Series RST_DS1

Code No. **RSPL/1**

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. A ray changes path from its original path and bends when it travels from one medium to another. But in some cases, refraction of light does not take place. Which of the following condition/s show that the refraction do/does not occur?

(i) When a ray of light is incident normally on a boundary.

(ii) When a ray of light goes from a rarer to a denser medium.

(iii) When a ray of light goes from a denser to a rarer medium.

(iv) When the refractive indices of two media are equal. **1**

(a) Only (i)

(b) Only (iv)

(c) Both (ii) and (iii)

(d) Both (i) and (iv)

2. Which one of the following represents aluminium oxide? **1**

(a) $Al_2^{3+}\left[:\ddot{O}:\right]^{2-}$ (b) $2Al^{3+}\left[:\ddot{O}:\right]_3^{2-}$

(c) $3Al^{2+}\left[:\ddot{O}:\right]_2^{2-}$ (d) $2Al^{3+}\left[:\ddot{O}:\right]_3^{1-}$

3. Which one of the following appliances uses more energy? **1**

(a) A 250 W TV set in 1 hour.

(b) A 600 W mixer grinder in 20 minutes.

(c) A 800 W hair dryer in 10 minutes.

(d) A 1200 W toaster in 12 minutes.

4. The part of the brain which controls the involuntary actions like blood pressure, salivation etc. is **1**

(a) hypothalamus

(b) cerebrum in forebrain

(c) medulla in the hindbrain

(d) cerebellum in the hindbrain

5. The table shows the electronic structure of four elements.

Element	Electronic structure
A	2, 8, 1
B	2, 8, 5
C	2, 8, 7
D	2, 8, 8

Which of the following elements will form covalent bonds? 1

(a) A and B
(b) B and C
(c) C and D
(d) A and D

6. What is the minimum resistance which can be obtained by using three resistors each of $\frac{1}{2}\ \Omega$? 1

(a) $\frac{1}{2}\ \Omega$.
(b) $\frac{1}{3}\ \Omega$
(c) $\frac{1}{6}\ \Omega$
(d) $6\ \Omega$

7. The transport of soluble products of photosynthesis like glucose from one part to the other parts of the plants is known as 1

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

8. Which of the following physical devices is used by females to prevent the entry of sperms in the genital tract during mating? 1

(a) Copper–T
(b) Condom
(c) Cervical cap
(d) Oral pills

9. Vikas writes the following redox reaction

$Cl_2(g) + 2NaBr(aq) \longrightarrow 2NaCl(aq) + Br_2$

He does not know to what other type this reaction belongs. Select the correct option. 1

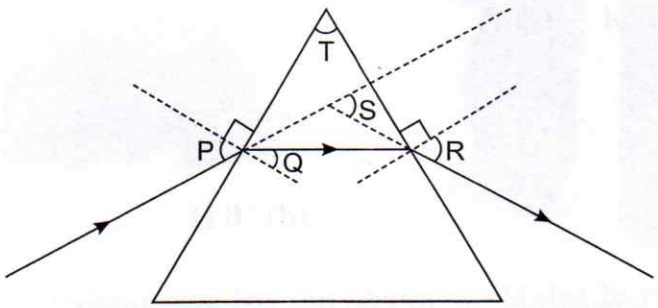
(a) Combination reaction

(b) Decomposition reaction

(c) Single displacement reaction

(d) Double displacement reaction

10. Study the given figure of refraction of light through a triangular glass prism. Select the letters which correctly represent angle of refraction, angle of deviation and angle of prism respectively. 1



(a) $\angle Q$, $\angle S$, and $\angle T$

(b) $\angle S$, $\angle Q$, and $\angle T$

(c) $\angle T$, $\angle S$, and $\angle Q$

(d) $\angle Q$, $\angle T$, and $\angle S$

11. Select from the following the statement which is not true for acids. 1

(a) Acids are sour and turn blue litmus to red.

(b) Acids turn pink when a drop of phenolphthalein is added to them.

(c) Acids have pH less than 7.

(d) Acids are good conductors of electricity.

12. Grass → Grasshopper → Frog → Snake → Hawk

In the given food chain, the 10% of energy is available for transfer from one trophic level to the next in the form of: 1

(a) Light energy

(b) Heat energy

(c) Chemical energy

(d) Both light and heat energy

13. When an element 'A' reacts with water, it starts floating. Identify the element 'A'. 1

(a) Sodium

(b) Potassium

(c) Iron

(d) Calcium

14. The electric resistance of a wire of a metal is R. Sumit doubled the length of the wire but kept the area same. What would be the new resistance? 1

(a) The new resistance would also double.

(b) The new resistance would become three times.

(c) The new resistance would become four times.

(d) There would not be any change in the resistance.

15. A Mendelian experiment consisted of breeding tall pea plants bearing red flowers with short pea plants bearing white flowers. The progeny bore all red flowers, but almost half of them were short. The genetic make up of the tall parent can be depicted as 1

(a) TTRR

(b) TTrr

(c) TtRr

(d) TtRR

$FeSO_4 \rightarrow Fe_2O_3 + SO_3$

16. When crystals of iron sulphate are heated, they decompose to form: 1

(a) Fe(s), SO_2(g) (b) FeO(s), S(s), SO_2(g)

(c) Fe_2O_3(s), SO_2(g), O_2(g) (d) Fe_2O_3(s), SO_2(g), SO_3(g)

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):** Electrical power is the rate at which electric energy is consumed by an appliance. 1

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.

18. **Assertion (A):** A zygote which has an X-chromosome inherited from the father will develop into a girl. 1

Reason (R): In human being, the genes inherited from the father decide where it will be a boy or girl.

19. **Assertion (A):** Non-metals cannot displace hydrogen from acids. 1

Reason (R): Non-metals are electron acceptors, they cannot supply electrons so as to convert H^+ ions to H_2(g).

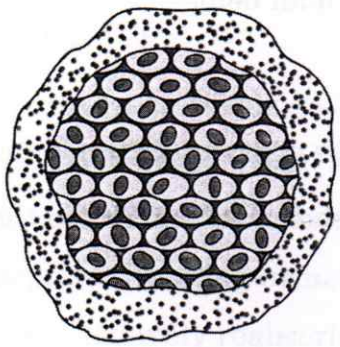
20. **Assertion (A):** Leather and cloth bags are non-biodegradable substances. 1

Reason (R): They can be broken down by microorganisms to simple inorganic substances.

SECTION–B

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

21. Observe the figure given below and answer the following questions.



(a) Identify the organism and the type of reproduction shown in the figure.

(b) What other name is given to this organism? Is it unicellular or multicellular organism? **2**

22. Justify the statement 'Sex of an organism is not always determined genetically'. **2**

23. (a) Mohit's mother kept the science book at a distance of 15 cm from his eyes. He shouted instantly that he was not able to read anything written in the book. Given reason for the same.

(b) Mohit needs spectacles of power –1.0 D for the correction of his vision. Name the defect of vision he is suffering from. Find the nature and focal length of the corrective lens. **2**

24. (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? **2**

OR

Explain the mechanism

(a) by which fishes breathe in water.

(b) of breathing in human beings.

25. Give reasons:

(a) Magnetic field lines are more crowded towards the poles of a magnet.

(b) A compass needle shows deflection when brought near a current carrying conductor. **2**

OR

State the rule to find the direction of magnetic field around a straight conductor carrying current. How will this magnetic field be affected on:

(a) increasing the current through the conductor?

(b) changing the direction of flow of current through the conductor?

26. A plant with round seeds is crossed with a plant with wrinkled seed. The gene for round seed (R) is dominant over that for wrinkled (r). The following Punett square was made by a child.

	R	r
r	Rr	rr
r	Rr	rr

(a) (i) What name is given to the above cross?

(ii) What percentage of the plants is likely to produce wrinkled seeds?

(b) On self pollination of plants having round seeds with genetic make up (Rr), what would be the genetic constitution of the next generation? **2**

SECTION–C

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

27. A metal 'M' on reacting with dilute acid liberates a gas 'G'. The same metal 'M' also liberates the same gas when reacts with a base.

(a) Identify metal 'M' and gas 'G'.

(b) How will you test the presence of this gas?

(c) Write chemical reactions of metal oxide (M_2O_3) with acid and base. **3**

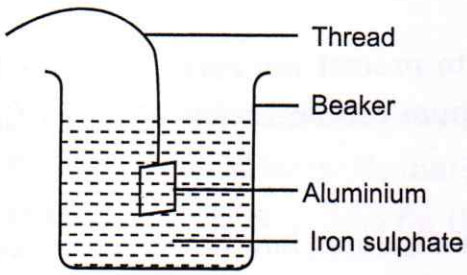
28. (a) (i) How do unicellular organisms remove the wastes from their body?

(ii) What is the purpose of making urine?

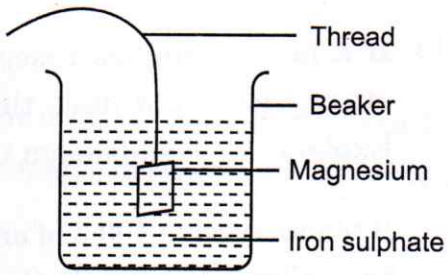
(b) Which substances are selectively reabsorbed from the initial filtrate?

(c) How is the amount of urine produced regulated in the human body? **3**

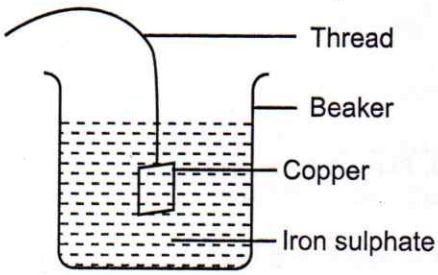
29. Rini took strips of aluminium, magnesium, copper and iron. She cleaned all the strips by using sand paper. Then she placed all cleaned strips with the help of thread in the freshly prepared iron sulphate solution taken in four beakers A, B, C and D as shown.



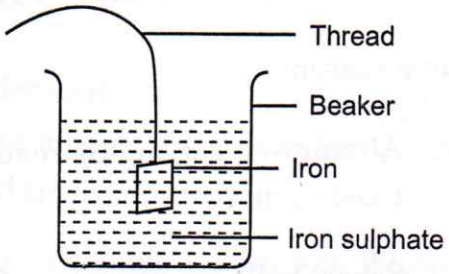
(A)



(B)



(C)



(D)

What would she observe after 30 minutes? Arrange these metals in the increasing order of reactivity. **3**

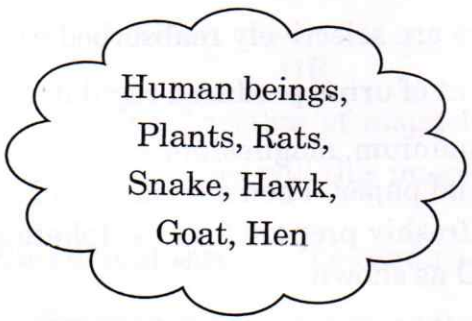
30. (a) Why are we not able to see anything for a while after entering dark room from outside which is brightly lit?

(b) A child wants to know what will happen when a narrow beam of (i) white light and (ii) a monochromatic light passes through

(1) glass slab?

(2) glass prism? **3**

31. (a) From the following groups of organisms, create different food chains having human being at the topmost trophic level.



(b) If a farmer applies insecticides to protect his cereal crops, which organisms would have the maximum concentration of insecticides? Explain the phenomenon involved.

(c) If plants receive 400 J of energy from the sun, how much energy would be available to hawk in the given food chain? **3**

Plant → Rat → Snake → Hawk

32. Give reason:

(a) Aluminium is a highly reactive metal; still it is widely used in making cooking utensils.

(b) School bells are made up of metals.

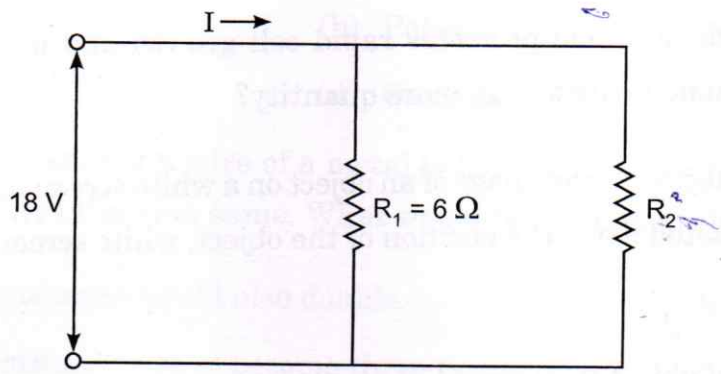
(c) Hydrogen gas is not evolved when most metals react with nitric acid. **3**

OR

(a) Metal 'M' is found in nature as its sulphide 'MS' and has been placed in the middle of the activity series. Identify the metal 'M'. How will you convert this metal sulphide into the metal? Explain with equations.

(b) This metal 'M' also occurs in nature as its carbonate ore 'MCO_3' but the extraction of metal 'M' from its ore 'MS' is different. Explain and support your answer with equations.

33. The Physics teacher gave 3 Ω and 4 Ω resistors respectively to Reema and Neeta to be put in the given circuit so as to obtain equivalent current of 9 A. Show by calculations which of the two students would be able to get the required result. **3**



SECTION–D

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

34. (a) Draw the structure of a neuron and mark the part through which information travels as an electrical impulse.

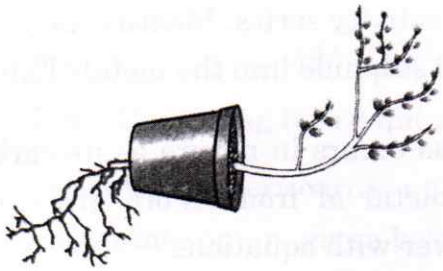
(b) (i) Name the part where the electrical impulse is converted into a chemical signal for onward transmission.

(ii) What happens at the synapse between two neurons?

(c) How is the mode of action in normal breathing different than a quick withdrawal of the hand from a hot pan? **5**

OR

(a) Observe the following experimental set-up. What does it demonstrate?



(b) Plants do not have nervous system yet control and coordination takes play in them. How does it happen in plants?

(c) How does a tendril coil around a support?

(d) Which hormone promotes rapid cell growth and in which areas this hormone is present in more quantity?

35. Akshaya focussed the image of an object on a white screen using a converging lens. He noted down the position of the object, white screen and converging lens as:

Position of object = 20 cm

Position of converging lens = 60 cm

Position of white screen = 1 m

(a) Calculate the focal length of lens.

(b) Where will be the image formed if he shifts the object towards the lens at a position of 25 cm?

(c) What will be the nature of the image formed if he further shifts the object towards the lens at a position of 50 cm? Draw a ray diagram to show the formation of the image formed in this case. **5**

OR

(a) If refractive index of glass with respect to air is 3/2, what is the refractive index of air with respect to glass?

(b) A tank of water is 3 m deep. How deep does it appear when seen normally? (Refractive index of water = 1.33)

(c) What do you mean by absolute refractive index of a medium? The refractive index of medium A is 1.36 and that of medium B is 1.63. If the speed of light in air is 3×10^8 m/s, what is the speed of light in medium A and B respectively?

36. 3 mL of ethanol is taken in a test tube and warmed gently in a water bath. A 5% solution of alkaline potassium permanganate is added first drop by drop to this solution, then in excess.

(a) (i) Why do we warm ethanol in a water bath?

(ii) How is 5% solution of potassium permanganate prepared?

(b) (i) State the role of alkaline potassium permanganate in this reaction. Does the colour of $KMnO_4$ solution persist when it is added initially?

(ii) What happens on adding excess of alkaline $KMnO_4$ solution to the reaction mixture?

(c) Write a chemical reaction for the same. **5**

OR

Give reasons:

(a) Carbon can neither from C^{4+} cations nor C^{4-} anions.

(b) Covalent compounds are bad conductors of electricity.

(c) Carbon forms strong bonds within the molecule.

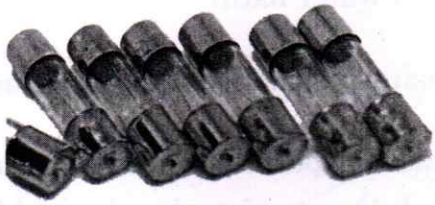
(d) Carbon forms a large number of compounds.

(e) Butter and cooking oil are different from each other.

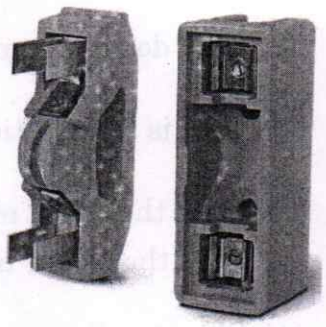
SECTION–E

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 fuse is the only electrical component that is affected by a power surge. It is based on a common application of Joule's law of heating. Two type of fuses are used commonly. These are 'Porcelain fuse and Cartridge fuse'. Vikas and Advitya started discussing about the type of fuse used in television sets or computers. Their mother informed them that in very sensitive and expensive appliances like TV sets or computers, cartridge fuse is used. Porcelain fuse is used at home. Whenever there is short circuit or voltage fluctuation the fuse wire melts and the current stops flowing but it can be made reusable by inserting fresh fuse wire by taking out the grip from the casing. **4**



Cartridge fuse



Porcelain fuse

Based on the above information, answer the following questions:

(a) In a household supply, what happens if a fuse wire is connected to neutral wire?

(b) Other than electric fuse, what other safety measure is commonly used and how does it protect the appliances?

(c) (i) How is fuse wire placed in an electric circuit and what is its function?

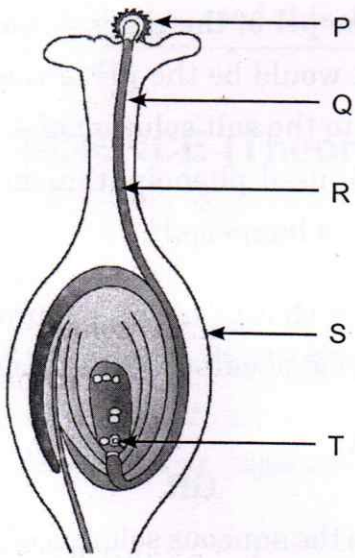
(ii) What happens if a current larger than the specified value flows through the electric circuit?

OR

(c) An electric iron of 1 kW power rating is operated in a domestic electric circuit (220 V) that has a current rating of 3 A. What result do you expect? Explain.

38. The pollen needs to be transferred from the stamen to the stigma for fertilisation to take place in plants. This transfer of pollen from one flower to another is achieved by agents like wind, water or animals. **4**

(a) (i) Rashmi draws the germination of a pollen grain on stigma. She wants to know the position of the male and female gamete just before fertilisation. What is the correct position?



(ii) Have you ever observed any flower part still persisting in the fruit? Name that part and the fruit having that part.

(b) What are the changes observed in the flower after fertilisation?

OR

(b) How will you differentiate between self-pollination and cross-pollination?

39. Ankita made the following table showing salt formation by mixing acid and base. 4

Acid	Base	Salt
HCl	NaOH	A
H_2CO_3	NaOH	B
H_2SO_4	NH_4OH	C

(a) Identify the salts A, B and C. Out of the given salts which one would be acidic in nature and why?

(b) (i) She observed the pH of the salt solution of A by using universal indicator. What would be the pH of the salt solution? She added NaOH solution to the salt solution of A and observed a change in colour when she used phenolphthalein as an indicator. Why do you think this has happened?

(ii) Will there be any change in the colour of litmus solution in case of aqueous solution of salt C? Give reason also.

OR

(b) What name is given to the aqueous solution of salt A? Write the chemical equation to show the preparation of a salt formed by electrolysing the concentrated aqueous solution of this salt and one use of this salt.

@darealarnav