Series RST-DS1 Code No. **RSPL/3**

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. The deviation of a ray of light through a glass prism depends on a number of factors. The factor on which deviation of a ray of light does not depend on **1**

   (a) angle of prism

   (b) angle of dispersion

   (c) nature of material of the prism

   (d) angle of incidence

2. 'All food chains start with plants.' Which of the following options do not justify the above statement? **1**

   (i) Plants are autotrophs.

   (ii) Plants can be easily grown.

   (iii) Plant can produce their own energy.

   (iv) Plants use oxygen and water to make food.

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

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

3. Neha writes a few statements about double displacement reaction. Which of the following statements are written correctly by her? **1**

   (i) Exchange of ions takes place.

   (ii) Exchange of atoms and molecules takes place.

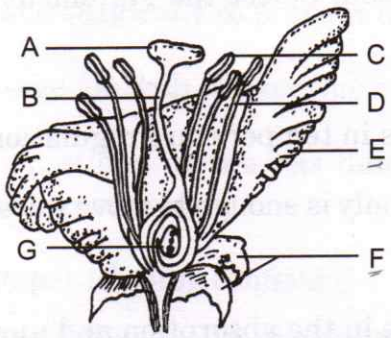
   (iii) A precipitate is formed.

   (iv) Heat is given out.

   (a) (i) and (iii) (b) (i) and (iv)

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

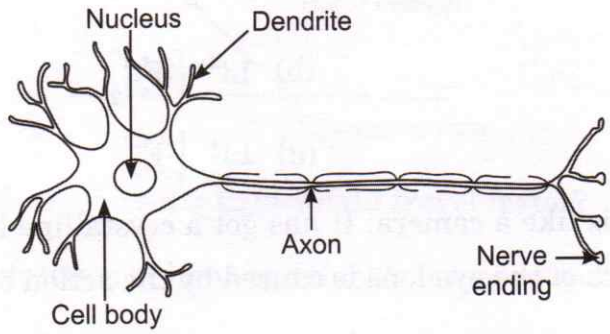
4. Study the given diagram and identify the non-essential parts of a flower. 1



(a) A, B and C (b) E and F

(c) D and E (d) C, E and F

5. The image shows the structure of a neuron.



After our nose senses a smell, which option shows the mechanism of the travelling of sense in our body? 1

(a) Olfactory receptors → dendritic tip of a nerve cell → cell body → axon → nerve ending → release of signal → dendritic tip of other nerve cell

(b) Olfactory receptors → dendritic tip of a nerve cell → axon → cell body nerve ending → release of signal → dendritic tip of other nerve cell

(c) Gustatory receptors → dendritic tip of a nerve cell → cell body → axon → release of signal → dendritic tip of other nerve cell

(d) Gustatory receptors → dendritic tip of a nerve cell → axon → cell body → release of signal → dendritic tip of other nerve cell

6. The loss of water in the form of vapour from the aerial parts of the plant is known as transpiration. Select the statement which is not related to transpiration. 1

(a) Transpiration helps in temperature regulation.

(b) Transpiration pull only is enough to move water from roots to the leaves of the plant.

(c) Transpiration helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves.

(d) During the day, transpiration pull is the major driving force in the movement of water in the xylem.

7. Which one of the following correctly represents lithium fluoride? 1

(a) $Li^{2+}\left[\cdot\underset{\cdot\cdot}{\overset{\cdot\cdot}{\times}}F:\right]^{2-}$ (b) $Li^{2+}\left[:\underset{\cdot\cdot}{\overset{\cdot\cdot}{F}}:\right]_2^-$

(c) $\begin{matrix}Li^+\\Li^+\end{matrix}\left[:\underset{\cdot\cdot}{\overset{\cdot\cdot}{F}}:\right]^{2-}$ (d) $Li^+\left[:\underset{\cdot\cdot}{\overset{\cdot\cdot}{F}}:\right]^-$

8. The human eye is like a camera. It has got a crystalline lens. The change in the focal length of the eye lens is caused by the action of 1

(a) ciliary muscles (b) optic nerve

(c) cornea (d) pupil

9. Fight or flight hormone is released by an endocrine gland also known as emergency gland. Choose the correct location and name of the gland from the given table. 1

	Location	Name of the gland
(a)	Lies outside the abdominal cavity	Testes
(b)	Lies in the neck region	Thyroid
(c)	Below the stomach	Pancreas
(d)	Upper side of kidney	Adrenal

10. Out of the given four metals namely copper, zinc, calcium and silver, which will liberate hydrogen gas with solution having pH 2.0 ? 1

(a) Silver and zinc
(b) Copper and zinc
(c) Zinc and calcium
(d) Copper and silver

11. A spore is a special cell protected by thick coating and helps an organism to survive in adverse conditions. Spores are present in 1

(a) Sporangia in *Rhizopus*
(b) Sporangia in *Rhizobium*
(c) Hyphae in *Rhizopus*
(d) Hyphae in *Rhizobium*

12. Two salts 'X' and 'Y' are dissolved is water separately. When a universal indicator is added to these two solutions, the solution 'X' turns pink and the solution 'Y' turns green in colour. Which one of the following options is correct? 1

	X	Y
(a)	CH_3COONa	Na_2CO_3
(b)	K_2CO_3	NaCl
(c)	NaCl	CH_3COONa
(d)	Na_2CO_3	K_2CO_3

13. An element 'M' has atomic number 6 (2, 4). Which of the following will be the formula and nature of its chloride? 1

(a) MCl_4, Ionic
(b) MCl_4, Covalent
(c) M_4Cl, Covalent
(d) M_4Cl, Ionic

14. A piece of wire of resistance R is cut into five equal parts. Which of the following represents equivalent resistance if all these parts are connected in parallel? 1

(a) 25
(b) 5
(c) $\frac{R}{5}$
(d) $\frac{R}{25}$

15. An alloy has a low melting point and it is used for welding electrical wires together. Identify from the following the alloy and its constituents. 1

(a) Bronze; Copper and tin (b) Solder; Lead and tin

(c) Amalgam; Lead and mercury (d) Brass; Copper and zinc

16. Neetu writes the following chemical reaction.

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

She also puts this reaction into various types of chemical reactions such as: 1

(i) Displacement reaction (ii) Exothermic reaction

(iii) Thermite reaction (iv) Precipitation reaction

Select the options which does/do not correspond to the given reaction.

(a) Only (ii) (b) (ii) and (iii)

(c) Only (iv) (d) (iii) and (iv)

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):** Biotic components include plants, animals, microorganisms and human beings.

Reason (R): Biotic components interact with physical surroundings and maintain a balance in nature. 1

18. **Assertion (A):** The communication between the central nervous system and the other parts of the body is facilitated by the peripheral nervous system.

Reason (R): The peripheral nervous system consists of sensory nerves and motor nerves. 1

19. **Assertion (A):** A magnetic field line is the path along which a hypothetical free North pole and South pole would tend to move towards each other.

Reason (R): The direction of the magnetic field at a point is given by the direction that a North pole placed at that point would take. 1

20. **Assertion (A):** Iron articles get reddish brown coating on their surface by the action of air and water due to the process of rusting.

Reason (R): The formation of black coating on silver and green coating on copper is by the action of air and moisture due to the process of corrosion. 1

SECTION–B

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

21. In an electric circuit comprising a resistor made up of a metallic wire, the ammeter reading is 80 mA. If the length of this metallic wire is doubled, how will the (a) resistivity (b) current (c) resistance change in the circuit? Justify your answer. 2

22. Give reason:

(a) Variations are useful for the survival of the organism over time.

(b) An offspring of human beings is not a true copy of his/her parents. 2

23. Rahul was given concentrated sulphuric acid and asked to dilute it. After diluting it, he added an aqueous solution of sodium hydroxide in it.

(a) Suggest a safe procedure to Rahul to dilute concentrated sulphuric acid.

(b) Name the salt formed when dilute sulphuric acid is added in an aqueous solution of sodium hydroxide. Also guess the pH of the salt. 2

OR

A substance 'X' is used for making surfaces smooth, toys and materials for decoration. It changes to hard solid mass on mixing with water.

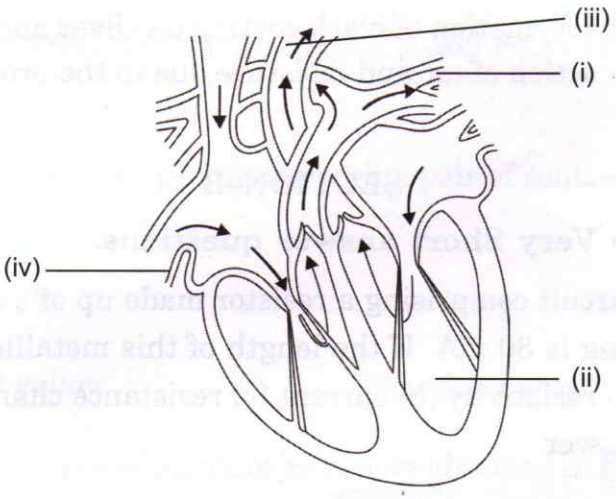
(a) Identify 'X'. Also write its chemical name and formula.

(b) How is substance 'X' manufactured?

24. (a) Draw magnetic field lines around a bar magnet.

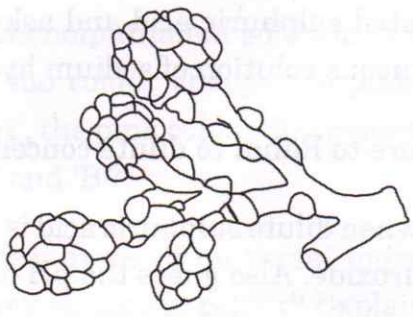
(b) Give two uses of magnetic compass needle. **2**

25. Identify the parts (i), (ii), (iii) and (iv) from the given diagram. Write the function of part (i). **2**



OR

(a) Identify the given figure, and write one function of it. Write its location also.



(b) Two sphincter muscles are present in the human digestive system. One is present at the junction of stomach and small intestine and the second is present at the anus. What will be the consequence of malfunctioning of each of these sphincter muscles?

26. A concave mirror produces three times magnified, real image of an object placed at 20 cm in front of it. Where should an object be placed to reduce the magnification to $-\frac{1}{3}$? **2**

SECTION–C

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

27. (a) Draw a diagram of excretory system in human beings and label the

(i) left kidney.

(ii) part where urine is stored.

(iii) part through which urine is released outside.

(b) Define excretion. How do unicellular organisms remove their wastes? **3**

28. (a) State the function performed by the ozone gas at the higher levels of the atmosphere.

(b) How is ozone formed?

(c) Why was there decline in the amount of ozone in the atmosphere in 1980s? Mention one harmful effect caused by its depletion. **3**

29. Atomic number of some elements are given below:

Element	Atomic number
A	2
B	13
C	17
D	19

Which of the elements can form

(a) ionic compounds?

(b) covalent compounds?

Show the formation of these compounds. **3**

OR

(a) Name the ore of mercury. How can it be extracted from its ore? Write the chemical equations for the reactions involved.

(b) Carbon cannot be used as a reducing agent for the extraction of sodium from its oxide. Explain.

(c) On which electrode sodium is obtained from its molten chloride?

30. (a) Advitya sitting at the back bench in a class is not able to see what is written on the blackboard. He, however, sees it clearly when sitting on the front seat at an approximate distance of 1.5 from the blackboard. Draw ray diagrams to show the image formation when he is seated at the (i) front seat (ii) back seat.

(b) Identify the defect he is suffering from and write two causes of this defect. **3**

31. When a cross between two pea plants with a pair of contrasting characters was made

RRYY	×	rryy
Round yellow		Wrinkled green

1120 plants with 4 types of combinations were obtained in F_2 progeny. Write the number of plants having new combinations. What conclusion do you draw from this experiment? **3**

32. (a) How do $[H^+]$ ions exist in water? What is the relationship between $[H^+]$ ions concentration of an aqueous solution and its pH?

(b) Meera added phenolphthalein solution to an aqueous solution 'A' and observed that the colour changes to pink. Then she added aqueous solution 'B' to 'A', the pink colour disappears. What would be the nature of solutions 'A' and 'B'?

(c) Rani added a few drops of universal indicator to the distilled water. Will there be any change in colour? Explain. **3**

33. (a) Draw the pattern of magnetic field lines through and around a current carrying circular loop.

(b) Explain with the help of the pattern drawn in the figure in question (a), the distribution of magnetic field due to a current carrying circular loop.

(c) If there is a circular coil having 'n' turns, the field produced is 'n' times as large as that produced by a single turn. Why? 3

SECTION–D

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

34. (a) (i) What is isomerism? Why do the first three members of the alkane series not show isomerism?

(ii) Write the structural isomers of fifth membrane of the alkane series.

(b) What is the general formula for alkynes? Draw the electron dot structure of second member of the series. What is the structural formula of cyclohexene? 5

OR

(a) What happens when

(i) ethanol is heated in air.

(ii) ethanol is heated with excess of concentrated sulphuric acid.

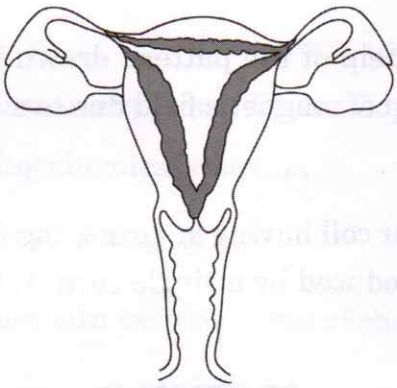
(iii) a small piece of sodium is dropped in ethanol.

(iv) ethanol reacts with acetic acid.

Write balanced chemical equations also.

(b) How would you distinguish experimentally between ethanol and ethanoic acid?

35. (a) The given diagram shows the human female reproductive system.



Redraw the diagram and label the part which

(i) is cut and sutured surgically to prevent the egg to reach the uterus. Write its one function.

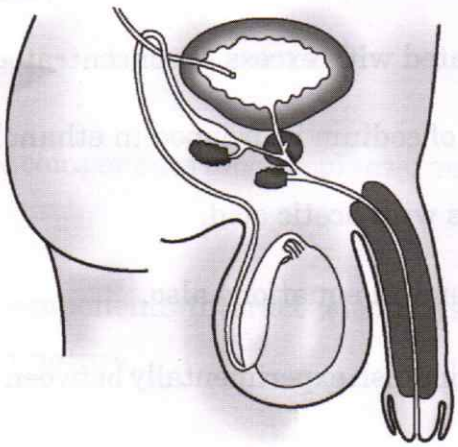
(ii) produces ovum. Write its one more function.

(b) What are the consequences of the reckless female foeticides?

(c) Human male gamete is different from human female gamete. Write the differences between them. **5**

OR

(a) The given diagram shows the human male reproductive system.



Redraw the diagram and label the part which

(i) is cut and sutured surgically to prevent the transfer of sperms.

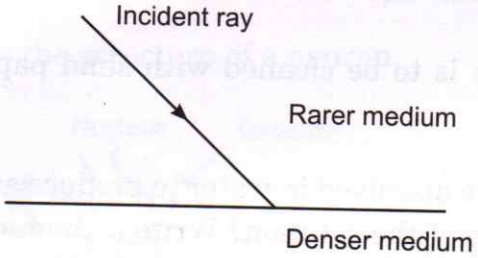
(ii) is common passage for both the sperms and urine.

(iii) secrete their secretions in the vas deferens. What is/are the function/s of the secretions?

(b) What are the advantages of using condoms?

(c) Give one example each of sexually transmitted diseases caused by (i) bacteria (ii) virus.

36. (a) (i) Complete the given diagram.



(ii) In which medium the light would travel faster?

(iii) State refraction of light and Snell's law of refraction.

(b) Draw a ray of light incident on a rectangular glass slab and mark lateral displacement with letter 'X'.

(c) The refractive index of crown glass is 1.52 and that of diamond is 2.42. Calculate the ratio of speed of light in crown glass and diamond. **5**

OR

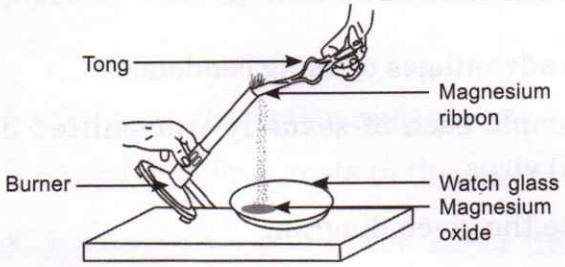
(a) Rahul has a lens that always form erect and diminished image for all positions of an object placed in front of it. What is the nature of lens? Draw a ray diagram to justify your answer. If the power of this lens is 4.5 D, what is its focal length in the Cartesian system?

(b) An object 5 cm in height is placed at 30 cm in front of a concave mirror of focal length 20 cm. At what distance from the mirror should a screen be placed to obtain a sharp image of the object? Find the nature and size of the image. Draw a ray diagram to justify your answer.

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. A magnesium ribbon burns with a dazzling white flame and changes into a white powder of magnesium oxide.



(a) Magnesium ribbon is to be cleaned with sand paper before burning. Explain.

(b) Magnesium oxide is dissolved in water to produce an aqueous solution. What is the nature of the solution? Write a chemical equation for the chemical reaction that has taken place.

(c) The reaction between magnesium and oxygen can be described in different ways other than combination reaction. Why can the reaction also be described as

(i) oxidation reaction?

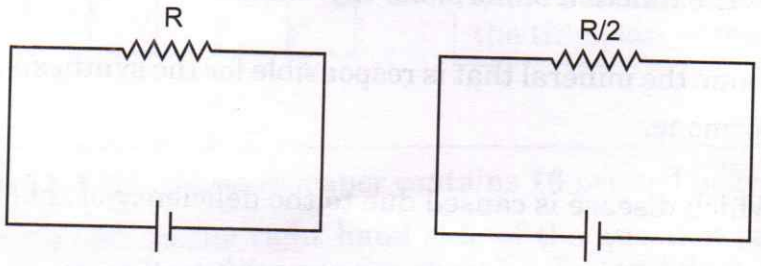
(ii) exothermic reaction? **4**

OR

(c) Write a combination reaction between quick lime and water. How can you say that this reaction is also exothermic?

38. Have you ever observed that an electric fan, charger, bulb, laptop, etc. become warm if they are used continuously for longer time? Heating effect of electric current is known as Joule's law of heating. To maintain the current, the source of energy keeps using its energy. A part of it is used for doing the useful work and the rest of energy raises the temperature of the gadget.

(a) In the given circuits (i) and (ii), all the parameters remain unchanged except the resistance which is reduced to half of its original value. What change will be seen in the heating effects of the resistors?



(i) (ii)

(b) Give reasons:

(i) The heating elements of electric toasters and electric irons are made of alloy rather than a pure metal.

(ii) The cord of an electric heater does not glow while the heating element does. **4**

OR

(b) An electric motor takes 10 A from a 220 V main line. Calculate the power and energy consumed in 3 hours.

39. More women have some kind of thyroid problem than men. Women are at greater risk for developing abnormal thyroid stimulating hormone levels during menstruation and after going through menopause. The given table shows the levels of thyroid stimulating hormones (TSH) in women of different age groups.

Age Range	Normal (mU/L)	Low (mU/L)
18 – 19 years	0.4 – 2.34	< 0.4
30 – 49 years	0.4 – 4.0	< 0.4
50 – 79 years	0.46 – 4.68	< 0.46

(a) What name is given to the endocrine gland which secretes TSH? Where is this gland situated in the human body?

(b) What is the function of hormone thyroxine?

(c) (i) Name the mineral that is responsible for the synthesis of thyroxine hormone.

(ii) Which disease is caused due to the deficiency of this hormone?

(iii) Write the most common symptom of this disease. 4

(iv) Why is it important for us to take iodised salt in our diet?

OR

(c) Which hormones are released in boys and girls at the time of puberty? Write any two common changes that take place in boys and girls at this time.

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