



General Instructions :

Read the following instructions very carefully and strictly follow them :

- (i) This question paper comprises **39** questions. **All** questions are **compulsory**.
- (ii) This question paper is divided into **five** sections – **A, B, C, D** and **E**.
- (iii) **Section A** – Questions No. **1** to **20** are Multiple Choice Questions. Each question carries **1** mark.
- (iv) **Section B** – Questions No. **21** to **26** are Very Short Answer type questions. Each question carries **2** marks. Answer to these questions should be in the range of **30** to **50** words.
- (v) **Section C** – Questions No. **27** to **33** are Short Answer type questions. Each question carries **3** marks. Answer to these questions should be in the range of **50** to **80** words.
- (vi) **Section D** – Questions No. **34** to **36** are Long Answer type questions. Each question carries **5** marks. Answer to these questions should be in the range of **80** to **120** words.
- (vii) **Section E** – Questions No. **37** to **39** are of **3** source-based/case-based units of assessment carrying **4** marks each with sub-parts.
- (viii) There is no overall choice. However, an internal choice has been provided in some sections. Only one of the alternatives has to be attempted in such questions.

SECTION A

Select and write the most appropriate option out of the four options given for each of the questions no. **1** to **20**. There is no negative marking for incorrect response. 20×1=20

1. The most common method of extraction of metals from their oxide ores is :
 - (A) Reduction with carbon
 - (B) Reduction with hydrogen.
 - (C) Reduction with aluminium
 - (D) Electrolytic reduction

31/3/3

3 #

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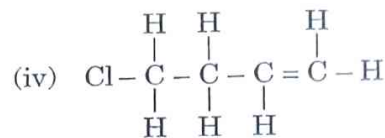
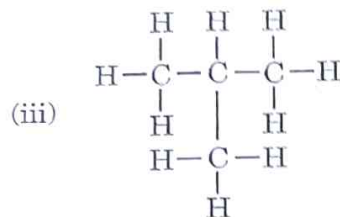
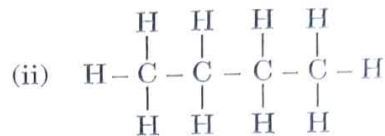
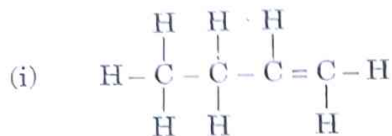
2. Consider the following chemical equation :



To balance this chemical equation, the values of 'p', 'q', 'r' and 's' must be respectively :

- (A) 3, 2, 2, 1 (B) 2, 3, 3, 1
(C) 2, 3, 1, 3 (D) 3, 1, 2, 2

3. Given below are the structures of some hydrocarbons. Select the two structures which are related to each other from the given options :



- (A) (i) and (iv) (B) (ii) and (iv)
(C) (ii) and (iii) (D) (i) and (iii)
4. Choose the **incorrect** statement about the common reaction used in hydrogenation of vegetable oils.
- (A) It is an addition reaction.
(B) It takes place in the presence of nickel or palladium catalyst.
(C) The product contains only single bonds between carbon atoms.
(D) It is an addition reaction which occurs in the presence of an acid catalyst.
5. Which of the given option represents a family of salts ?
- (A) NaCl, Na₂SO₄, CaSO₄ (B) K₂SO₄, Na₂SO₄, CaSO₄
(C) NaNO₃, CaCO₃, Na₂CO₃ (D) MgSO₄, CuSO₄, MgCl₂

31/3/3

5

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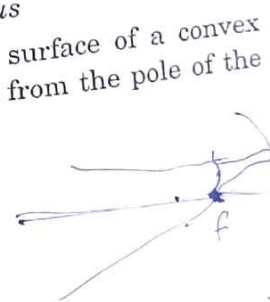
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6. Select a pair of bisexual flowers from the following :
- (A) ~~Papaya~~ and mustard (B) ~~Hibiscus~~ and mustard
(C) ~~Hibiscus~~ and papaya (D) ~~Hibiscus~~ and watermelon
7. The growth of the pollen tubes towards ovules is an example of :
- (A) Phototropism (B) Hydrotropism
(C) Geotropism (D) Chemotropism
8. Match Column-I with Column-II and select the correct option from the choices provided.

| Column-I | Column-II |
|--|---------------|
| a. Site of fertilisation of egg with the sperm | (i) Vagina |
| b. Site of implantation of embryo | (ii) Uterus |
| c. Site of entry of sperm into the female reproductive tract | (iii) Oviduct |
| d. Site through which the waste materials generated by the developing embryo are removed | (iv) Placenta |
| | (v) Cervix |

- (A) a-(ii), b-(i), c-(v), d-(iv) (B) a-(iii), b-(i), c-(v), d-(iv)
(C) a-(iv), b-(ii), c-(iii), d-(i) (D) a-(iii), b-(ii), c-(i), d-(iv)
9. The plant hormone present in greater concentration in the areas of rapidly dividing cells is :
- (A) Auxin (B) Cytokinins
(C) Gibberellins (D) Abscisic acid
10. Parasitic mode of nutrition is observed in :
- (A) *Bryophyllum* (B) *Hibiscus*
 (C) *Cuscuta* (D) *Helianthus*
11. A candle flame is placed in front of the reflecting surface of a convex mirror of focal length f . If the distance of the flame from the pole of the mirror is ' f ', its image is formed :
- (A) at infinite distance from the mirror
(B) behind the mirror at the principal focus
(C) behind the mirror at a distance $2f$
(D) behind the mirror at a distance $\frac{f}{2}$



[P.T.O.]

7 #

31/3/3

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12. Select the correct statement from the following :

- (A) The size of the molecules of air is larger than the wavelength of visible light.
- (B) The blue light has a wavelength about 1.8 times greater than that of red light.
- (C) When sunlight passes through the fine particles in air, they scatter the blue colour of visible light more strongly than red.
- (D) The light of red colour is scattered the most by fog or smoke.

13. In domestic electric circuits, the colour of insulation covers of wires in the cables of electric iron/electric toaster is generally :

- (A) red for live wire, green for neutral wire and black for earth wire
- (B) red for live wire, black for neutral wire and green for earth wire
- (C) green for live wire, black for neutral wire and red for earth wire
- (D) green for live wire, red for neutral wire and black for earth wire

14. The strength of magnetic field produced inside a long straight current carrying solenoid does **not** depend upon :

- (A) number of turns in the solenoid ✓
- (B) direction of current flowing through the solenoid ✓
- (C) material of the core filled inside the solenoid ✓
- (D) radius of the coil of the solenoid ✗

15. Which one of the following statements is **not** true about a bar magnet ?

- (A) It sets itself in north-south direction when suspended freely.
- (B) It has attractive power for iron filings.
- (C) It produces magnetic field lines.
- (D) The direction of magnetic field lines inside a bar magnet is from its north pole to its south pole. ✗

31/3/3

9 #

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16. Other than the abiotic components, which of the given biotic components are **not** required to make an aquarium with small herbivorous fishes a self-sustaining system ?
- (i) Aquatic plants and aquatic animals
 - (ii) Terrestrial plants and terrestrial animals
 - (iii) Decomposers as bacteria and fungi
 - (iv) Consumers as clown fishes and sea urchins
- (A) (i) and (iv) ✓ (B) (ii) and (iii)
(C) (i) and (iii) (D) (ii) and (iv) ✓

For Questions number 17 to 20, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.
17. *Assertion (A)* : Brass is prepared by first melting copper and then dissolving tin into it in a definite proportion.
Reason (R) : The primary metal of brass is copper.
18. *Assertion (A)* : Use of jute bags for shopping reduces pollution.
Reason (R) : Jute is biodegradable and its bag may be reused as and when needed.
19. *Assertion (A)* : In our actions of writing or talking, our nervous system communicates with the muscles.
Reason (R) : Cranial nerves and spinal nerves form the peripheral nervous system.
20. *Assertion (A)* : Magnetic field lines around a bar magnet never intersect each other.
Reason (R) : Magnetic field produced by a bar magnet is a quantity that has both magnitude and direction.

31/3/3

11 #

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SECTION B

Questions no. 21 to 26 are Very Short Answer Type questions

21. (a) List the possible sources of energy required in decomposition reactions. Illustrate any one with a suitable example. ✓ 2

OR

- (b) What is observed when hydrated ferrous sulphate crystals are heated in a dry boiling tube? Give balanced chemical equation(s) of the reaction(s) that occur(s). 2
22. A chemical compound 'X' is used to bleach washed clothes in laundry as well as to make drinking water free from germs. Identify 'X'. How is this compound represented? Write the method of its preparation along with the chemical equation for the reaction that occurs. 2
23. State the main function of veins in human circulatory system. Why do they not need thick walls? / 2
24. "Sex of the children is determined by type of sex chromosomes which they inherit from their father." Justify the statement. / 2
25. (a) A student has difficulty in reading his textbooks but can read the blackboard clearly while sitting in the last row. Name the defect of vision the student is suffering from. List two reasons due to which this defect arises. Write the nature of the lenses required to correct this defect. ✓ 2

OR

- (b) Draw a ray diagram to show the path of a ray of light falling obliquely on one of the refracting faces of a triangular glass prism and mark the angle of deviation on it. 2

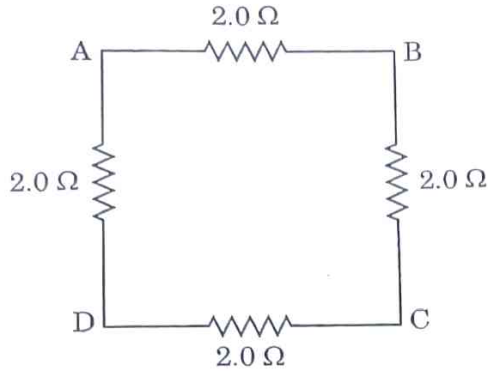
31/3/3

13 #

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26. Four resistors, each of resistance 2.0Ω , are joined end to end to form a square ABCD as shown. Using appropriate formula, determine the equivalent resistance of the combination between its two ends A and B. 2



SECTION C

Questions no. 27 to 33 are Short Answer Type questions.

27. State the change that is observed when a China dish containing copper powder is heated over the flame of a burner. Name the phenomenon responsible for the change and write balanced equation for the chemical reaction that occurs. How is this reaction different from the reaction that occurs when copper wares kept in open air slowly lose their shiny brown surface and gain a coat? Write chemical name of the coating and state its colour. 3

28. (a) Common salt is an important raw material for various chemicals of daily use. State in brief the method of preparation of (i) Sodium hydroxide, and (ii) Sodium hydrogen carbonate from common salt. Write balanced chemical equations of the reactions that occur. 3

OR

- (b) Design an experimental set-up to demonstrate that "Alcohol and glucose contain hydrogen but are not categorised as acids". Also give the reason to justify this fact. 3
29. Why is blood circulation in vertebrates known as "double circulation"? Trace its path in the form of a flow chart. 3

[P.T.O.]

31/3/3

15 #

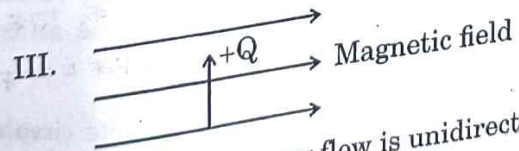
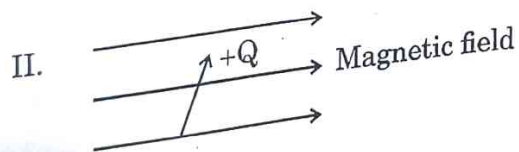
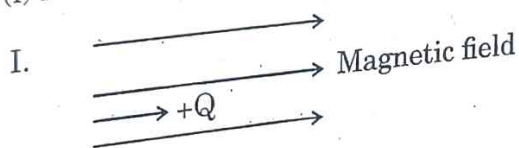


30. A pure pea plant having round (R), yellow (Y) seeds is crossed with another pure pea plant having wrinkled (r), green (y) seeds. Subsequently F_1 progeny is self-pollinated to obtain F_2 progeny.

- (a) What do the seeds of F_1 generation look like?
- (b) Give the possible combinations of traits in seeds of F_2 generation. Also give their ratio.
- (c) State the reason of obtaining seeds of new combination of traits in F_2 generation.

31. A person is suffering from an eye defect in which the far point of the eye is much nearer than infinity. Name the defect of vision the person is suffering from. List two main causes of this defect. Write the type of the corrective lens and draw a ray diagram to show the function of the corrective lens.

- 32. (a) Name and state the rule which determines the force on a current carrying conductor placed in a uniform magnetic field.
- (b) Consider the following three diagrams in which the entry of a positive charge (+Q) in a magnetic field is shown. Identify giving reason the case in which the force experienced by the charge is (i) maximum, and (ii) minimum.



33. (a) "In a food chain energy flow is unidirectional." Give two reasons for the given statement.
- (b) If 10,000 J energy is available at the producer level, how much energy will be available to the secondary consumers? Give reason to justify your answer.

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SECTION D

Questions no. 34 to 36 are Long Answer Type questions.

34. (a) (i) Consider the following metals :
K, Ca, Al, Cu, Ag, Fe
- Select from the above metals, a metal which
- I. does not react with oxygen even at high temperature.
 - II. reacts with oxygen at ordinary temperature and forms a protective oxide layer which prevents the metal from further oxidation.
 - III. catches fire when kept in the open.
 - IV. does not burn in oxygen but the hot metal is coated with a black coloured oxide layer.
- (ii) What are amphoteric oxides ? With the help of balanced chemical equations show that aluminium oxide is an amphoteric oxide.
- (iii) What are alkalis ? Give one example. ^{No. of 11}

5

OR

- (b) (i) With the help of balanced chemical equations state the process of extracting (I) mercury from its ore called cinnabar, and (II) copper from its sulphide ore.
- (ii) Silver and copper articles slowly lose their shiny surfaces when exposed to air. Name the compounds formed on (I) silver articles, and (II) copper articles in the form of coating.

5

[P.T.O.]

31/3/3

19 #

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35. (a) (i) "In refraction of light through a rectangular glass slab, the emergent ray is always parallel to the direction of the incident ray." Why? Explain with the help of a ray diagram. What happens when a ray of light falls normally on one of the faces of a rectangular glass prism? Draw diagram.
- (ii) An object is placed at a distance of 30 cm from the optical centre of a concave lens of focal length 20 cm. Use Lens formula to determine the position of the image formed in this case.

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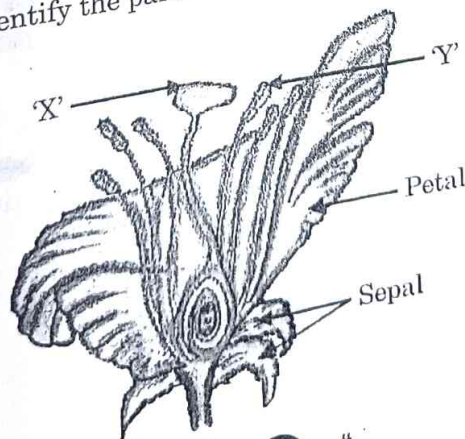
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- (b) (i) A student wishes to study the image formation by a concave mirror using candle flame as object. State the type of the image formed by the mirror and mention the change in the image formed, if any, that he observes when the candle flame is gradually moved away from the pole of the mirror. Draw a ray diagram to show the image formation when the object distance is nearly equal to the radius of curvature of the mirror.
- (ii) A convex mirror used for rear-view on an automobile has a focal length of 3.0 m. If a bus is located at 6.0 m from this mirror, use mirror formula to find the position of the image of the bus as seen in the mirror.

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36. ✓ (a) (i)

Identify the parts 'X' and 'Y' in the figure given below :



21 #

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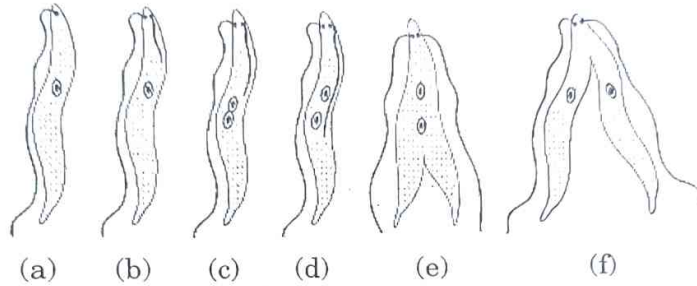
31/3/3



- (ii) Name the yellowish coloured structures produced by the part labelled as 'Y'.
- (iii) Write the name of the process by which these are transferred to the part labelled as 'X'.
- (iv) Explain the process of seed formation in a flowering plant. 5

OR

- (b) (i) Name the type of asexual mode of reproduction shown in the given figure.



- (ii) Identify the unicellular organism in the diagram.
- (iii) List any two advantages of asexual reproduction over sexual reproduction.
- (iv) Name and explain any one mode of asexual reproduction observed in *Hydra*. 5

SECTION E

The following questions are Source-based/Case-based questions. Read the case carefully and answer the questions that follow.

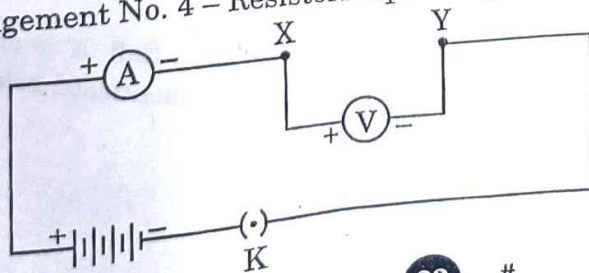
37. As shown in the diagram, an electric circuit consisting of an ammeter, a voltmeter, 4 cells of 1.5 V each, a plug key with a gap XY was set up. Voltmeter and ammeter readings were recorded in the observation table for four arrangements as given below :

Arrangement No. 1 – only resistor R_1 in gap XY

Arrangement No. 2 – only resistor R_2 in gap XY

Arrangement No. 3 – Resistors R_1 and R_2 in series in gap XY

Arrangement No. 4 – Resistors R_1 and R_2 in parallel in gap XY

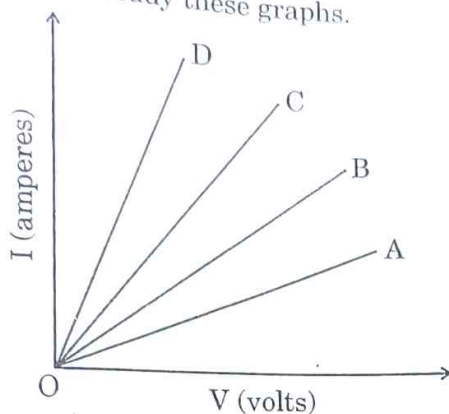


23 #

[P.T.O.]

31/3/3

Based on the observations, four V – I graphs A, B, C and D as shown in figure were drawn. Study these graphs.



- (a) Which one of the graphs represents the series combination of R_1 and R_2 ? 1
- (b) Which one of these graphs represents the parallel combination of R_1 and R_2 ? 1
- (c) (i) Show an arrangement of three resistors, each of resistance $10\ \Omega$, so that the combination has a resistance of $15\ \Omega$. Give justification for your answer. 2

OR

- (c) (ii) A battery of $6\ \text{V}$ is connected with a series combination of five resistors of $0.1\ \Omega$, $0.2\ \Omega$, $0.3\ \Omega$, $0.4\ \Omega$ and $0.5\ \Omega$. How much current would flow through the $0.3\ \Omega$ resistor? Justify your answer. 2

38. 'A' and 'B' are two salts used for washing purposes. Salt 'A' is used for bathing also. Four test tubes I, II, III and IV as mentioned below are taken.

- I. Rain water + solution of salt 'A'
- II. Rain water + solution of salt 'B'
- III. Tubewell water + solution of salt 'A'
- IV. Tubewell water + solution of salt 'B'

[P.T.O.]

25 #

31/3/3



The test tubes are shaken one by one almost identically for the same time and the lengths of foam formed in each test tube is noted.

- (a) In which one of the four test tubes is the foam formed the minimum? 1
- (b) Differentiate between salt A and salt B. 1
- (c) (i) What are esters? What happens when an ester reacts with an alkali (say sodium hydroxide)? Give chemical equation for the reaction. 2

OR

- (c) (ii) What is the cause of hardness of water? Sometimes it is observed that while bathing foam is formed with difficulty and an insoluble substance is formed. Name this substance and write the cause of its formation. 2

✓
39.

A person while climbing up a rocky hill comes into a panic state and fear. His body starts reacting in a "flight-or-flight" condition to adjust to the dangerous and stressful situation.

Based on the above facts, answer the questions that follow.

- (a) (i) Name the hormone secreted in the blood of the person in this situation. 2

OR

- (a) (ii) Name the source gland of the hormone secreted in this condition. 2
- (b) State any two responses in the body of the person as a result of the secretion of this hormone. 1
- (c) How does the action of the chemical signal in terms of hormones differ from the electrical impulses via nerve cells? 1