Set-2

Series RST-DS2

Q.P. Code **RSPL/2**

Roll No. [redacted]

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

- Please check that this question paper contains **16** 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. What happens when a solution of an acid is mixed with a solution of a base in a test tube?

(i) The temperature of the solution increases

(ii) The temperature of the solution decreases

(iii) The temperature of the solution remains the same

(iv) Salt formation takes place.

(a) (i) only (b) (i) and (iii)

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

2. Sodium and chlorine react to form sodium chloride. Which of the following is correct?

(a) Sodium is oxidising agent, Cl_2 is reducing agent.

(b) Sodium is reducing agent, Cl_2 is oxidising agent.

(c) Both Na and Cl_2 are oxidising agents.

(d) Both Na and Cl_2 are reducing agents.

3. $MnO_2 + xHCl \longrightarrow MnCl_2 + yH_2O + zCl_2$,

In order to balance the chemical equation x, y, z respectively are

(a) 6, 2, 2 (b) 4, 1, 2

(c) 4, 2, 1 (d) 2, 2, 1

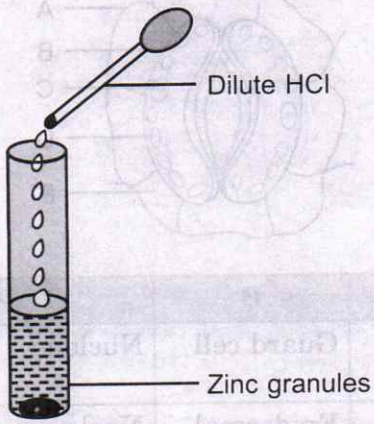
4. Match the chemical substances given in Column (A) with their appropriate application given in Column (B).

Column (A)	Column (B)
A. Bleaching powder	(i) Preparation of glass
B. Baking soda	(ii) Production of H_2 and Cl_2
C. Washing soda	(iii) Disinfectant
D. Sodium chloride	(iv) As an antacid

(a) A—(ii), B—(i), C—(iv), D—(iii) (b) A—(iii), B—(ii), C—(iv), D—(i)

(c) A—(iii), B—(iv), C—(i), D—(ii) (d) A—(ii), B—(iv), C—(i), D—(iii)

5. A student added dilute HCl to Zn granules taken in a test tube. The correct observation would be



(a) Zn granules turned green (b) formation of a precipitate

(c) evolution of gas (d) no change

6. $CaOCl_2$ will liberate Cl_2 gas in presence of

(i) CO_2 (ii) HCl (iii) CO (iv) NO

(a) (i) and (ii) (b) (ii) and (iii)

(c) (i) and (iv) (d) (ii) and (iv)

7. 1 mole of ethene and 1 mole of ethyne are separately made to completely undergo addition reaction to form the respective saturated compound.

Which of the following will be DIFFERENT for the two reactions?

(P) The number of moles of the saturated compound formed.

(Q) The number of moles of the hydrogen consumed.

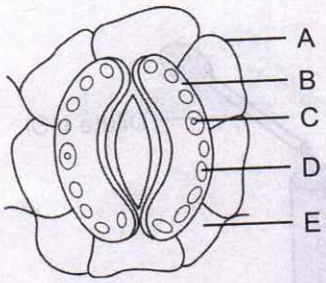
(a) only (P)

(b) only (Q)

(c) both (P) and (Q)

(d) neither (P) nor (Q)

8. Four students made the diagram of stomata and tabulated the labellings as follows:



Student	A	B	C	D	E
(P)	Epidermal cell	Guard cell	Nucleus	Cell wall	Chloroplast
(Q)	Guard cell	Epidermal cell	Nucleus	Chloroplast	Cell wall
(R)	Cell wall	Guard cell	Nucleus	Chloroplast	Epidermal cell
(S)	Epidermal cell	Guard cell	Nucleus	Chloroplast	Cell wall

The student who made the correct labelling is

(a) P

(b) Q

(c) R

(d) S

9. Select out of the following a gland which does NOT occur as a pair in the human body.

(a) Pituitary
(b) Adrenal
(c) Ovary
(d) Testis

10. If a tall pea plant is crossed with a pure dwarf pea plant then, what percentage of F_1 and F_2 generation respectively will be tall?

(a) 25%, 25%
(b) 50%, 50%
(c) 75%, 100%
(d) 100%, 75%

11. The correct sequence of organs in the male reproductive system for transport of sperms is:

(a) testis → vas deferens → urethra
(b) testis → ureter → urethra
(c) testis → urethra → ureter
(d) testis → vas deferens → ureter

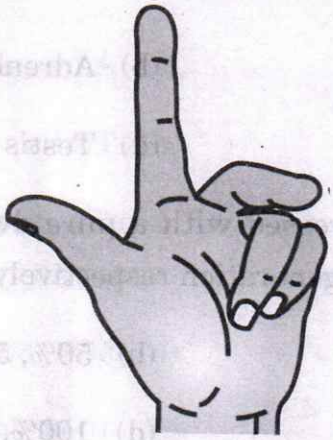
12. The transport of soluble products of photosynthesis like glucose from one part to the other parts of the plants is known as

(a) transportation
(b) translocation
(c) transpiration
(d) both (b) and (c)

13. Priya has three resistors each of resistance 2 Ω. Which of the following resistances will she not be able to get by combining these resistors in different combinations?

(a) 6 Ω
(b) 3 Ω
(c) 0.75 Ω
(d) 0.67 Ω

14. The figure given below represents:



(a) Flemming's right-hand thumb rule

(b) Maxwell's left hand thumb rule

(c) Maxwell's corkscrew rule

(d) Flemming's left-hand rule

15. An object of height 4 cm is kept at a distance of 30 cm from the pole of a diverging mirror. If the focal length of the mirror is 10 cm, the height of the image formed is

(a) + 3.0 cm (b) + 2.5 cm

(c) + 1.0 cm (d) + 0.75 cm

16. The basic cause of refractive error that makes far-away objects look blurry is

(a) decrease in the focal length of eye-lens.

(b) increase in the focal length of eye-lens.

(c) decreasing curvature of eye-lens.

(d) weakening of ciliary muscles.

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):** Homologous series is a series of compounds in which the members present have the same functional group and similar chemical properties.

Reason (R): Any two successive members in a particular homologous series differ in their molecular formula by a $—CH_2$ unit.

18. **Assertion (A):** A pair of testis is located inside scrotum which is present outside the abdominal cavity.

Reason (R): Testes produce male germ cells and release male sex hormone.

19. **Assertion (A):** Electrical power is the rate at which electric energy is consumed by an appliance.

Reason (R): The power of an appliance is 1 watt if one ampere of current flows through it on applying a potential difference of 1 volt across its ends.

20. **Assertion (A):** Height in pea plants is controlled by efficiency of enzymes and is thus genetically controlled.

Reason (R): Cellular DNA is the information source for making proteins in the cell.

SECTION – B

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

21. Mention the basis of classifying substances as biodegradable and non-biodegradable. Give two examples of each.

22. (a) Name one gustatory receptor and one olfactory receptor present in human beings.

(b) Write i and ii in the given flow chart of neuron through which information travels as an electrical impulse.

Dendrite → i → ii → End point of Neuron

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

A. (a) Reema's mother does not have gall bladder as it was removed surgically due to presence of stones in it. She was advised by her doctor to eat less oily food. Why has she been advised to do so?

(b) What are the final products of fats after their complete digestion? Where does complete digestion of fats take place?

OR

B. Explain the mechanism:

(a) by which fishes breathe in water.

(b) of breathing in human beings.

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

A. When we place a glass prism in the path of a narrow beam of white light, a spectrum is obtained. What happens when a second identical prism is placed in an inverted position with respect to the first prism. Draw a labelled ray diagram to illustrate it.

OR

B. Draw a ray diagram to show the refraction of light through a glass prism. Mark on it (a) the incident ray, (b) the emergent ray and (c) the angle of deviation.

25. What happens when NaCl solution reacts with $AgNO_3$ solution? Name the two types of reaction to which it belongs.

26. In an asexually reproducing species, a trait 'A' exists in 10% of a population and trait 'B' exists in 75% of the same population. Which of the two traits is likely to have arisen earlier? Give reason.

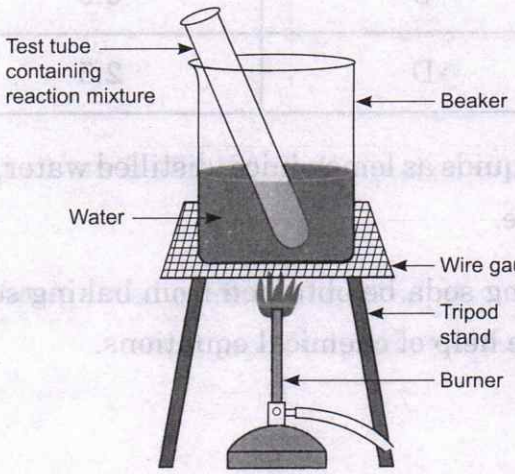
SECTION – C

Question No. 27 to 33 are Short Answer Questions.

27. (a) Rahul is very careful in disposing off the waste generated at home as he knows improper waste disposal is not good to the environment. Explain.

(b) What is the role of decomposers in an ecosystem?

28. Study the given diagram carefully and identify the reaction mixture which contains two carbon compounds 'A' and 'B'. In compound 'A' the functional group present is $-\overset{\overset{O}{\|}}{C}-OH$ and in compound 'B' the functional group present is —OH. Reaction between 'A' and 'B' results in the formation of a compound 'C'.



(a) Identify the compounds A, B and C.

(b) Why is the reaction mixture heated on a water bath?

(c) Write the chemical reaction involved between A and B.

29. An object is placed perpendicular to the principal axis of a convex lens of focal length 20 cm. The distance of the object from the lens is 30 cm. Find: (a) the position (b) the magnification and (c) the nature of the image formed.

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

(a) Write the chemical equation involved in the preparation of sodium hydroxide. Name the process.

(b) Why does bleaching powder smell strongly of chlorine and does not dissolve completely in water?

OR

(a) The pH value of four different liquids is given in the table below.

Liquid	pH
A	14.0
B	7.0
C	6.0
D	2.5

Classify these liquids as lemon juice, distilled water, 1 M NaOH solution and tomato juice.

(b) How can washing soda be obtained from baking soda? Illustrate your answer with the help of chemical equations.

31. Give reasons:

(a) In a bisexual flower, inspite of the young stamens being removed artificially the flower produces fruit.

(b) All multicellular organisms cannot give rise to new individuals through fragmentation or regeneration.

(c) Sexual reproduction promotes diversity of characters in the offspring.

32. (a) A magnetic compass needle shows a deflection when placed near a current carrying wire. How will the deflection get affected if the current in the wire is decreased?

(b) A thin beam of moving alpha particles produce a magnetic field while neutrons do not produce any magnetic field. Explain.

(c) Can a freely suspended current carrying solenoid stay in any direction? Justify your answer.

33. The stars appear slightly higher than their actual positions in the sky. Explain why it is so. Draw a diagram also.

SECTION – D

Question No. 34 to 36 are Long Answer Questions.

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

A. (a) It is observed that covalent compounds are bad conductors of electricity. Give reason.

(b) Carbon can neither form C^{4+} cation and nor C^{4-} anion. Explain.

(c) Draw electron dot structure of ethanol.

(d) Identify the heteroatom (s) in the following compounds.

(i) $CH_3CH_2-\underset{\underset{O}{\|}}{C}-CH_3$

(ii) CH_3CH_2Cl.

OR

B. Soaps and detergents are both types of salts. State the difference between the two. Write the mechanism of the cleaning action of soaps. Why do soaps not form lather (foam) with hard water? Mention any two problems that arise due to the use of detergents instead of soaps.

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

A. (a) Human beings produce two different types of gametes by the process of cell division i.e. meiosis and gametes have chromosomal difference. What is the importance of the chromosomal difference of the two types of gametes of human beings?

(b) What are chromosomes? Where are they located in the cell?

(c) What is the law of dominance of traits? Explain the law by taking an example of plants having red coloured (RR) and white coloured flowers (rr).

OR

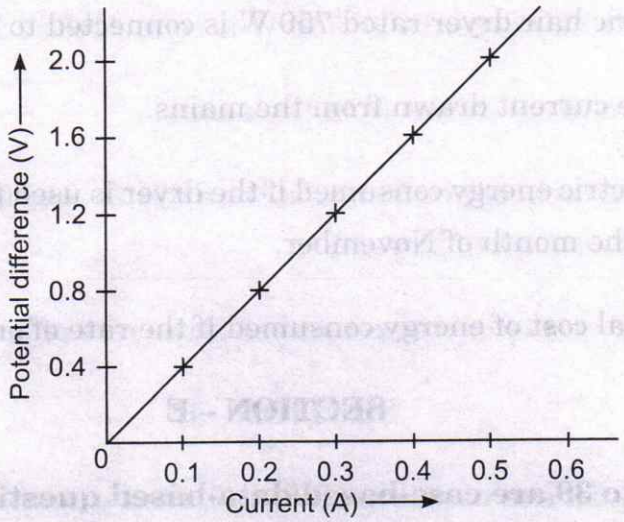
B. (a) Why is DNA copying necessary during reproduction?

(b) What is law of segregation of traits? Explain the law by taking an example of animals having white fur (WW) and brown fur (ww).

(c) Identify the phenotypes of F_1 generation and genotypes of F_2 generation where the parent animals have white fur (WW) and calculate the percentage of brown fur animals.

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

A. (a) A child draws a V-I graph for a nichrome wire which is shown below. Study the graph and state what do you infer from this graph. State the law which helps you to find the inference.

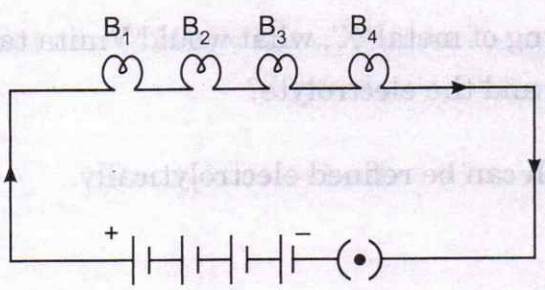


(b) Draw a labelled circuit diagram to obtain such a law.

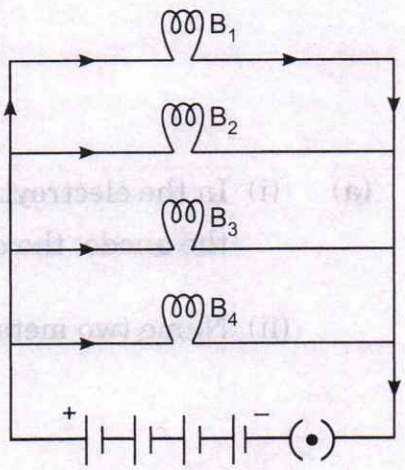
(c) A nichrome wire having resistance 10 Ω has length l and area of cross-section A. What would be the resistance of another wire of same material having length $\frac{l}{2}$ and area of cross-section 2 A?

OR

B. Study the given circuit carefully in which four bulbs are connected in (A) series and in (B) parallel with a battery of 6 V and answer the following questions.



(A)



(B)

(a) Will the bulbs in both the circuits glow with the same brightness? Justify your answer.

(b) What will happen to the glow of bulbs in circuit (i) if bulb B_3 gets fused?

(c) An electric hair dryer rated 750 W is connected to 220 V. Find:

(i) The current drawn from the mains.

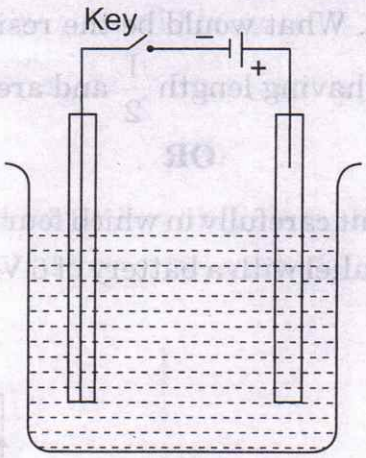
(ii) Electric energy consumed if the dryer is used for 10 minutes daily in the month of November.

(iii) Total cost of energy consumed if the rate of one unit is ₹ 6.

SECTION – E

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

37. Vinita draws the electrolytic refining of metal 'X' as shown below.



(a) (i) In the electroytic refining of metal 'X', what would Vinita take as the anode, the cathode and the electrolyte?

(ii) Name two metals which can be refined electrolytically.

Attempt either subpart (b) or (c)

(b) (i) What other name can be given to the following reaction other than thermit reaction?

$$Fe_2O_3\,(s) + 2Al\,(s) \longrightarrow 2Fe\,(l) + Al_2O_3\,(s) + Heat$$

(ii) Identify the substances that are getting oxidised and reduced in the above reaction.

OR

(c) List the different steps used to extract mercury from its ore.

38. Green plants are called the life supporters of the world as they synthesise food using the sunlight through the process of photosynthesis. The food prepared by green plants supports all other life on our planet. The leaves are called kitchen of the plants. Water also plays an important role in plant life processes like transpiration and photosynthesis.

(a) Name the elements of xylem which transport water and minerals in the upward direction.

Attempt either subpart (b) or (c)

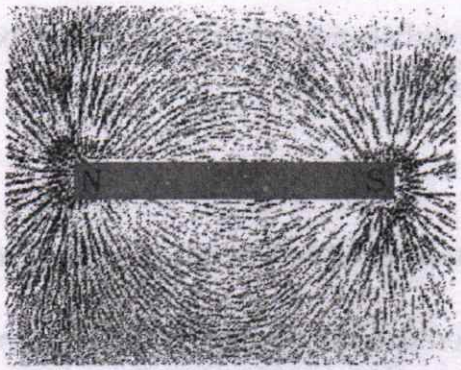
(b) Explain the mechanism of transport of water and minerals in plants.

OR

(c) The food prepared by the leaves is transported to other parts of the plant. How is food transported in plants?

(d) You must have seen the plants on the road side are mostly covered with certain deposits like dust and smoke. Mention three processes which may be hampered due to the dust and smoke on the leaves.

39. Ashwini fixes a sheet of white paper on a drawing board using cello tape. He places a bar magnet in the centre of it and sprinkles some iron filings uniformly around the bar magnet. After tapping the board gently, he observes that the iron filings arrange themselves in a particular pattern as shown in the given figure.



(a) Why do iron filings arrange in a particular pattern?

(b) What does the crowding of iron filings at the end of the bar magnet indicate?

Attempt either subpart (c) or (d)

(c) What do the lines along which the iron filings align, represent? Write the properties of these lines.

OR

(d) Define magnetic field of a bar magnet. List two factors that affect the strength of a magnetic field at a point due to a straight current carrying conductor.