Series RST-DS1

Code No. RSPL/2

Roll No. | | | | | | | |

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

- Please check that this question paper contains **16** printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-sheet by the candidate.
- Please check that this question paper contains **39** questions.
- **Please write down the Serial Number of the question before attempting it.**
- **15** Minutes time has been alloted to read this question paper.

SCIENCE (Theory)

Time allowed : 3 hours *Maximum Marks : 80*

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. A student is expected to attempt only one of these questions.*

(iii) ***Section A** consists of **20** Objective type questions carrying **1** mark each.*

(iv) ***Section B** consists of **6** Very Short questions carrying **2** 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 **3** marks each. Answers to these questions should be in the range of **50** to **80** words.*

(vi) ***Section D** consists of **3** Long Answer type questions carrying **5** marks each. Answer to these questions should be in the range of **80** to **120** words.*

(vii) ***Section E** consists of **3** Source-based / Case-based units of assessment of **04** marks each with sub-parts.*

SECTION–A

(Select and write one most appropriate option out of the four options given for each of the questions 1 – 20)

1. On seeing a tiger, Aditi instantly jumped back. She then slowly moved from the spot. Which of the following statements give/s the correct difference between jumping and slowly walking away?

   (i) Instant jumping is an involuntary reflex action.

   (ii) Walking away is a voluntary action controlled by the cerebrum.

   (iii) Instant jumping is an involuntary action controlled by the brain.

   (iv) Walking away is a voluntary action controlled by the cerebellum. **1**

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

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

2. A child heated ferrous sulphate crystals in a dry test tube. Which of the following is not the correct observation made by her? **1**

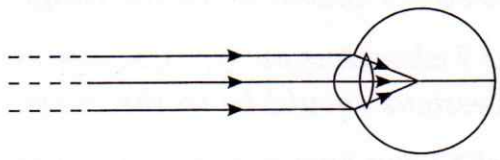
   (a) The colour of ferrous sulphate crystals changed from light green to white.

   (b) Brown gas is evolved.

   (c) Gas with choking smell is evolved.

   (d) The white crystals of ferrous sulphate on further heating change to brown black.

3. Which one of the defects of vision has been shown in the figure given below? **1**



   (a) Far-sightedness (b) Myopia

   (c) Presbyopia (d) Hypermetropia

4. Abhir's doctor suggested him to use contraceptive methods to keep a gap between the two children. He thought to use mechanical barrier method which not only prevents sperms to reach the egg but also helps in prevention of transmission of sexually transmitted diseases. Which one of the following method does he use? 1

(a) Surgical method (b) Use of condom

(c) Use of chemicals (d) Use of copper-T

5. A current of 1 mA is drawn by the filament of an electric bulb. What would be the number of electrons which pass through a cross-section of the filament in 8 sec? 1

(a) 5×10^{20} (b) 5×10^{16}

(c) 5×10^{17} (d) 5×10^{18}

6. A coil of many circular turns of insulated copper wire wrapped closely in the shape of a cylinder is a solenoid. Identify the incorrect statement regarding solenoid. 1

(a) The pattern of magnetic field lines around a current carrying solenoid is different from the pattern of magnetic field lines around a bar magnet.

(b) One end of a solenoid behaves as a magnetic north pole, while the other behaves as the south pole.

(c) The field lines are in the form of parallel straight lines inside the solenoid.

(d) A solenoid can be used to magnetise a piece of magnetic material.

7. Select the incorrect statement.

All green plants and blue-green algae are called producers as 1

(a) they contain chlorophyll and capture the energy from the sun.

(b) they convert solar energy into chemical energy

(c) they prepare their food using inorganic substances by the process of photosynthesis.

(d) during the process of photosynthesis, they use oxygen and give out carbon dioxide.

8. The wires that carry current in our homes have a coating of an insulating material. The material generally used is: **1**

(a) Graphite (b) CFC

(c) Diamond (d) PVC

9. Mahima went to a nursery along with her parents and saw beautiful flowers. She wondered whether the information she knew was true or not. She wrote few statements. Now find out which of the following statements are true for flowers? **1**

(i) Flowers are produced by both gymnosperms and angiosperms.

(ii) Flowers are sexual reproductive organs.

(iii) Flowers are always bisexual.

(iv) After fertilisation, flowers give rise to fruits.

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

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

10. The table given below shows the resistivity of four materials A, B, C and D. **1**

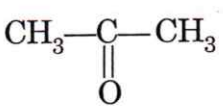
Material	A	B	C	D
Resistivity	1.60×10^{-6}	1.84×10^{-10}	4.4×10^{6}	6.0×10^{17}

Which one of the following is the best conductor?

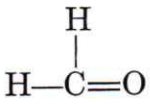
(a) A (b) B

(c) C (d) C

11. Neetu got confused with the nomenclature of hydrocarbons. She writes different names for the following compounds. Which option from the following is correct? 1



(i)



(ii)

(a) (i) –Propanol (ii) –Methanol

(b) (i) –Propanone (ii) –Methanal

(c) (i) –Propanal (ii) –Methanoic acid

(d) (i) –Propanoic acid (ii) –Methanone

12. If a white flowered plant (pp) is crossed with a purple flowered plant (PP) then, what percentage of F_1 and F_2 generation respectively will be purple? 1

(a) 100%, 75% (b) 75%, 100%

(c) 50%, 50% (d) 100%, 50%

13. A child observed a patch of greenish- black powdery mass on a stale piece of bread. Which of the following organism is responsible for this and its specific mode of asexual reproduction? 1

(a) *Rhizobium* and spore formation

(b) Bread mould and fragmentation

(c) *Rhizopus* and budding

(d) *Rhizopus* and spore formation

14. Curd cannot be stored in

(i) Brass vessel (ii) Copper vessel

(iii) Steel vessel (iv) Bronze vessel 1

(a) (i), (ii), (iii) (b) (ii), (iii), (iv)

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

15. A strong magnetic field produced inside a solenoid can be used to magnetise a piece of magnetic material like 1

(a) soft iron (b) hard iron

(c) steel (d) stainless steel

16. Which of the following reactions will not take place? 1

(a) $2KBr + Cl_2 \rightarrow KCl + Br_2$

(b) $Mg + FeSO_4 \rightarrow MgSO_4 + Fe$

(c) $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

(d) $Zn + MgSO_4 \rightarrow ZnSO_4 + Mg$

Q. no 17 to 20 are Assertion – Reasoning based questions.

These consist 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):** As human beings occupy the top of any food chain, the maximum concentration of these chemicals get accumulated in the human body. 1

Reason (R): Food chain helps to understand the movement of toxic substances in an ecosystem and the problem of their biological magnification.

18. **Assertion (A):** During the process of combustion, hydrocarbon compounds burn in air to give carbon dioxide, water, heat and light. 1

Reason (R): Only saturated hydrocarbon compounds burn in air to produce carbon dioxide, water, heat and light.

19. **Assertion (A):** The cerebellum is the main thinking part of the brain. 1

Reason (R): The cerebellum controls all the voluntary actions and the posture and maintains balance of the body.

20. **Assertion (A):** When light travels obliquely from one medium to another, the direction of propagation of light in the second medium changes. 1

Reason (R): Refraction is due to the change in the speed of light when it travels from one medium to another.

SECTION–B

Q. no. 21 to 26 are Very Short answer questions.

21. The near point of a hypermetropic eye is 50 cm. What is the nature and power of the lens required to enable him to read a book placed at 25 cm from the eye? 2

22. The molecular formula of a carbon compound 'A' is $C_3H_6O_2$.

(a) Identify the compound 'A' and name the functional group it possesses.

(b) If solution of 'A' reacts with a solution of strong base, what would happen? Write chemical equation for the reaction involved. 2

23. Draw a diagram of human brain and mark the regions responsible for

(a) memory and reasoning

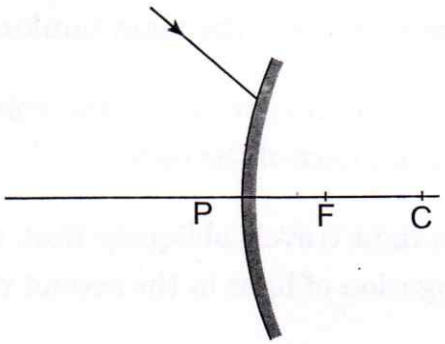
(b) regulating respiration **2**

OR

(a) How is human brain protected from injuries and mechanical shocks?

(b) How is spinal cord protected and from where it originates?

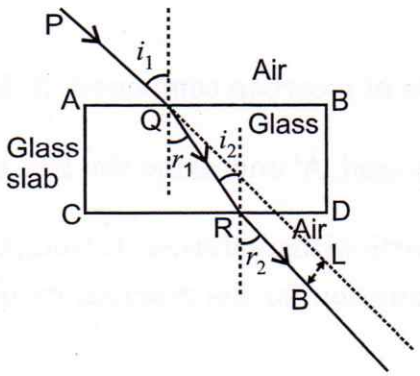
24. A ray of light is incident on a convex mirror as shown.



Redraw the diagram and complete the path of this ray after reflection from the mirror. Mark angle of incidence and angle of reflection on it. **2**

OR

The ray of light emerges parallel to the incident ray as shown during refraction of light through a rectangular glass slab.



(a) Why does the ray emerge parallel to the incident ray?

(b) What happens when a ray of light is incident normally to the interface of two media?

25. A concave lens of focal length 15 cm forms an image 10 cm from the lens. How far is the object placed from the lens? **2**

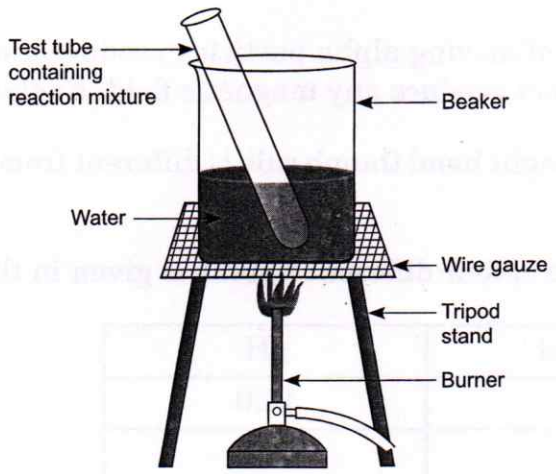
26. (a) In single-celled organisms, no specific organs for taking in food, exchange of gases or removal of wastes are present. How do these organisms meet their oxygen requirements?

(b) How does *Paramoecium* obtain its food? **2**

SECTION–C

Q.no. 27 to 33 are Short answer questions.

27. 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 both?

(c) State the chemical reaction involved between A and B. **3**

28. 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) Sperms and ova have half the number of chromosomes whereas the zygote formed after the fertilisation of a sperm and an ovum has same number of chromosomes as parents. **3**

29. (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? **3**

30. (a) What is reflex action? Why reflex arcs have evolved in animals?

(b) Trace the sequence of events which occur when a bright light is focussed on your eyes. **3**

31. (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) In what way right hand thumb rule is different from Fleming's left hand rule? **3**

32. (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	2.0

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. 3

33. (a) Classify the given wastes into two categories-biodegradable and non-biodegradable waste.

Leather purse, Plastic bag, Fruit peels, Egg shells.

(b) Suggest one method of disposal for each type of waste.

(c) List one impact of each type of the accumulated waste on environment if not disposed off properly. 3

OR

State the disadvantage

(a) To the organisms belonging to the 4th or 5th trophic levels in a food chain.

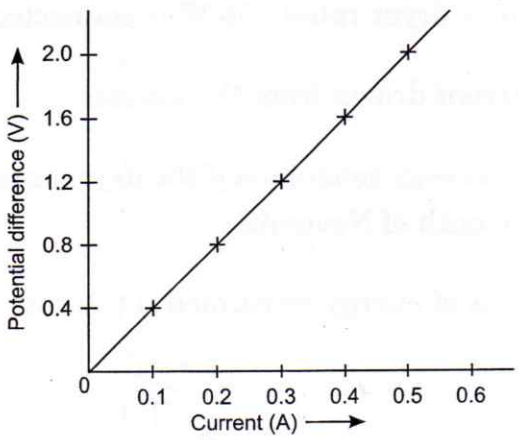
(b) If a cereal plant is grown in the soil rich the pesticides and fertilisers.

(c) Of using plastic bags on the environment.

SECTION–D

Q.no. 34 to 36 are Long answer questions.

34. (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.

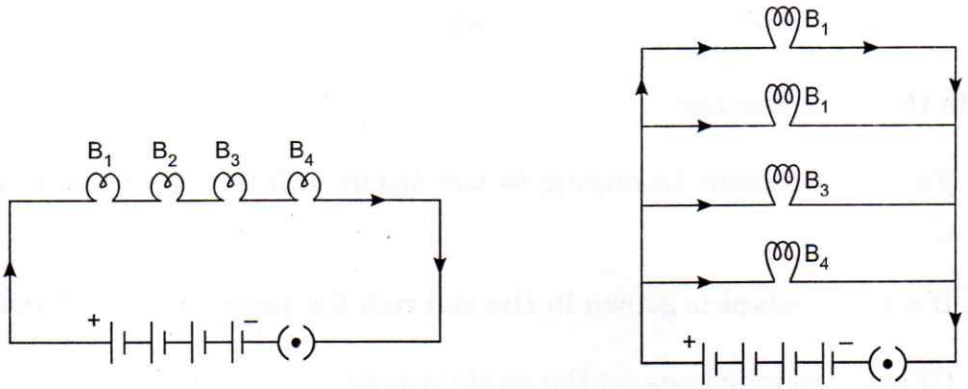


(b) Draw a labelled circuit diagram to obtain such a law.

(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 $2A$? **5**

OR

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



(i) (ii)

(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.

35. (a) A metal ribbon 'A' burns in oxygen with a dazzling white flame forming a white ash 'B'.

(i) Identify 'A' and 'B'.

(ii) What type of reaction and type of oxide are formed during the burning of ribbon 'A'?

(b) A child mixed the solutions of lead nitrate and potassium iodide and made some observations.

(i) What was the colour and name of precipitate formed?

(ii) State the type of reaction. Define it also.

(iii) Write balanced chemical equation for the above reaction. **5**

OR

(a) Ankita on heating blue coloured powder of 'X' in a boiling tube obtained black coloured substance 'Y', oxygen gas and a brown coloured gas 'Z'.

(i) Identify 'X', 'Y' and 'Z' and the type of reaction.

(ii) Write a balanced chemical equation of the reaction.

(iii) What could be the pH range of aqueous solution of the gas 'Z'?

(b) Give reasons:

(i) Silver articles turn black when kept in the air for a few days.

(ii) The taste and smell of some food materials change when left for a long time.

Name the phenomenon involved in (i) and (ii).

36. (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). **5**

OR

(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.

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. The melting and boiling points of some compounds are given below:

Compound	Melting Point (K)	Boiling Point (K)
Aluminium chloride	465	653
Sodium chloride	1074	1686
Calcium oxide	2850	3100
Magnesium oxide	3125	3573

4

(a) It was found that these compounds are solids and have high melting and boiling points. What type of compounds have high melting points and boiling points and why?

(b) List two properties of these compounds other than the high melting and high boiling point

(c) Show the formation of compound aluminium chloride.

OR

(c) (i) How can sodium be obtained from its molten sodium chloride?

(ii) What are the ions present in compound calcium oxide?

38. Rainbows are one of the nature's spectacular gifts. A primary rainbow is formed when light shines through water droplets. A double rainbow appears when light is reflected twice in a raindrop. We can never get to the end of a rainbow. Usually we see a circular rainbow from the sky. **4**

(a) (i) When and where do we see a rainbow?

(ii) What is the condition required for the rainbow to be seen?

(iii) Where else can you see rainbow other than the natural spectrum?

(b) Name the phenomena that plays a role in the formation of rainbow. Draw a diagram showing rainbow formation.

OR

(b) (i) How is rainbow formed?

(ii) Which colour appears on the outer edge of the rainbow?

39. To sustain life, our body must produce enough energy which is produced by burning of food molecules in the presence of oxygen. Oxidation of food molecules produces carbon dioxide and water. To take in oxygen and to expel out carbon dioxide, respiratory system is present in human beings. The respiratory system starts at the nose and mouth and continues through the airways and the lungs. The energy released during the process of respiration is used to make an ATP molecule from ADP and inorganic phosphate. **4**

$$ADP + \textcircled{P} \xrightarrow{\text{Energy}} ADP - \textcircled{P} = ATP$$

Ⓟ : Phosphate

(a) Name and draw the balloon like structures present in the lungs. List its two functions.

(b) Write the pathway for the beakdown of glucose

(i) in yeast cells and

(ii) in mitochondria

In which of the cases, the energy released is more and why?

OR

(b) (i) Sometimes you get cramps in your legs. What is the reason behind it?

(ii) Blood is red in colour due to the presence of a pigment. Name the respiratory pigment. Where is it present and what is its function?

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