Set-3

Series RST-DS2

Q.P. Code **RSPL/3**

Roll No. | | | | | | | | |

Candidates must write the Q.P. code on the title page of the answer-book.

- Please check that this question paper contains **15** printed pages.
- Please check that this question paper contains **39** questions.
- Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- **Please write down the Serial Number of the question in the answer-book before attempting it.**
- **15** minute time has been allotted to read this question paper. During this time, the students will read the question paper only and will not write any answer on the answer-book.

SCIENCE

Time allowed : 3 hours *Maximum Marks : 80*

***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** – Question Nos. **1** to **20** are multiple choice questions. Each question carries 1 mark.

(iv) **Section B** – Question Nos. **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** – Question Nos. **27** to **33** are short answer type questions. Each question carries **3** marks. Answer to these questions should in the range of 50 to 80 words.

(vi) **Section D** – Question Nos. **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** – Question Nos. **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

Question 1 to 16 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.

1. Which of the following statements about the reaction given below are correct?

$MnO_2 + 4HCl \longrightarrow MnCl_2 + 2H_2O + Cl_2$

(i) HCl is oxidised to Cl_2

(ii) MnO_2 is reduced to $MnCl_2$

(iii) $MnCl_2$ acts as an oxidising agent

(iv) HCl acts as an oxidising agent

(a) (ii), (iii) and (iv)

(b) (i), (ii) and (iii)

(c) (i) and (ii) only

(d) (iii) and (iv) only

2. An element 'X' is yellow coloured solid, insoluble in water but soluble in carbon disulphide. It has low melting point 114.5°C. It boils at 445°C and it burns with pale blue flame forming pungent smelling gas 'Y' which turns moist blue litmus red and finally colourless. 'X' and 'Y' are

(a) C, CO_2

(b) N, NO_2

(c) S, SO_2

(d) I_2, $I2_2O_5$

3. Which of the options in the given table are correct?

Option	Natural source	Acid present
(i)	Orange	Oxalic acid
(ii)	Sour milk	Lactic acid
(iii)	Ant sting	Methanoic acid
(iv)	Tamarind	Acetic acid

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

4. A solution of NaCl

(i) will turn red litmus blue.

(ii) will turn pH paper green.

(iii) will turn blue litmus red.

(iv) will not affect litmus.

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

5. When hydrogen sulphide gas is passed through a blue solution of copper sulphate, a black precipitate of copper sulphide is obtained and the sulphuric acid so formed remains in the solution. The reaction is an example of a:

(a) Combination reaction

(b) Displacement reaction

(c) Decomposition reaction

(d) Double displacement reaction

6. Reaction between X and Y, forms compound Z. X loses electron and Y gains electron. Which of the following properties is not shown by Z?

(a) Has high melting point

(b) Has low melting point

(c) Conducts electricity in molten state

(d) Occurs as solid

7. $C_6H_{12}O_6(aq) + 6O_2(aq) \longrightarrow 6CO_2(aq) + 6H_2O(l)$ The above reaction is a/an

(a) displacement reaction

(b) endothermic reaction

(c) exothermic reaction

(d) neutralisation reaction

8. In living organisms during respiration which of the following products are not formed if oxygen is not available?

(a) Carbon dioxide + water

(b) Carbon dioxide + Alcohol

(c) Carbon dioxide + Lactic acid

(d) Both (b) and (c)

9. Which option correctly shows the transport of oxygen to the cell?

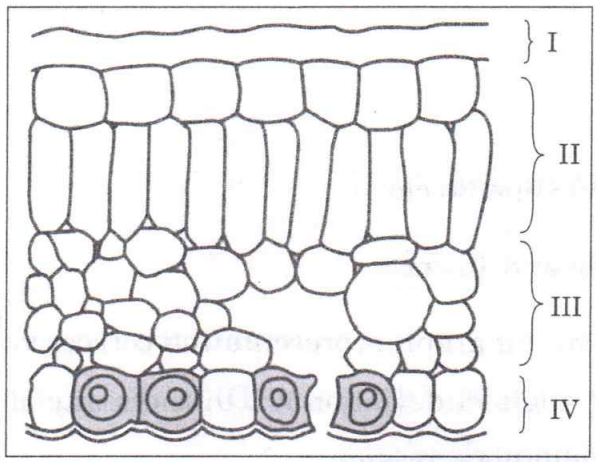
(a) Lungs → pulmonary vein → left atrium → lef ventricle → aorta → body cells

(b) Lungs → pulmonary vein → right atrium → right ventricle → aorta → body cells

(c) Lungs → pulmonary artery → left atrium → left ventricle → vena cava → body cells

(d) Lungs → pulmonary artery → right atrium → right ventricle → vena cava → body cells

10. In the given transverse section of the leaf identify the layer of cells where maximum photosynthesis occurs.

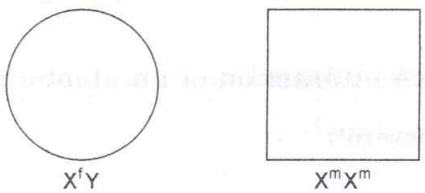


(a) I, II
(b) II, III
(c) III, IV
(d) I, IV

11. Involuntary actions in the body are controlled by

(a) medulla in forebrain
(b) medulla in midbrain
(c) medulla in hindbrain
(d) medulla in spinal cord

12. Two individuals are as shown using geometric shapes.



Their sex chromosomes are respectively denoted by X^f, X^m and Y. What are the possible combinations of sex chromosomes for their male and female offspring respectively?

(a) X^fX^m and X^mX^m
(b) X^mY and X^mX^m
(c) X^fY and X^mY
(d) X^mY and X^mX^f

13. The radius of curvature of a converging mirror is 30 cm. At what distance from the mirror should an object be placed so as to obtain a virtual image?

(a) Infinity

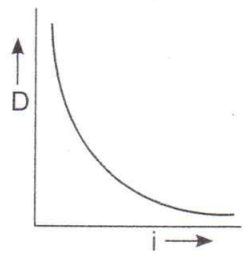
(b) 30 cm

(c) Between 15 cm and 30 cm

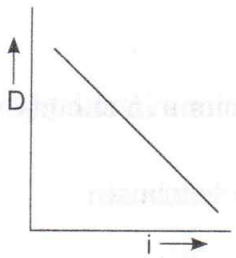
(d) Between 0 cm and 15 cm

14. Which of the following graph represents the correct variation of angle of incidence (i) and angle of deviation (D) in the study of refraction of light through a triangular glass prism?

(a)



(b)



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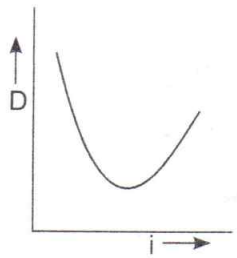
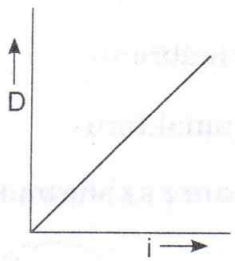


(d)



15. Which statement shows interaction of an abiotic component with a biotic component in an ecosystem?

(a) A grasshopper feeding on a leaf.

(b) Rainwater running down into a lake.

(c) An earthworm making a burrow in the soil.

(d) A mouse fighting with another mouse for food.

16. In the following food chain 10 J of energy was available to the peacocks. How much energy would have been present in grass?

Grass → Grasshopper → Frog → Snake → Peacock

(a) 10,000 J

(b) 1,00,000 J

(c) 100 J

(d) 10,00,000 J

Question No. 17 to 20 consist of two statements – Assertion (A) and Reason (R). Answer these questions by 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):** Copper does not reacts with dil. H_2SO_4.

Reason (R): Copper is more reactive than hydrogen.

18. **Assertion (A):** In human beings, males produce similar gametes.

Reason (R): Males have a pair of sex chromosomes XY and 22 pairs of autosomes.

19. **Assertion (A):** The word AMBULANCE on the hospital vans is written in the form of its mirror as ƎCNALUBMA

Reason (R): The image formed in a plane mirror is same size of the object.

20. **Assertion (A):** Vegetarian food habit is more beneficial to organisms.

Reason (R): Only 10% energy is available as food from one trophic level to next.

SECTION – B

Question No. 21 to 26 are Very Short Answer Questions.

21. 2 g of ferrous sulphate crystals are heated in a dry boiling tube.

(a) List any two observations.

(b) Name the type of chemical reaction taking place.

(c) Write the chemical equation for the reaction

22. Name two animals having cutaneous respiration. What special features of the skin make cutaneous respiration effective?

23. ***Attempt either option A or B***

A. "All plants give out oxygen during day and carbon dioxide during night". Do you agree with this statement? Give reason.

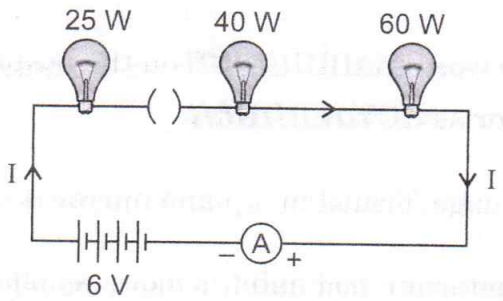
OR

B. Why is small intestine in herbivores longer than in carnivores?

24. A real image $\frac{2}{3}$rd of the size of the object is formed by a convex lens when the object is at a distance of 12 cm from it. Find the focal length of the lens.

25. ***Attempt either option A or B***

A. In the circuit given below:



(a) Would any bulb glow when plug key is in open position?

(b) Write the order of brightness of the bulb when key is closed. Give reason.

OR

B. A piece of wire of resistance R is cut into three equal parts. These parts are then connected in parallel. If the equivalent resistance of this parallel combination is R_1, what is the value of the ratio $R_1 : R$?

26. A lot of waste is generated in neighbourhood. However, almost all of it is biodegradable. What impact will it have on the environment or human health?

SECTION – C

Question No. 27 to 33 are Short Answer Questions.

27. You are given samples of three metals: Sodium, magnesium and copper. Suggest any two activities to arrange them in order of decreasing activity.

28. ***Attempt either option A or B***

A. (a) Out of the two — hydrochloric acid and acetic acid, which one is considered a strong acid and why? Write the name/molecular formula of one more strong acid.

(b) Name the metals which are soluble in aqua regia.

OR

B. Consider the following salts

(i) YCl (ii) NH_4X and (iii) ZCO_3.

(a) What would be pH of salt solution of YCl if Y is Na?

(b) If salt NH_4X, X is nitrate, then the solution will give what colour with universal indicator and why?

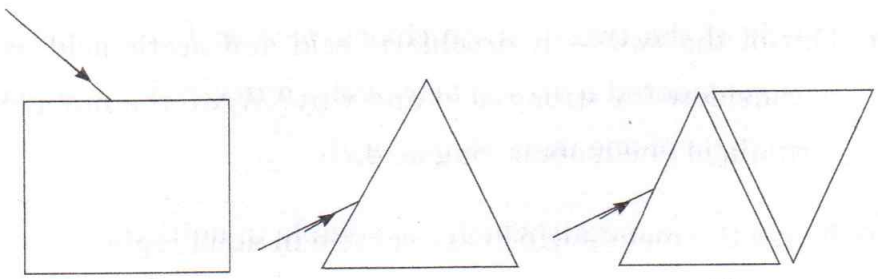
(c) What will be change in colour in blue litmus solution if ZCO_3 is added to it and 'Z' is potassium?

29. How is lymph an important fluid involved in transportation? If lymphatic vessels get blocked, how would it affect the human body? Elaborate.

30. (a) A study found that children with light-coloured eyes are likely to have parents with light-coloured eyes. On this basis, can we say anything about whether the light eye colour trait is dominant or recessive? Why or why not?

(b) Outline a project which aims to find the dominant coat colour in dogs. Consider coat colour in dogs as black and white.

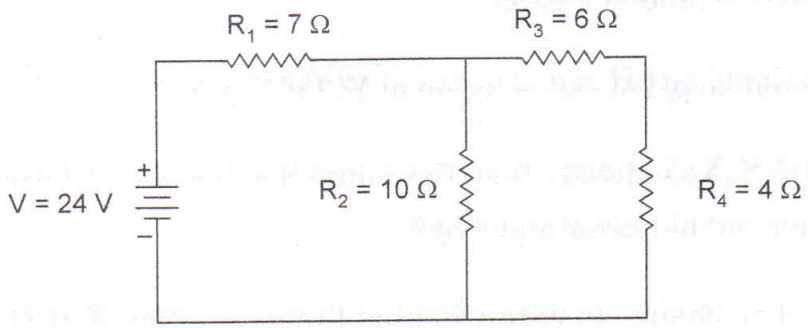
31. (a) A very thin narrow beam of white light is made incident on three glass objects as shown below. Comment on the nature of behaviour of the emergent beam in all three cases.



(i) (ii) (iii)

(b) There is a similarity between two of the emergent beams. Identify the two.

32.

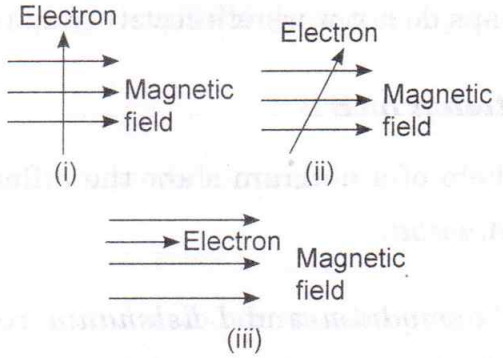


Calculate the total resistance of the circuit and find the total current in the circuit.

33. (a) State the rule used to find the force acting on a current carrying conductor placed in a magnetic field.

(b) Given below are three diagrams showing entry of an electron in a magnetic field. Identify the case in which the force will be

(1) maximum and (2) minimum respectively. Give reason for your answer.



SECTION – D

Question No. 34 to 36 are Long Answer Questions.

34. ***Attempt either option A or B***

A. The formulae of four organic compounds are given below:

A	B	C	D
C_2H_4	CH_3COOH	C_2H_5OH	C_2H_6

(a) Which one of these compounds A, B, C or D is a saturated hydrocarbon?

(b) Identify the organic acid and give its structural formula.

(c) Which of the above compounds when heated at 443 K in the presence of concentrated H_2SO_4 forms ethene as the major product? What is the role played by concentrated H_2SO_4 in this reaction? Also write the chemical equation involved.

(d) Give a chemical equation when B and C react with each other in presence of concentrated H_2SO_4. Name the major product formed and mention one of its important use.

OR

B. (a) What are isomers? Write the structures of two compounds having molecular formula C_3H_6O and give their names.

(b) What are soaps? How are they chemically different from detergents? Why do soaps do not work effectively in hard water?

35. ***Attempt either option A or B***

A. (a) With the help of a diagram show the different stages of binary fission in *Amoeba*.

(b) How do *Plasmodium* and *Leishmania* reproduce? Write one difference in their mode of reproduction.

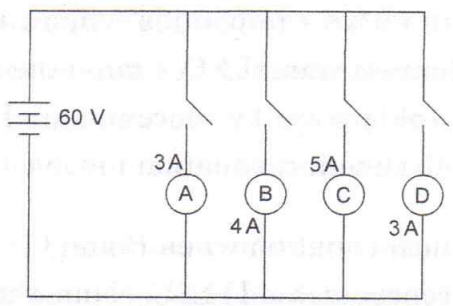
(c) Why are budding, fragmentation and regeneration all considered as asexual types of reproduction?

OR

B. What is a seed? What are the parts of a seed? Explain with the help of a labelled diagram. What are the advantages of seed formation for the plant?

36. ***Attempt either option A or B***

A. In the given circuit, A, B, C and D are four lamps connected with a battery of 60V



Analyse the circuit to answer the following questions.

(a) What kind of combination are the lamps arranged in (series or parallel)?

(b) Explain with reference to your above answer, what are the advantages (any two) of this combination of lamps?

(c) Explain with proper calculations which lamp glows the brightest?

(d) Find out the total resistance of the circuit.

OR

B. (a) Though same current flows through the electric line wires and the filament of bulb, yet only the filament glows. Why?

(b) The temperature of the filament of bulb is 2700 °C when it glows. Why does it not get burnt up at such high temperature?

(c) The filament of an electric lamp, which draws a current of 0.25 A is used for four hours. Calculate the amount of charge flowing through the circuit.

(d) An electric iron is rated 2 kW at 220 V. Calculate the capacity of the fuse that should be used for the electric iron.

SECTION – E

Question No. 37 to 39 are case-based/data-based questions.

37. The metal reactivity series lists metals according to their reactivity. The more reactive metals are placed at the top of the list. While the less reactive metals are placed near the bottom of the series. Less reactive metals like silver, gold and platinum occur in their native form along with the earthy impurities. Elements or compounds which occur naturally in the earth's

crust are known as minerals. Minerals from which metals can be extracted are known as ores. Different techniques are used for obtaining metals falling in metals of low reactivity, metals of medium reactivity and metals of high reactivity.

(a) Which reduction process is used to obtain the following metals from their compounds? Explain.

(i) Metal X which is low in reactivity series

(ii) Metal Y which is in the middle of reactivity series

(iii) Metal Z which is high in the reactivity series

Attempt either subpart (b) or (c)

(b) What is the process of removing impurities from an ore known as?

OR

(c) Name an ore of mercury and copper.

38. Plants do not move but they respond to their environment. It means their cells must be able to communicate with other cells. Hormones send messages between the cells. Plant hormones or phytohormones are also known as plant growth substances as they coordinate the activities of plants by controlling one or other aspect of the growth of the plant. The growth of the plant can be divided into three stages: cell division, cell enlargement and cell differentiation which occur in particular locations in a plant. The phytohormones also promote dormancy in seeds and buds, breaking of dormancy, stomata control, wilting and falling of leaves, fruit growth, ripening of fruits and delay in ageing of plants. The plant hormones are synthesised at places away from where they act and simply diffuse to the area of action.

(a) Name a plant hormone that inhibits growth.

Attempt either subpart (b) or (c)

(b) Write two function of gibberellins.

OR

(c) Write two functions of cytokinins.

(d) Which hormone is synthesied when growing plants detect light? Where it is synthesied?

39. Study the data given below showing the focal length of three concave mirrors A, B and C and the respective distances of objects placed in front of the mirrors :

Case	Mirror	Focal Length (cm)	Object Distance (cm)
1	A	20	45
2	B	15	30
3	C	30	20

(a) In which one of the above cases the mirror will form a diminished image of the object? Justify your answer.

(b) List two properties of the image formed in case 2.

Attempt either subpart (c) or (d)

(c) What is the nature and size of the image formed by mirror C? Draw ray diagram to justify your answer.

OR

(d) An object is placed at a distance of 18 cm from the pole of a concave mirror of focal length 12 cm. Find the position of the image formed in this case.