

**SCIENCE-086**  
**Max. Marks: 80**

**Time : 3 hours**

**General Instructions:**

- i. This question paper consists of 39 questions in 5 sections.*
  - ii. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.*
  - iii. Section A consists of 20 objective type questions carrying 1 mark each.*
  - iv. Section B consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.*
  - v. Section C consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.*
  - vi. Section D consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.*
- Section E consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.*

**Section-A**

Select and write the most appropriate option out of the four options given for each of the questions 1 - 20. There is no negative mark for incorrect response.

**1. The metals that float when treated with water are:**

- a) Manganese and sodium
- b) Sodium and calcium
- c) Magnesium and sodium
- d) Magnesium and calcium

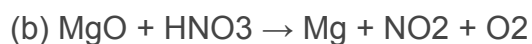
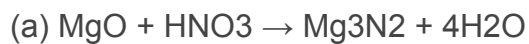
**2. When hydrochloric acid is added to barium hydroxide, a white-coloured compound is formed. Which of the following option gives the complete chemical reaction?**

- a)  $\text{HCl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaCl}_2 + 2\text{HOH}$
- b)  $2\text{HCl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaCl}_2 + 2\text{HOH}$
- c)  $2\text{HCl} + \text{Ba}(\text{OH})_2 \rightarrow \text{BaH}_2 + 2\text{HCl} + \text{O}_2$
- d)  $\text{HCl} + 2\text{Ba}(\text{OH}) \rightarrow 2\text{BaCl}_2 + 2\text{HOH} + \text{O}_2$

**3. A student studying the chemical properties of metals finds incomplete chemical reactions in his book, as shown below:**



**Which option completes the reaction?**



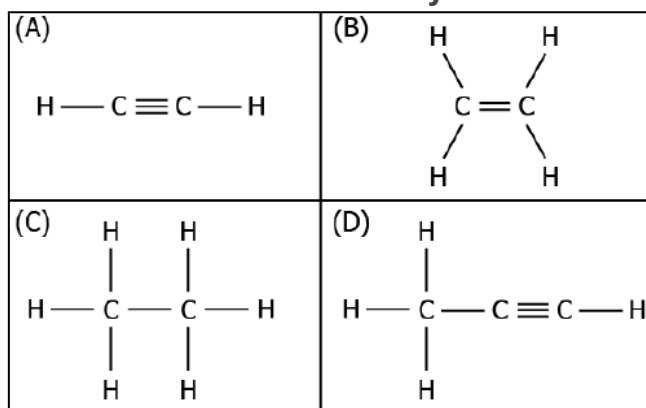
4. The following chemical reaction shows the addition of chlorine to methane in the presence of sunlight:



What is likely to be the product of the reaction represented by "X"?



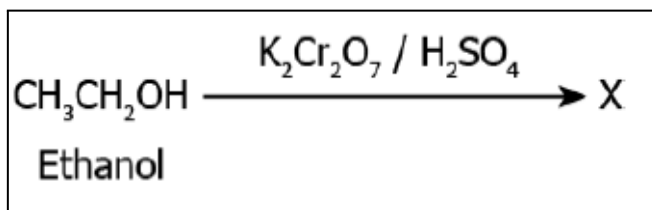
5. The image represents the structure of a few hydrocarbon compounds.



Which of these compounds can be classified as alkynes?



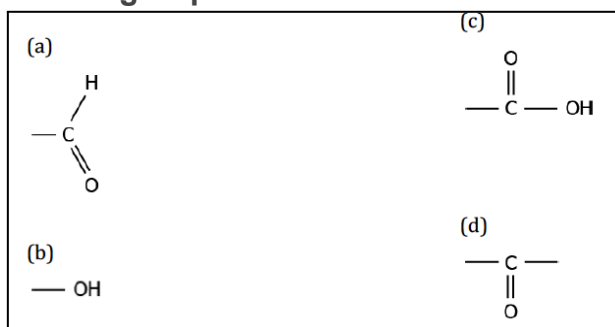
6. The below image represents a chemical reaction where ethanol is oxidised using potassium dichromate and sulphuric acid.



Which of the following option represents the product “X”?

- (a) CH<sub>2</sub>O
- (b) CH<sub>3</sub>CH
- (c) CH<sub>3</sub>H<sub>2</sub>O
- (d) CH<sub>3</sub>COOH

7. Which of these functional groups can combine with carbon to produce alcohol?



8. A feature of reproduction that is common to Amoeba, Yeast and Spirogyra is that

- (a) they reproduce asexually
- (b) they are all unicellular
- (c) they reproduce only sexually
- (d) they are all multicellular

9. Which of the following methods of contraception protects from acquiring sexually transmitted diseases?

- (a) Surgery
- (b) Condoms
- (c) Copper-T
- (d) Oral-pills

10. Which among the following diseases is not sexually transmitted?

- (a) Syphilis
- (b) Hepatitis
- (c) HIV-AIDS
- (d) Gonorrhoea

11. Which of the following statements are true for flowers?

- a) flowers are always bisexual
- b) They are sexual reproductive organ

- c) They are produced in all group of plants
- d) After fertilization they give rise to fruit

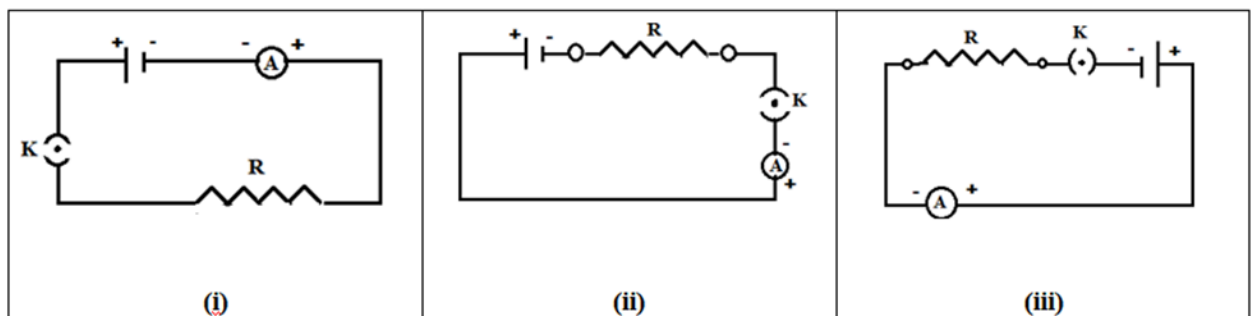
12. A man with blood group A marries a woman having blood group O. What will be the blood group of the child?

- (a) O only
- (b) A only
- (c) AB
- (d) Equal chance of acquiring blood group A or blood group O.

13. Three resistances of  $1\ \Omega$  each are connected to form a triangle. The resistance between any two terminals is

- (a)  $3\ \Omega$
- (b)  $1/2\ \Omega$
- (c)  $2/3\ \Omega$
- (d)  $3/2\ \Omega$

14. A cell, a resistor, a key and an ammeter are arranged as shown in the circuit diagrams. The current recorded in the ammeter will be:



- (a) maximum in (i)
- (b) maximum in (ii)
- (c) maximum in (iii)
- (d) the same in all the cases

15. Pure-bred pea plant A is crossed with pure -bred pea plant A is crossed with pure bred pea plant B. It is found that the plants which look like A do not appear in F<sub>1</sub> generation but re-emerge in F<sub>2</sub> generation. Which of the plants A and B are tall and dwarf?

- (a) A are tall and B are dwarf.
- (b) A is tall and B is also tall.
- (c) A are dwarf and B are also dwarf
- (d) A are dwarf and B are tall

16. Which of the following statements about food chain and energy flow through the ecosystem is false?

- (a) Food webs include two or more food chains.
- (b) All organisms that are not producers are consumers.
- (c) A single organism can feed at several trophic levels.
- (d) Detritivores feed at all trophic levels except the producer level.

**Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:**

- a) Both A and R are true, and R is the correct explanation of A.
- b) Both A and R are true, and R is not the correct explanation of A.

- c) **A is true but R is false.**
- d) **A is false but R is true.**

17. **Assertion (A)** : Zinc oxide is amphoteric in nature.  
**Reason (R)**: Zinc oxide reacts with both acids and bases.
18. **Assertion(A)** : The offspring produced by sexual reproduction is likely to adjust better in environmental fluctuation.  
**Reason (R)** : During the fusion of gametes there is mixing of genetic material from two parents.
19. **Assertion(A)**: On changing the direction of flow of current through a straight conductor, the direction of a magnetic field around the conductor is reversed.  
**Reason (R)** : The direction of magnetic field around a conductor can be given in accordance with left hand thumb rule.
20. **Assertion** : Traits like tallness and dwarfness in pea plant are inherited independently.  
**Reason**: When a homozygous tall pea plant is crossed with dwarf pea plant, medium sized pea plant is obtained in F<sub>1</sub> generation.

### **Section-B**

#### **Question No. 21 to 26 are very short answer questions**

21. (a) Metals are electropositive in nature. Why?  
(b) State whether the following statement is true or false  
Diamond and graphite are the covalent compounds of carbon elements.
22. a) Why is there a difference in the breathing rate of aquatic organisms and terrestrial organisms ? Explain .
- b) Draw the labelled diagram of a pistil showing the following parts.
- Stigma , Style , Ovary , Female germ cell
23. a) List two sexually transmitted diseases in each of the following cases:  
(i) Bacterial infections  
(ii) Viral infections  
b) Which contraceptive method changes the hormonal balance of the body ?  
(or)
- a) In the following food chain, plants provide 500 J of energy to rats. How much energy will be available to hawks from snakes?  
Plants → Rats → Snakes → Hawks
- b) In a food chain, if 10,000 joules of energy is available to the producer, how much energy will be available to the secondary consumer to transfer it to the tertiary consumer?
24. A household uses the following electric appliances:  
(i) refrigerator of rating 400W for 10 hours each day.  
two electric fans of rating 80w each for 6 hours daily.  
Calculate the electricity bill for a day if the rate is Rs.3.00 per unit of energy.

25. A device 'X' is always connected in series at the beginning of a circuit to protect expensive electrical gadgets from getting damaged when there is excessive flow of current in the circuit. Identify the device 'X' and write any two characteristics of the material used in this device.

26. a) Why are the traits acquired during the lifetime of an individual not inherited? Explain.

b) How do Mendel's experiments show that traits are inherited independently?

### Section-C

#### Question No. 27 to 33 are short answer questions

27. Compound X and aluminium are used to join railway tracks.

(a) Identify the compound X.

(b) Name the reaction.

(c) Write down its reaction.

28. (a) Give the general formula of an : Alkane, Alkene, Alkyne

(b) Classify the following compounds Alkanes, Alkenes, Alkynes  
C<sub>2</sub>H<sub>4</sub>, C<sub>3</sub>H<sub>4</sub>, C<sub>4</sub>H<sub>8</sub>, C<sub>5</sub>H<sub>12</sub>, C<sub>5</sub>H<sub>8</sub>, C<sub>3</sub>H<sub>8</sub>, C<sub>6</sub>H<sub>6</sub>.

(OR)

Name the functional groups present in the following compounds

(a) CH<sub>3</sub>COCH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>3</sub>

(b) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>COOH

(c) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CHO

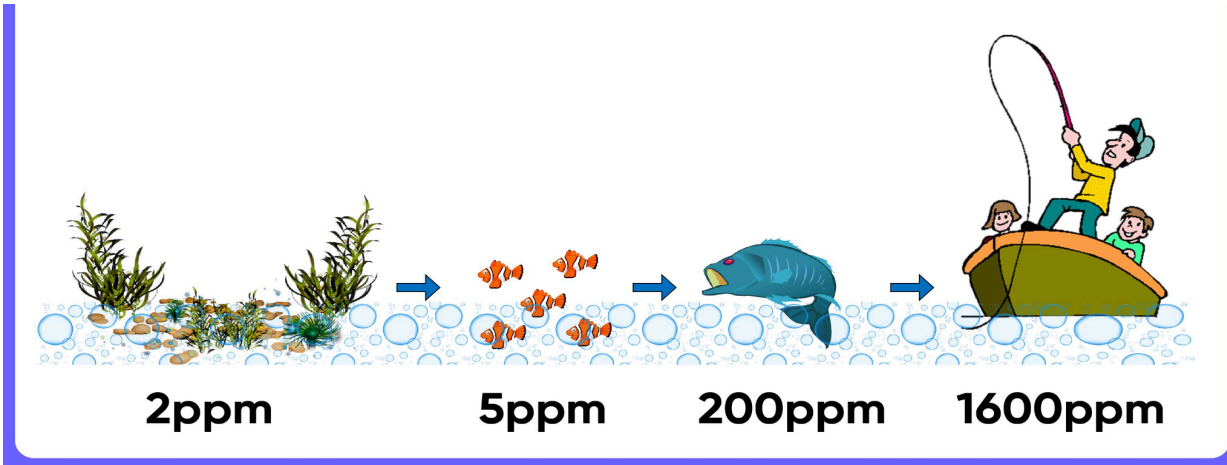
(d) CH<sub>3</sub>CH<sub>2</sub>OH

29. a) Why did Mendel carry out an experiment to study inheritance of two traits in garden pea?

(b) What were his findings with respect to inheritance of traits in F<sub>1</sub> and F<sub>2</sub> generation?

(c) State the ratio obtained in the F<sub>2</sub> generation in the above mentioned experiment.

30.



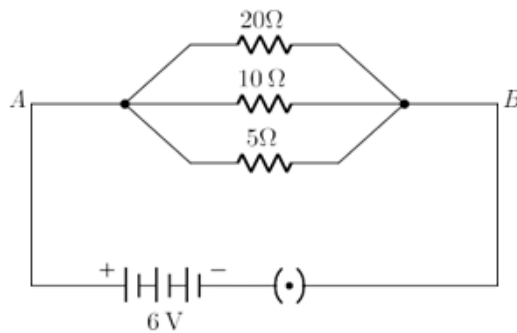
1. Name the process involved in the above picture.
2. Why was the concentration of DDT maximum in the case of tertiary consumers ? Explain .
3. How to avoid the effects of the above mentioned process ?

31. Two resistors with resistance  $10\ \Omega$  and  $15\ \Omega$  are to be connected to a battery of emf  $12\ \text{V}$  so as to obtain:

- (i) minimum current
- (ii) maximum current

Describe the mode of connecting the resistances in each case. Calculate the strength of the total current in the circuit in each case.

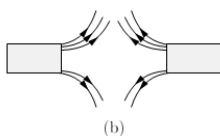
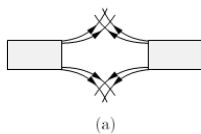
OR



Calculate the current flowing through the  $10\ \text{ohm}$  resistor.

32. (a) State the rule to determine the direction of a magnetic field produced around a straight conductor-carrying current.

(b) Magnetic field lines of two magnets are shown in fig. (a) and (b).



Select the figure that represent the correct pattern of field lines. Give reason for your answer. Also name the poles of the magnet facing each other.

33. (i) List the factors on which the resistance of a conductor in the shape of a wire depends.

(ii) Why are alloys commonly used in electrical heating devices? Give reason.

**OR**

(i) Write Joule's law of heating.

(ii) Compute the heat generated while transferring 96000 coulomb of charge in two hours through a potential difference of 40V.

**Section-D**

**Question No. 34 to 36 are long answer questions.**

34. Two ores A and B were taken. On heating, ore A gives CO, whereas ore B gives SO<sub>2</sub>. What steps will you take to convert them into metals?

**(OR)**

Explain the given reactions with the examples

(a) Hydrogenation reaction

(b) Oxidation reaction

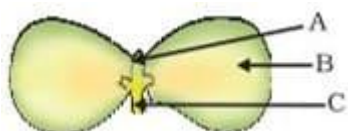
(c) Substitution reaction

(d) Saponification reaction

(e) Combustion reaction

35. a ) A farmer wants to grow banana plants genetically similar enough to the plants already available in his field. Which method would you suggest for this purpose? Give reason.

b ) In the below figure parts A, B, and C are sequentially



**C) Match the following:**

Column I	Column II
A. Amoeba	p. Budding
B. Hydra	q. Regeneration



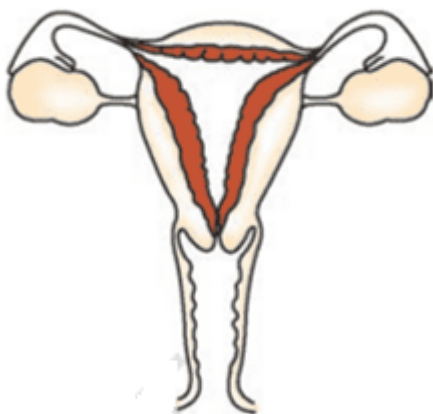
C. Planaria	r. Fission
D. Rhizopus	s. Fragmentation
E. Spirogyra	t. Spore formation

d ) Why is it not possible to reconstruct the whole organism from a fragment in complex multicellular organisms?

e ) Discuss spore formation in fungi. How will an organism benefit if it reproduces through spores?

**OR**

a ) In the given figure, label the parts and mention their functions:



a. Production of egg

b. Site of fertilization

c. Site of implantation

d. Entry of the sperms

b) What are various ways to avoid pregnancy? Elaborate the mode of action of the methods.

36.(i) State the relation correlating the electric current flowing in a conductor and the voltage applied across it. Also draw a graph to show this relationship.

(ii) Which physical quantity is given by the slope of the graph? Write its SI unit and define it.

(iii) The current through a resistance wire is halved. What happens to the resistance of the wire? The same wire is stretched to double its value along its length, how will the resistance get affected now?

**OR**

(i) Define electrical resistivity. Give its SI unit.

(ii) The resistance of a wire is R. How does the resistivity get affected when the wire its diameter is made four times the original value?

(iii) Calculate the area of cross section of a wire if its length is 1.0m, its resistance is 23  $\Omega$  and the resistivity of the material of the wire is  $1.84 \times 10^{-6} \Omega\text{m}$ .

## SECTION - E

Question No. 37 to 39 are case-based/data -based questions with 2 to 3 short sub-parts. Internal choice is provided in one of these sub-parts.

37. Most dirt is oily in nature and as you know, oil does not dissolve in water. The molecules of soap are sodium or potassium salts of long-chain carboxylic acids. The ionic-end of soap interacts with water while the carbon chain interacts with oil. The soap molecules, thus form structures called micelles, where one end of the molecules is towards the oil droplet while the ionic-end faces outside. This forms an emulsion in water. The soap micelle thus helps in pulling out the dirt in water and we can wash our clothes clean

i) What is the hydrophobic end?

ii) Draw the structure of micelle.

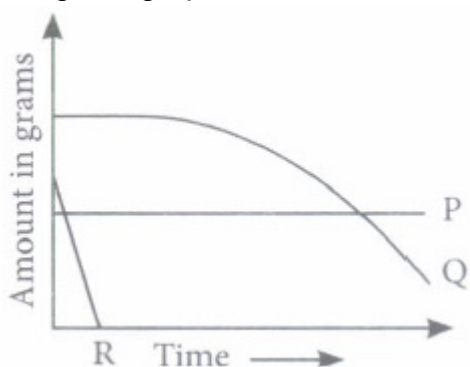
iii) What are scums?

iv) What is hard water?

v) To remove the hardness of water, the water is treated with soap or detergent?

38. Advancement of technology has resulted in improvement of our lifestyle and has also changed our attitude. When the human population was low and technology was in its infancy, the various kinds of solid wastes generated due to human activities were easily degraded by decomposers present in nature and it did not create any Significant harmful effect on the environment. In the recent times, however human population has increased tremendously and the technology has become greatly advanced. These two factors have contributed Significantly in the deterioration of our environment due to addition of number of wastes.

(i) Samaira took three different types of solid wastes P,Q, R and buried them under the soil in a pot, as she wanted to study their rate of decomposition. Her findings are shown in the given graph



Select the option that correctly identifies P, Q and R

- | P                 | Q            | R             |
|-------------------|--------------|---------------|
| (a) Polythene bag | Leather bag  | Fruit peel    |
| (b) Used syringes | Broken glass | Leather purse |
| (c) Cardboard     | Cow dung     | Rubber mat    |
| (d) Human excreta | Paper cup    | Cow dung      |

(ii) Which of the following statements regarding solid wastes is correct?

(a) Change in the packaging technology has resulted in generation of a lot of solid wastes.

(b) Dumping of solid wastes could reduce the fertility of the soil leading to reduction in crop yield.

- (c) Accumulation of solid waste could cause increased incidents of disease in a locality.  
 (d) All of these

(iii) Teacher kept few solid wastes in her class as given

Jute bag (I), Tube light (II), Aluminium (oil) (III), Paper cup (IV), Fruits (V), Glass tumbler (VI), Hedge trimming (VII), Plastic bag (VIII), Metal keys (IX), DDT (X)

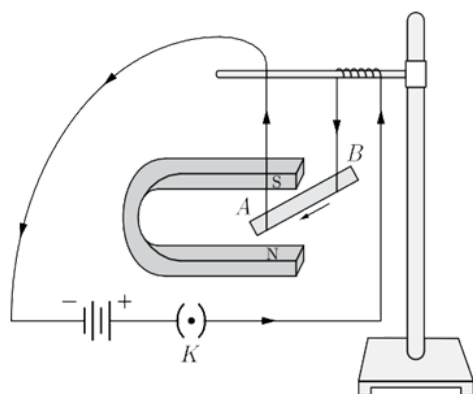
She asked students to arrange them in group A (Biodegradable) and group B (Non-biodegradable). Select the student that has grouped the items correctly.

- (a) Tarun - Group A: I, IV, V, VII, Group B: II, III, VI, VIII, IX, X  
 (b) Shivani - Group A: I, III, V, VII, X Group B: II, IV, VI, VIII, IX  
 (c) Neha - Group A: II, III, IV, V, IX Group A: II, III, IV, V, IX  
 (d) Advait - Group A: I, III, IV, V, X Group B: II, VI, VII, VIII, IX

(iv) Select the option that incorrectly matches the type of solid waste and its correct disposal system

- (a) Plastic bottle - Send for recycling  
 (b) Used tea leaves and kitchen waste - Collect in a pit to form compost  
 (c) Used syringes and needle - Wash and reused  
 (d) Municipal solid waste and fecal sludge - Buried in low lying areas to level the uneven surface of land.

39. A student was asked to perform an experiment to study the force on a current carrying conductor in a magnetic field. He took a small aluminium rod  $AB$ , a strong horse-shoe magnet, some connecting wires, a battery and a switch and connected them as shown. He observed that on passing current, the rod gets displaced. On reversing the direction of current, the direction of displacement also gets reversed. On the basis of your understanding of this phenomenon, answer the following questions:



- (i) Why does the rod get displaced on passing current through it?  
 (ii) State the rule that determines the direction of the force on the conductor  $AB$ .  
 (iii) (a) If the U shaped magnet is held vertically and the aluminium rod is suspended horizontally with its end  $B$  towards due north, then on passing current through the rod from  $B$  to  $A$  as shown, in which direction will the rod be displaced?  
 (b) What will be the displacement of the rod if both the magnetic field and the current carrying conductor are aligned parallel to each other?

OR

- (iv) State any two properties of magnetic field lines.