CBSE
Class X Science
Sample Paper – 2
2024-25

Time: 3 hours. **Total Marks: 80**

General Instructions:

i. *All questions would be compulsory. However, an internal choice of approximately 33% would be provided. 50% marks are to be allotted to competency-based questions.*
ii. *Section A would have 16 simple/complex MCQs and 04 Assertion-Reasoning type questions carrying 1 mark each.*
iii. *Section B would have 6 Short Answer (SA) type questions carrying 02 marks each.*
iv. *Section C would have 7 Short Answer (SA) type questions carrying 03 marks each.*
v. *Section D would have 3 Long Answer (LA) type questions carrying 05 marks each.*
vi. *Section E would have 3 source based/case based/passage based/integrated units of assessment (04 marks each) with sub-parts of the values of 1/2/3 marks.*

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. Substance X is used for the work done shown in image A which is basic in nature, while Y is an acid found in the fruit shown in image 2. Identify the substances X and Y. [1]

Image A.

Image B

a) X - Potassium hydroxide and Y – Acetic acid
b) X – Ammonium hydroxide and Y – Oxalic acid
c) X – Ammonium hydroxide and Y – Tartaric acid
d) X – Potassium hydroxide and Y – Tartaric acid

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2. The below image shows the use of aluminium in daily life. [1]

Aluminium cooking utensil

The properties of aluminium responsible for this use are,

(i) Good thermal conductivity
(ii) Good electrical conductivity
(iii) Ductility
(iv) High melting point

a) (i) and (ii)
b) (i) and (iii)
c) (ii) and (iii)
d) (i) and (iv)

3. Meenal went to her kitchen garden on terrace where bee stung her hand. In which of the following solutions should she dip her hands for instant relief from pain? [1]

a) Baking powder
b) Lime juice
c) Vinegar
d) Alcohol

4. Which one of the following pairs of elements combine with electrovalent bond to form ionic compound? [1]

a) Na and Cl
b) C and H
c) Mg and Ca
d) F and Cl

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5. Food materials containing oils and fats when kept for a long time is shown in the below image. They give out a foul odour and taste different. Name this process. [1]

a) Corrosion
b) Milling
c) Rancidity
d) Osmosis

6. Kunal had dinner late at night and so developed stomach pain due to indigestion. Which type of medicines from the options below, he should prefer? [1]
a) Antibiotic
b) Analgesic
c) Antiseptic
d) Antacid

7. The functional group –CHO is present in: [1]
a) Ketone
b) Aldehyde
c) Alcohol
d) Carboxylic acid

8. Shilpa wanted to cross the road. She looked on either side of the road and then walked across to the other side of the road.
Which of the following is/are involved in the process described above? [1]
I) Cerebrum
II) Cerebellum
III) Skeletal muscles
IV) Medulla oblongata
a) Only III
b) Only I and III
c) Only I, III and IV
d) Only I, II and III

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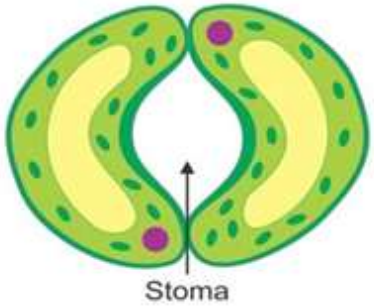
9. The diagram shows a single stoma in the epidermis. What is the state of the guard cells? What is the effect of this state on guard cells? [1]

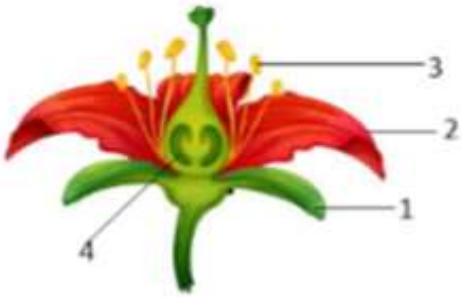


a) Turgid state: helps in decreasing the size of the stoma, i.e. opening the stomata.
b) Flaccid state: helps in decreasing the size of the stoma, i.e. opening the stomata.
c) Turgid state: helps in increasing the size of the stoma, i.e. opening the stomata.
d) Flaccid state: helps in increasing the size of the stoma, i.e. opening the stomata.

10. A pea plant with inflated pods denoted by WW is cross bred with a pea plant with constricted pods denoted by ww. State the expected ratio of the genotypes WW and Ww in the F_2 progeny. [1]

a) 1:3
b) 3:1
c) 1:2
d) 2:1

11. Which of the following parts protect the essential parts of the flower during the bud stage? [1]



a) 1 only
b) 2 only
c) 2 and 3
d) 4 only

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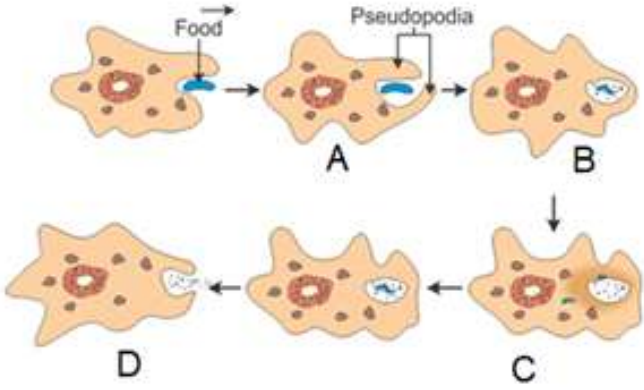
12. Observe the diagram of nutrition in *Amoeba*. Match the labeling referred to in column I with the process mentioned in column II. [1]



Column I	Column II
A	i. Food diffusing into cytoplasm
B	ii. Forming food vacuole
C	iii. Engulfing food within food vacuole
D	iv. Undigested food thrown out

a) A – i, B – ii, C – iii, D – iv
b) A – ii, B – iii, C – i, D – iv
c) A – iii, B – ii, C – iv, D – i
d) A – iv, B – ii, C – I, D – iii

13. A heater of resistance 30 ohm is connected to 220 V line. How much current will this heater draw? [1]

(a) 6.2 A
(b) 5.5 A
(c) 4 A
(d) 7.3 A

14. If the potential difference between the ends of a fixed resistor is doubled, the electric power will become [1]

a) double
b) half
c) one-fourth
d) four times

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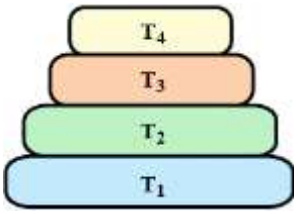
15. In the given figure, various trophic levels are shown in a pyramid. At which trophic level is minimum energy available?



(a) T_1
(b) T_2
(c) T_3
(d) T_4

16. Rajeev's father had ordered disposable plastic plates for his birthday to reduce the cleaning work. However, Rajeev convinced his father that instead of plastic, they should opt for paper plates. What could be the reason behind not using disposable plastic plates? [1]

(a) They are made of materials with light weight.
(b) They are inconvenient to handle.
(c) They are made of biodegradable materials.
(d) They are made of non-biodegradable materials.

Question No. 17 to 20 consists 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): If an acid reacts with a base, then salt and water are formed. [1]
Reason (R): This is an example of redox reaction.

18. Assertion (A): Offspring produced by sexual reproduction are likely to adjust better in environmental fluctuations. [1]
Reason (R): There is mixing of genetic material from the two parents during the fusion of gametes.

19. Assertion (A): The second trophic level of a food chain operating in a grassland is mostly occupied by a carnivore. [1]
Reason (R): Carnivores feed on herbivores and are secondary consumers.

20. Assertion (A): When light rays enter the eyes, most of the refraction takes place at outer surface of cornea.
Reason (R): Cornea controls the size of the pupil. [1]

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SECTION - B

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

21. Karuna added some water to a syrupy liquid taken in a tube while working in the laboratory. The tube immediately cracked and the liquid which escaped out of it produced blisters on the skin of the student. What actually happened? [2]

22. A single ejaculation of semen from the penis contains about 300 million sperms. How is it that only one of them fertilizes with an egg? [2]

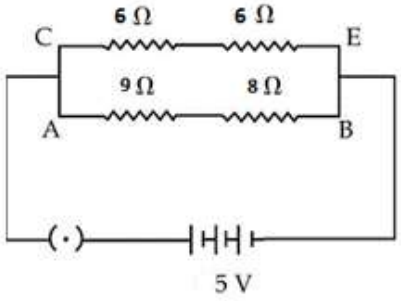
23. Why is the rate of breathing much faster in aquatic organisms than in terrestrial organisms? [2]

OR

Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

24. Draw ray diagrams to show the formation of image of an object by a concave mirror, when it is placed between its centre of curvature and focus also describe the nature of image formed for the given case. [2]

25. Study the circuit and find the



(i) Total resistance in arm CE
(ii) Current in arm AB [2]

OR

Draw a schematic labelled diagram of a closed circuit which connects all the given components in series and connected across a 12-V battery:
(i) 20 W lamp
(ii) An ammeter
(iii) A switch
(iv) 10 Ω/100 W resistor

26. In a certain study conducted on the occurrence of DDT along food chains in an ecosystem, the concentration of DDT in grass was found to be 0-5 ppm. In sheep, it was 2 ppm and in man it was 10 ppm. Why was the concentration of DDT maximum in case of man? [2]

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SECTION - C

Question No. 27 to 33 are short answer questions.

27. Ryan was helping his mother bake a cake for the first time. He accidentally uses baking soda instead of baking powder. After putting the cake in the oven, he noticed it was not rising properly and the taste of the cake turned out bitter. [3]

(a) Why didn't the cake rise properly as expected?
(b) Why did the cake taste bitter?
(c) What should have been done to fix both the issues?

28. Describe three reactions to show that chemical reactions are characterised by a change in colour. [3]

OR

Write the balanced equation for the chemical reactions involved when
(a) Chlorine is passed over dry slaked lime.
(b) Sodium bicarbonate reacts with dilute hydrochloric acid.
(c) Sodium bicarbonate is heated.

29. Which hormone would be released during the following situations? [3]
(a) Watching a horror movie
(b) Low blood sugar levels
(c) Growth of a child to an adult

30. A blue-flowered plant denoted by BB is cross-bred with a white-flowered plant denoted by bb. [3]
(a) State the colour of the flowers you would expect in the F_1 generation plants.
(b) What must be the percentage of white-flowered plants in the F_2 generation if flowers of F_1 plants are self-pollinated?
(c) State the expected ratio of the genotypes BB and Bb in the F_2 progeny.

31. Answer the following: [3]
(a) What according to you happens to the eyes when you enter a dark room from bright sunlight?
(b) Suggest how the iris helps protect the retina from damage by bright light.
(c) How do you compare the defect of a person wearing spectacles of +1.5 D to the one wearing spectacles of –1.5 D?

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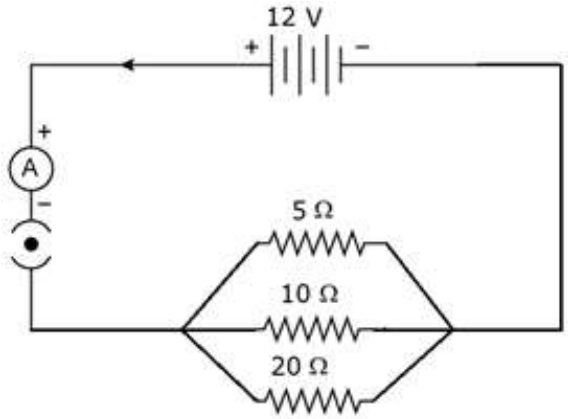
32. In the circuit given below, three resistors of 5 Ω, 10 Ω and 20 Ω, respectively, are connected across a battery of 12 V. [3]



Calculate:
(a) Current through each resistor
(b) Total current in the circuit
(c) Total resistance of the circuit

33. A 2 cm high object is placed at a distance of 20 cm from a concave mirror. A real image is formed at 40 cm from the mirror. Calculate the focal length of the mirror. Also, find the height of the image formed. [3]

SECTION - D

Question No. 34 to 36 are long answer questions.

34. What are hydrocarbons? Distinguish alkanes from alkenes and each of them from alkynes giving one example of each. Also draw the structures of each compound cited as an example to justify your answer. [5]

OR

An organic compound A (molecular formula $C_2H_4O_2$) reacts with Na metal to form a compound B and evolves a gas which burns with a pop sound. Compound A on treatment with an alcohol C in the presence of a little of concentrated sulphuric acid forms a sweet-smelling compound D (molecular formula $C_3H_6O_2$). Compound D on treatment with NaOH solution gives back B and C. Identify A, B, C and D and give the chemical reactions involved. [5]

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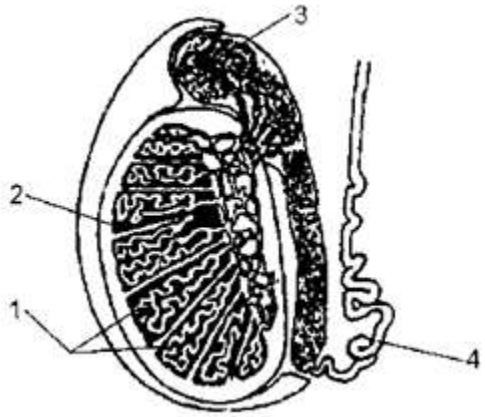
35. [5]

(a) Given below is a diagram of the lateral section of the human testis. Study the same and answer the questions which follow:



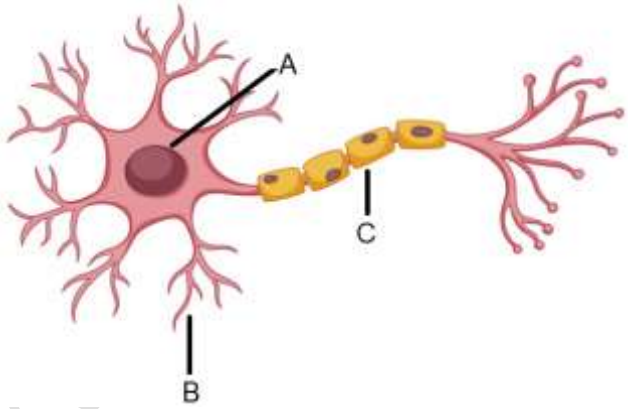
(i) State the functions of the parts labelled 2 and 3.

(ii) What is the significance of the testes being located in the scrotal sac outside the abdomen?

(b) A few tapioca plants remained in the farmland after harvest. Harvesting was done in summer. Then there was a summer rain. When these plants were harvested and the tubers eaten raw, they tasted sweet. Can you explain the reason for the sweet taste of the tubers?

OR

Given below is the structure of a neuron. A neuron helps in the conduction and transmission of nerve impulses.



(a) Name the parts labelled A, B and C.

(b) Which labelled part acquires information in the neuron?

(c) With reference to the given figure, how does information travel in a neuron?

(d) In what form does this information travel?

(e) Where is the impulse converted into a chemical signal for onward transmission?

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36.

(a) State the rule to determine the direction of:

(i) Magnetic field produced around a straight conductor carrying current

(ii) Force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it

(iii) Current induced in a coil due to its rotation in a magnetic field

(b) Differentiate between AC and DC. Write one advantage of AC over DC. [5]

OR

Tanmay is studying his air conditioner's energy consumption. The refrigerator has a power consumption of 800 watts and is connected to a 220 V power supply.

(a) How much energy will the refrigerator consume if it is kept ON for 10 hours each day for a week? Express your answer in MJ.

(b) Tanmay replaced his Air conditioner during the Diwali sale; the new one has a power rating of half of its initial value. How much energy will the new Air conditioner consume if it is kept ON for the same time?

(c) Also, find the amount he saves if the charge of 1 unit of electricity is 4 rupees.

(1 unit = 3.6 MJ) [5]

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. A news-article reported that India loses up to $100 billion annually to corrosion. Corrosion is a natural phenomenon that transforms a refined material into an undesirable, chemically more stable form. When the surface of a metal is attacked by air, moisture or any other substance around it, the metal is said to corrode, and the phenomenon is known as corrosion. Corrosion of metals can be prevented if the contact between the metal and air is cut off. [4]

(a) Explain following methods to cut off contact between metal and air.

(i) Galvanising

(ii) Electroplating

(b) Explain the terms rust and rusting. Give a name and composition of an alloy of iron.

OR

(c) Shilpa by mistake kept below shown articles made up of silver and copper in open air for few days in monsoon season. After a few days, she found that the colour of these articles had been changed. Give the reason for colour change and names of compounds formed if any.

(i) Silver article

(ii) Copper article

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38. Gregor Mendel conducted hybridisation experiments on garden peas for seven years and proposed the laws of inheritance in living organisms. He investigated characters in the garden pea plant that were manifested as two opposing traits e.g., tall and dwarf, yellow and green seeds, etc. Based on the given information, answer the following questions. [4]

(a) Among the seven pairs of contrasting traits in pea plant as studied by Mendel, how many traits were related to flower, pod and seed respectively?

(b) How many colour-based contrasting traits were studied by Mendel in pea plant?

(c) List the dominant and recessive traits studied by Mendel with respect to flower colour, pod colour and seed shape.

OR

Refer to the given table of contrasting traits in pea plant as studied by Mendel.
Which of the given traits are correctly placed? Rectify the incorrectly placed traits.

Character	**Dominant trait**	**Recessive trait**
(i) Seed colour	 Yellow	 Green
(ii) Flower colour	 Violet	 White
(iii) Pod shape	 Full	 Constricted
(iv) Flower position	 Terminal	 Axial

39. Many times, we hear about a building catching fire due to a short circuit. Sometimes, if an electrical appliance in our house is switched on, the fuse wire melts, and the electric supply shuts down. The home electrical connection consists of 'live', 'neutral' and 'earth' wires. The 'live' wire and 'neutral' wires have a potential difference of 220 V. The 'earth' wire is connected to the ground. Due to a fault in equipment, the two wires come in contact with each other and a large current flow through it producing heat. If any inflammable substance comes in contact with it, it can catch fire. When a high current flows in a circuit, the fuse wire melts and breaks the circuit and damage is avoided. In summers, huge electrical power is used in the evenings due to home lighting, fans, air conditioners etc. Thus, excessive current is drawn from the transformer supplying the electricity, and if the capacity of the transformer is insufficient, its fuse wire melts, and the supply shuts down.

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(a) Which type of circuit, series or parallel, is preferred while connecting electrical appliances at home? [1]

(b) What is the frequency of the AC supply in India? [1]

(c) Which condition occurs when too many appliances of high-power rating are connected to a single socket? [2]

OR

(c) 'Live and neutral wires have a potential difference of 220 V'. Explain the meaning of this statement in detail. [2]

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