Science [Sample Paper Shaalaa.com]

CBSE
English Medium

Academic Year: 2023-2024
Date: March 2024
Duration: 3h

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. Students are expected to attempt only one of these questions.
iii. Section A consists of 20 objective type questions carrying 1 mark each. Q. No. 17 to 20 are Assertion - Reasoning based questions.
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.
vii. Section E consists of 3 Long Answer type questions carrying 05 marks each. Answers to these questions should be in the range of 80 to 120 words.

SECTION - A: Select and write one most appropriate option out of the four options given for each of the questions 1 – 20

1 [1]

The above reaction is an example of a ______
combination reaction
double displacement reaction
decomposition reaction
displacement reaction

VIEW SOLUTION

2 [1]

10 mL of a solution of NaOH is found to be completely neutralised by 8 mL of a given solution of HCl. If we take 20 mL of the same solution of NaOH, the amount of HCl solution (the same solution as before) required to neutralise it will be:
4 mL
8 mL
12 mL
16 mL

VIEW SOLUTION

3 [1]

Food cans are coated with tin and not with zinc because ______
zinc is costlier than tin
zinc has a higher melting point than tin
zinc is more reactive than tin
zinc is less reactive than tin

VIEW SOLUTION

4 [1]

Butanone is a four-carbon compound with the functional group:
carboxylic acid
aldehyde
ketone
alcohol
The xylem in plants is responsible for _____.
transport of water
transport of food
transport of amino acids
transport of oxygen

Which of the following terms does not represent electrical power in a circuit?
I^2R
IR^2
VI
V
R

Which of the following is not a part of the female reproductive system in human beings?
Ovary
Uterus
Vas deferens
Fallopian tube

A Mendelian experiment consisted of breeding tall pea plants bearing violet flowers with short pea plants bearing white flowers. The progeny all bore violet flowers, but almost half of them were short. This suggests that the genetic make-up of the tall parent can be depicted as:
TTWW
Ttww
TtWW
TtWw

Which of the following lenses would you prefer to use while reading small letters found in a dictionary?
A convex lens of focal length 50 cm.
A concave lens of focal length 50 cm.
A convex lens of focal length 5 cm.
A concave lens of focal length 5 cm.

The human eye can focus objects at different distances by adjusting the focal length of the eye lens. This is due to _____.
presbyopia
accommodation
near-sightedness
far-sightedness
A piece of wire of resistance R is cut into five equal parts. These parts are then connected in parallel. If the equivalent resistance of this combination is R', then the ratio \( \frac{R}{R'} \) is \( \frac{1}{5} \).

12 Which of the following correctly describes the magnetic field near a long straight wire?
The field consists of straight lines perpendicular to the wire
The field consists of straight lines parallel to the wire
The field consists of radial lines originating from the wire
The field consists of concentric circles centred on the wire

13 Which of the following constitute a food chain?
Grass, wheat and mango
Grass, goat and human
Goat, cow and elephant
Grass, fish and goat

14 A spherical mirror and a thin spherical lens have each a focal length of -15 cm. The mirror and the lens are likely to be:
both concave
both convex
the mirror is concave and the lens is convex
the mirror is convex, but the lens is concave

15 While cooking, if the bottom of the vessel is getting blackened on the outside, it means that _______.
the food is not cooked completely
the fuel is not burning completely
the fuel is wet
the fuel is burning completely

16 Which of the following is a plant hormone?
Insulin
Thyroxin
Oestrogen
Cytokinin

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

17 **Assertion:** Height in pea plants is controlled by the efficiency of enzymes and is thus genetically controlled.
**Reason:** Cellular DNA is the information source for making proteins in the cell.
Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
Both Assertion and Reason are true and Reason is not the correct explanation of Assertion.
Assertion is true but Reason is false.
Assertion is False but Reason is true.

18

- **Assertion:** A compass needle is placed near a current-carrying wire. The deflection of the compass needle decreases when the magnitude of the current in the wire is increased.
- **Reason:** The strength of a magnetic field at a point near the conductor increases by increasing the current.
Both A and R are true, and R is the correct explanation of A.
Both A and R are true, and R is not the correct explanation of A.
A is true but R is false.
A is false but R is true.

19

**Assertion (A):** The inner walls of the small intestine have finger-like projections called villi which are rich in blood.
**Reason (R):** These villi have large surface area to help the small intestine in completing the digestion of food.
Both (A) and (R) are true and (R) is the correct explanation of (A).
Both (A) and (R) are true but (R) is not the correct explanation of (A).
(A) is true, but (R) is false.
(A) is false, but (R) is true.

20

**Assertion (A):** The energy which passes to the herbivores does not come back to autotrophs.
**Reason (R):** The flow of energy in a food chain is unidirectional.
Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of (A).
Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of (A).
Assertion (A) is true, but Reason (R) is false.
Assertion (A) is false, but Reason (R) is true.

SECTION – B: Q. no. 21 to 26 are very short answer questions.

21
What do you mean by a precipitation reaction? Explain by giving examples.

22
Five solutions A, B, C, D and E when tested with universal indicator showed pH as 4, 1, 11, 7 and 9, respectively. Which solution is
(a) neutral?
(b) strongly alkaline?
(c) strongly acidic?
(d) weakly acidic?
(e) weakly alkaline?
Arrange the pH in increasing order of hydrogen-ion concentration.

23

23.A
What are outside raw materials used for by an organism?
23. B
How is oxygen and carbon dioxide transported in human beings?

OR

24
Give reason for the following:
Vegetative propagation is practised for growing only some type of plants.

OR

25
25.A
The far point of a myopic person is 80 cm in front of the eye. What is the nature and power of the lens required to correct the problem?

OR

25.B
Explain why the planets do not twinkle?

26
A man went door to door posing as a goldsmith. He promised to bring back the glitter of old and dull gold ornaments. An unsuspecting lady gave a set of gold bangles to him which he dipped in a particular solution. The bangles sparkled like new but their weight was reduced drastically. The lady was upset but after a futile argument the man beat a hasty retreat. Can you play the detective to find out the nature of the solution he had used?

SECTION - C. Q. No. 27 to 33 are short answer questions

27
27.A
Write the balanced chemical equation for the following reaction.
Calcium hydroxide + Carbon dioxide → Calcium carbonate + Water

OR

27.B
Write the balanced chemical equations for the following reaction.
Aluminium + Copper chloride → Aluminium chloride + Copper

OR

27.C
Write the balanced chemical equation for the following and identify the type of reaction
Potassium bromide (aq) + Barium iodide (aq) → Potassium iodide (aq) + Barium bromide(s)
28.A.i
Consider the following salts: YCl
What would be the pH of the solution if in YCl, Y is sodium? Give reason for your answer.

28.A.ii
Consider the following salts: NH₄X
If in salt NH₄X, X is nitrate; then its solution will give what colour with universal indicator? Why?

28.A.iii
Consider the following salts: ZCO₃
What would be the change in colour in blue litmus if ZCO₃ is added to it and Z is potassium?

OR

28.B
A metal ‘M’ on reacting with dilute acid liberates a gas ‘G’. The same metal also liberates gas ‘G’ when reacts with a base.
   i. Write the name of gas ‘G’.
   ii. How will you test the presence of this gas?
   iii. Write chemical equations for the reactions of the metal with (1) an acid and (2) a base.

29
Describe the structure and functioning of nephrons

30
30.A
Why is DNA copying an essential part of the process of reproduction?

30.B
How is the process of pollination different from fertilization?

31
A person needs a lens of power -5.5 dioptres for correcting his distant vision. For correcting his near vision he needs a lens of power +1.5 dioptre. What is the focal length of the lens required for correcting (i) distant vision, and (ii) near vision?

32
32.A
Give reasons Platinum, gold and silver are used to make jewellery.
32.B
Give reason
Sodium, potassium and lithium are stored under oil.

32.C
Give reasons Aluminium is a highly reactive metal, yet it is used to make utensils for cooking.

33
If a harmful chemical enters in a food chain comprising peacock, plants, rats and snakes, which of these organisms is likely to have the highest concentration of the chemical in its body. Justify your answer. Name the process involved and define it.

SECTION - D: Q. No. 34 to 36 are Long answer questions.

34
34.A
What is the role of the brain in reflex action?

OR

34.B
What happens at the synapse between two neurons?

35
35.A
Three incandescent bulbs of 100 W each are connected in series in an electric circuit. In another circuit another set of three bulbs of the same wattage are connected in parallel to the same source.
   a. Will the bulb in the two circuits glow with the same brightness? Justify your answer.
   b. Now let one bulb in both the circuits get fused. Will the rest of the bulbs continue to glow in each circuit? Give reason.

OR

35.B
Redraw the circuit of question 1, putting in an ammeter to measure the current through the resistors and a voltmeter to measure potential difference across the 12 Ω resistor. What would be the readings in the ammeter and the voltmeter?

36
36.A
36.A.i
Write the chemical equation for the following:
Combustion of methane
36.A.ii

Write the chemical equation for the following:
Oxidation of ethanol

36.A.iii

Write the chemical equation for the following:
Hydrogenation of ethane

36.A.iv

Write the chemical equation for the following:
Esterification Reaction

36.A.v

Write the chemical equation for the following:
Saponification Reaction

OR

36.B

Describe in brief the cleansing action of soap.

SECTION - E: Q. 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

Sex of an individual is determined by different factors in various species. Some animals rely entirely on the environmental ones, while in some other animals the individuals can change their sex during their life time indicating that sex of some species is not genetically determined. However in human beings, the sex of an individual is largely determined genetically.

a. In what way are the sex chromosomes 'X' and 'Y' different in size? Name the mismatched pair of sex chromosome in humans.
b. Write the number of pair/pairs of sex chromosomes present in human beings. In which one of the parent (male/female) perfect pair/pairs of sex chromosome are present?
c. Citing two examples, justify the statement “Sex of an individual is not always determined genetically”.

OR

Draw a flow chart to show that sex is determined genetically in human beings.

38

A student took three concave mirrors of different focal lengths and performed the experiment to see the image formation by placing an object at different distance with these mirrors as shown in the following table.

<table>
<thead>
<tr>
<th>Case No.</th>
<th>Object-distance</th>
<th>Focal length</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>45 cm</td>
<td>20 cm</td>
</tr>
<tr>
<td>II</td>
<td>30 cm</td>
<td>15 cm</td>
</tr>
<tr>
<td>III</td>
<td>20 cm</td>
<td>30 cm</td>
</tr>
</tbody>
</table>

Now answer the following questions:

(a) List two properties of the image formed in Case I.

(b) In which one of the cases given in the table, the mirror will form real image of same size and why?
(c) Name the type of mirror used by dentists. Given reason why do they use such type of mirrors.

(c) Look at the table and identify the situation (object distance and focal length) which resembles the situation in which concave mirrors are used as shaving mirrors? Draw a ray diagram to show the image formation in this case.

---

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 horseshoe 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:

![Image of the experiment](image.png)

a. Why does the rod get displaced on passing current through it?
b. State the rule that determines the direction of the force on the conductor AB.
c.  
   i. 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?
   ii. Name any two devices that use current carrying conductors and magnetic fields.

OR

Draw the pattern of magnetic field lines produced around a current carrying straight conductor held vertically on a horizontal cardboard. Indicate the direction of the field lines as well as the direction of current flowing through the conductor.