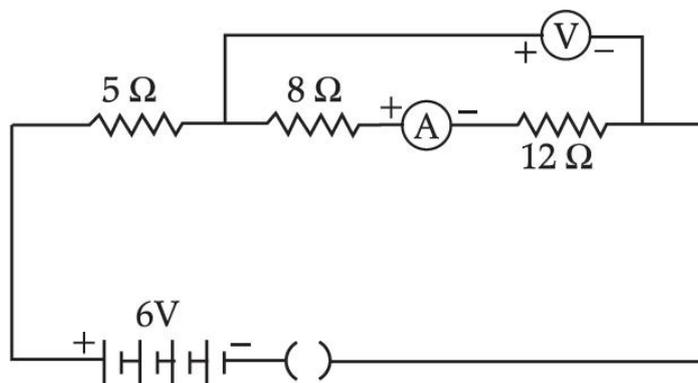
Draw the structures of the following compounds :

(i) Acetic acid (ii) Chloroform (iii) Ethanol

**Ans:**



**10.** Help Anita to find the readings of the ammeter and the voltmeter when key is closed? Justify your answer.



**Ans:** When resistances are connected in series,  $R_{eq} = R_1 + R_2 + R_3$

$$R = 5 \Omega + 8 \Omega + 12 \Omega = 25 \Omega$$

Given  $V = 6 \text{ V}$

By Ohm's law,  $V = IR$

$$I = \frac{V}{R} = \frac{6}{25} = 0.24 \text{ A}$$

$R$

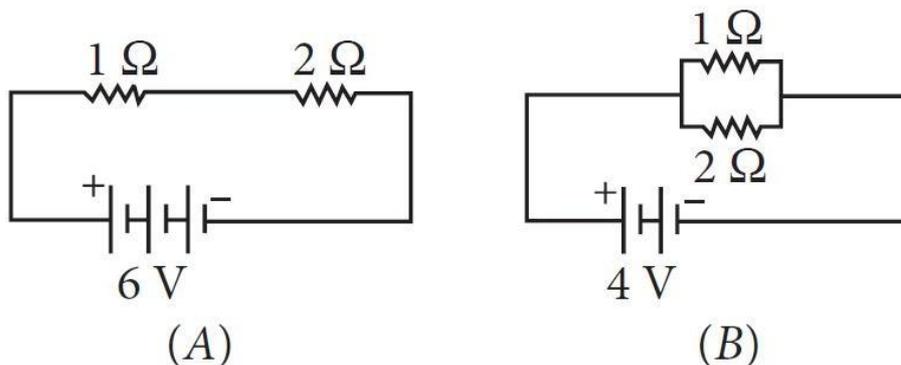
Ammeter reading = 0.24 A

The voltmeter is connected across the series combination of  $8 \Omega$  and  $12 \Omega$ .

So, the voltmeter reads,  $V' = I \times R' = 0.24 \times (8+12) = 4.8 \text{ V}$

**OR**

Compare the power used in 2 W resistor in each of the following circuits.



**Ans:** In circuit A, Total resistance,  $R = 1 + 2 = 3 \Omega$

$$\text{Voltage across } 2 \Omega = \frac{V_{\text{Total}}}{R_{\text{Total}}} \times 2 = \frac{6}{3} \times 2 = 4V$$

$$\therefore \text{Power used in } 2 \Omega \text{ resistor, } P = \frac{V^2}{R} = \frac{4^2}{2} = 8W$$

In circuit B, voltage across both the resistance is same i.e. 4 V and both are connected in parallel combination.

$$\therefore \text{Power used in } 2 \Omega \text{ resistor} = \frac{V^2}{R} = \frac{4^2}{2} = 8W$$

$\therefore$  Power used in 2  $\Omega$  resistor in each case is same i.e., 8 W

11. How the present environment is negatively affected due to modern lifestyle ?

**Ans:** With the advancement in technology over time, there has been improvement in lifestyle of people. Such changes have also changed their attitudes. When people have more resources at their end they tend to overuse and misuse it thereby generating huge amounts of waste materials. For example, the affluent lifestyle has forced people to start using more of disposable articles, e.g., plastic cups, bags, etc., which keep on accumulating in the environment and lie undecomposed, thereby negatively affecting the environment.

Similarly, excessive use of refrigerators and air conditioners, plastic foams, etc., also release high quantities of CFCs which are responsible for ozone depletion.

12. How many pairs of chromosomes are there in human beings? How is the sex of human offspring determined? Explain.

**Ans:** There is one pair of sex chromosomes present in human being. The offspring receives one chromosome from each of the parents. Mother have a perfect pair of sex chromosomes (XX). But, father have a mismatched pair (XY). All children will inherit an X chromosome from their mother regardless of whether they are boys or girls. Thus, the sex of the children will be determined by chromosome they inherit from their father. A child who inherits an X chromosome from her father will be a girl, and one who inherits a Y chromosome from him will be a boy.

13. Write Joule's law of heating.

**Ans:** The Joule's law of heating implies that heat produced in a resistor is

- (i) directly proportional to the square of current for a given resistance,
  - (ii) directly proportional to resistance for a given current, and
  - (iii) directly proportional to the time for which the current flows through the resistor.
- i.e.,  $H = I^2Rt$

## SECTION – C

*This section has 02 case-based questions (14 and 15). Each case is followed by 03 sub-questions (a, b and c). Parts a and b are compulsory. However, an internal choice has been provided in part c.*

**14.** Asexual reproduction is a way by which organisms can give rise to new organisms. It is a mode of reproduction that involves a single parent and take place in unicellular as well as in multicellular organisms.

(a) Name the mode of reproduction of the following organisms and state the important feature of each mode :

(i) Planaria

(ii) Hydra

(iii) Rhizopus

(b) We can develop new plants from the leaves of Bryophyllum. Comment.

(c) List two advantages of vegetative propagation over other modes of reproduction.

**Ans:** (a) (i) Planaria – Regeneration

– Regeneration of organism from its cut body parts occurs by the process of growth and development.

– Regeneration is an asexual mode of reproduction common in lower plants and animals.

(ii) Hydra – Budding

– In budding, a small part of the body of the parent organism grows out as a bud which on detaching forms a new organism.

– Budding occurs in yeast, some protozoans and certain lower animals.

(iii) Rhizopus – Spores

– Spores are usually produced in sporangia.

– Spore formation is a common method of an asexual reproduction in bacteria and most of the fungi.

(b) The leaves of a Bryophyllum have special type of buds in their margins. These buds may get detached from the leaves, fall to ground and then grow to produce new Bryophyllum plants. The buds can also drop to the ground together with the leaf and then grow to produce new plants.

(c) Advantages of vegetative propagation are :

(i) It is a quick method of propagation.

(ii) The new plants produced by artificial vegetative propagation are exactly like the parent plants.

(iii) Many plants can be grown from one plant by vegetative propagation.

**OR**

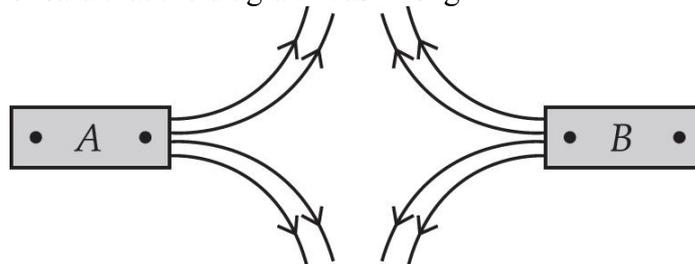
Differentiate binary fission from multiple fission and give one example of each.

**Ans:** In binary fission the parent organism splits into two new organisms and the nucleus of the parent body divides only once to produce two nuclei, whereas in multiple fission the parent organism splits into many new organisms and the nucleus of the parent body divides repeatedly to produce many nuclei.

Example of binary fission – Leishmania

Example of multiple fission – Plasmodium.

**15.** Richa is performing an experiment on magnetism for which she has used two magnets A and B. She felt that there was an attraction between the magnets. So, she drew the magnetic field lines as below. But her teacher said that the diagram was wrong.



(a) Why the diagram was wrong?

(b) Draw the correct diagram.

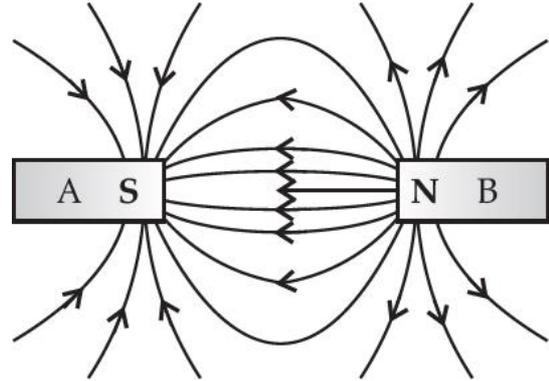
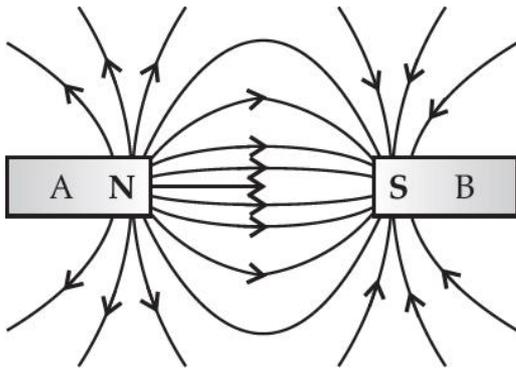
(c) What does the direction of thumb indicate in the right-hand thumb rule. In what way this rule is different from Fleming's left-hand rule?

**Ans:** (a) From the drawing of Richa it is clear that the magnetic north poles are facing each other.

But there was an attraction between the magnets. So, north pole of one magnet was facing the south pole of the other magnet.

(b) The correct diagram may be any one of the following two diagrams.

(c) In right hand thumb rule the right hand thumb indicates the direction of current in the straight conductor held by curled fingers, whereas in Fleming's left-hand rule the thumb gives the direction of force experienced by current carrying conductor placed in an external magnetic field.



**OR**

Meena draws magnetic field lines of field close to the axis of a current carrying circular loop. As she moves away from the centre of the circular loop she observes that the lines keep on diverging. How will you explain her observation?

**Ans:** Strength of the magnetic field decreases as distance increases.

This is indicated by the decrease in degree of closeness of the lines of field.

