SECTION - A

(Biology)

1. Two pea plants one with round green seeds (RRyy) and another with wrinkled yellow seeds (rrYY) were crossed. All the seeds of F_1 progeny have round, yellow seeds (RrYy). When F_1 plants are self-pollinated, the F_2 progeny will have new combination of characters. 1

(i) Round, yellow

(ii) Round, green

(iii) Wrinkled, yellow

(iv) Wrinkled, green

Choose the option that shows new combination of characters in F_2 progeny.

(A) (i) and (ii) (B) (i) and (iv)

(C) (iii) and (iv) (D) (i) and (iii)

2. Examine the given food chains to establish the correct one in an ecosystem : 1

(A) Seed ⟶ mouse ⟶ snake ⟶ deer

(B) Algae ⟶ small fish ⟶ large fish ⟶ hawk

(C) Grasshopper ⟶ frog ⟶ snake ⟶ elephant

(D) Plants ⟶ rabbit ⟶ deer ⟶ wolf

3. 'The lymph is colourless tissue fluid.' This indicates that it lacks __(i)__ cells and hence cannot carry __(ii)__.

From the following options, choose the one that correctly identifies (i) and (ii). 1

(A) (i) – Platelets ; (ii) – excess fluid

(B) (i) – Red blood ; (ii) – oxygen

(C) (i) – Red blood ; (ii) – fats

(D) (i) – White blood ; (ii) – salts

4. Which of the following groups consists entirely of substances that are broken down by an enzyme, lipase ? 1

(A) Carbohydrates, proteins and vitamins

(B) Fats, oils and ghee

(C) Minerals, starch and vitamins

(D) Proteins, sugars and esters

5. Select the incorrect statement from the following : 1

(A) Iodine is necessary for production of thyroxin hormone by pituitary gland.

(B) Thyroxin regulates metabolism of carbohydrates, fats and protein.

(C) Swelling of neck may indicate goitre due to iodine deficiency.

(D) Thyroid is located in the neck region in our body.

6. Select the correct option that shows the path of flow of only the deoxygenated blood through the human circulatory system. 1

(A) Body ⟶ left atrium ⟶ left ventricle ⟶ lungs ⟶ right atrium ⟶ right ventricle ⟶ body.

(B) Right atrium ⟶ right ventricle ⟶ lungs ⟶ left atrium ⟶ left ventricle ⟶ body

(C) Body ⟶ left atrium ⟶ left ventricle ⟶ lungs

(D) Body ⟶ right atrium ⟶ right ventricle ⟶ lungs

7. A man underwent MRI of brain which shows some defects in the cerebellum of his brain. Which activity of that person will be affected ? 1

(A) Heart beat

(B) Feeling of hunger and thirst

(C) Reflexes

(D) Walking in straight line

Question No. 8 & 9 consists of **two** statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option from (A), (B), (C) and (D) given below :

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

8. **Assertion (A)** : The energy transferred to a lion when it eats a deer is only a small fraction of the deer's total energy content. 1

Reason (R) : Energy transfer is efficient at all trophic levels with nearly 90% of energy passed on to the next level.

9. **Assertion (A)** : A reflex arc provides an immediate and automatic response to a stimulus. 1

Reason (R) : The nerve pathway in a reflex arc involves the brain for the fastest possible processing.

10. (A) Transport of water and minerals in plants takes place through xylem tissue where vessels and tracheids of roots, stems and leaves are interconnected. This forms a continuous system of channels reaching all plant parts. Simple physical forces are involved in the process. 2
If the soil has adequate water, name and explain which force will be acting effectively at :
(i) Night
(ii) Day

OR

(B) Although plants do not have excretory system still they are able to get rid-off their waste products. How ?

11. The sensitive plant shows movement of leaves in response to touch. Explain such movement briefly. 2

12. (A) Name the reproductive and non-reproductive parts of bread mould (Rhizopus).
(B) Give any two advantages of sexual reproduction in plants. 2

Table II – Structure Q components	concentration %
Urea	1.00
Amino acids	0.00
Salts	1.60
Glucose	0.00

(A) Where are kidneys located in the human body ? Name the filtration unit of them. 1

(B) List two factors on which reabsorption of water from the filtrate depends. 1

(C) Why is there variation in the concentration of given substance in structure P and Q listed in table I and II respectively ? 2

OR

(C) If a person is suffering from diabetes, concentration of which substance present in structure Q (listed in table II) will be modified and why ? 2

16. (A) (i) Name the special tissue inside the uterus that provides nutrition to the developing embryo. Describe its structure. State its two functions besides nutrition. 3

(ii) Write any two sexually transmitted diseases in humans and their causative microbial agents. 2

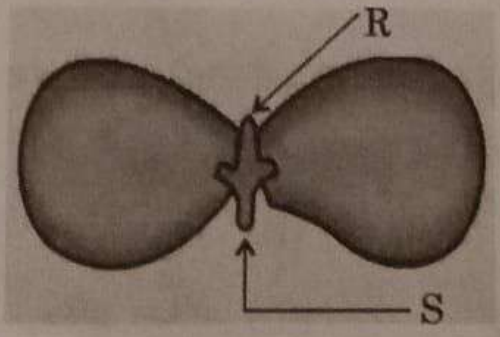
OR

(B) In flowering plants, the process of pollination leads to fertilization.

(i) Explain with the help of a well-labelled diagram how the male germ cell from the pollen grain reaches the female germ cell located in the ovule.

(ii) Differentiate between self-pollination and cross-pollination.

(iii) Identify and name the parts 'R' and 'S' in the given diagram of seed. 5



SECTION – B

(Chemistry)

17. The number of isomers of butane is 1

(A) 1 (B) 2

(C) 3 (D) 4

18. Which of the following compound is formed when CO_2 gas is passed through ammoniacal brine solution ? 1

(A) Na_2CO_3 (B) NH_4Cl

(C) NaOH (D) $NaHCO_3$

19. Which of the following compounds will undergo addition reaction ? 1

(A) C_3H_8 (B) C_4H_8

(C) C_2H_6 (D) C_4H_{10}

20. In the compound $CH_3 - \underset{\underset{O}{\|}}{C} - OH$, which of the following functional group is present ? 1

(A) Carboxylic acid

(B) Alcohol

(C) Aldehyde

(D) Ketone

21. Which of the following acid-base indicators will be used by a visually challenged student to detect the presence of acid in a given solution ? 1

(A) Blue litmus (B) Clove oil

(C) Red cabbage extract (D) Methyl orange

13. "Each organism has two sets of all genes, one inherited from each parent i.e. both parents contribute equally to the DNA of the progeny during sexual reproduction".

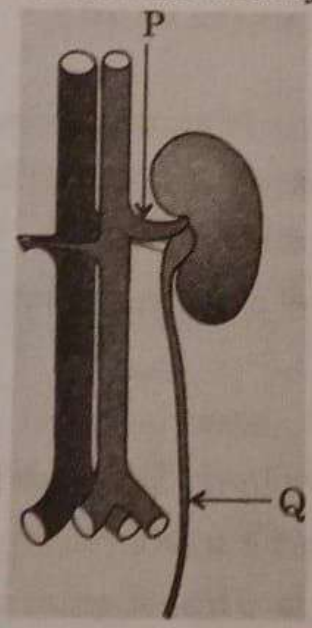
If such is the case, then how is the stability of DNA of the species ensured ? Discuss. **3**

14. Consider a simple aquatic ecosystem like a lake which consists of algae, small fish and large fishes. It was found that the lake water was contaminated with a low concentration of a non-biodegradable pesticide, DDT. Based on this ecosystem, answer the following questions : **3**

(a) In which organism will the concentration of the pesticide DDT be the highest ? Name and explain the phenomenon.

(b) Why is the flow of energy in a food chain always unidirectional ?

15. The given diagram shows the human kidney and its associated structures.



Study the Table I and Table II that shows the concentration of certain substances found within the structure P and Q.

Table I – Structure P	
components	**concentration %**
Urea	0.05
Amino acids	0.06
Salts	1.72
Glucose	0.10

26. (A) Name the acid present in ant sting and give its chemical formula. Give the common method to get relief from the pain and irritation caused by ant sting.

(B) Two solutions 'X' and 'Y' have pH values 3.0 and 9.5 respectively. Which of these will turn blue litmus to red and which will turn phenolphthalein from colourless to pink ? **2 + 1**

27. Attempt either option (A) or (B) :

(A) (i) State any two reasons for carbon forming a large number of compounds. Why does carbon form compounds mainly by covalent bonds ?

(ii) Identify the compound which contains aldehyde as its functional group :

C_3H_7OH, C_3H_7Cl, C_2H_5CHO, CH_3COCH_3 **2 + 1**

OR

(B) An organic compound 'X' is a constituent of wine. 'X' on reacting with acidified $K_2Cr_2O_7$ forms another compound 'Y' with molecular formula $C_2H_4O_2$. 'Y' produces brisk effervescence with sodium carbonate.

(i) Identify 'X' and 'Y'.

(ii) Name the gas evolved when 'Y' reacts with sodium carbonate.

(iii) Write the chemical equations involved for the chemical reactions taking place. **3 × 1**

28. The Statue of Liberty is one of the seven wonders. It is present on Liberty island in New York harbour in U.S.A. It is made up of a metal. Over a period of time, the metal's colour has changed and statue gives greenish look. Answer the following questions based on the above information :

(A) What is corrosion ?

(B) Why do silver articles turn black after some time ?

(C) Copper reacts with moist gas 'A' present in the air and slowly loses its shiny surface. It turns green. Identify 'A' and the substance of green coating formed on the surface of copper.

OR

(C) What is an alloy ? How is an alloy made ? **1 + 1 + 2**

29. Attempt either option (A) or (B) :

(A) Write chemical equations for the following when

(a) Silver bromide is exposed to sunlight.

(b) A piece of lead metal is dropped into copper (II) chloride solution.

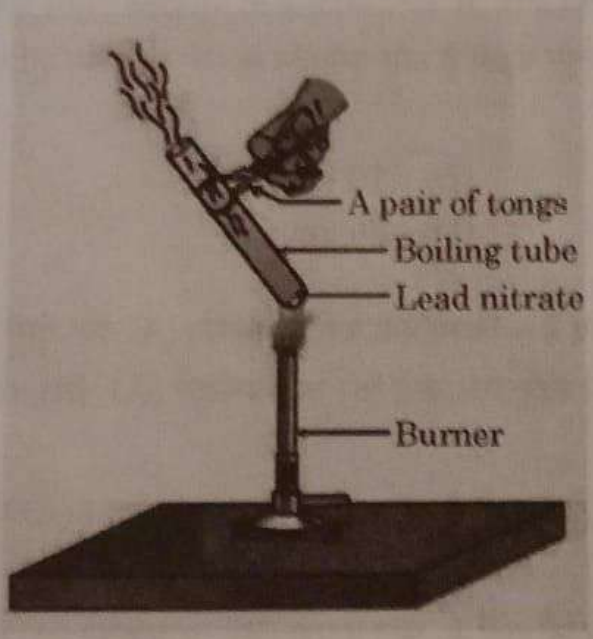
(c) Hydrogen gas is passed over heated copper oxide.

(d) Methane gas is burnt in air.

(e) Quick lime is mixed with water. 5 × 1

OR

(B) (a)



Study the experimental setup shown in the diagram and write chemical equation for the same. Name and define the type of reaction. Mention the colour of the products formed.

(b) What type of reaction takes place when aqueous solution of lead (II) nitrate and potassium iodide are mixed together ? Write chemical equation also. 3 + 2

22. Which of the following aqueous solution reacts with crushed egg-shells to give a gas that turns lime water milky ? 1

(A) KCl
(B) HCl
(C) $NaCl$
(D) NH_4Cl

23. During the preparation of hydrogen chloride gas on a humid day, the gas is usually passed through a guard tube containing calcium chloride. The role of $CaCl_2$ taken in guard tube is to – 1

(A) Absorb the evolved gas
(B) Moisten the gas
(C) Absorb moisture from the gas
(D) Absorb chloride ions from the evolved gas

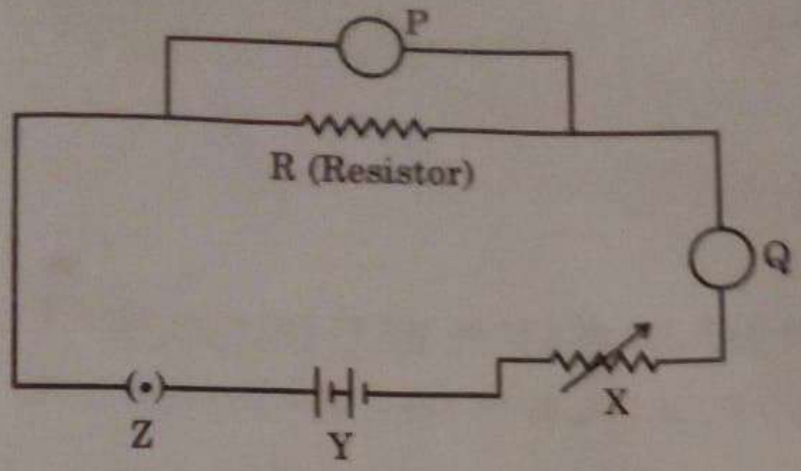
For question number **24**, **two** statements are given-one labelled as Assertion (A) and the other labelled as Reason (R). Answer this question selecting the appropriate option from (A), (B), (C) and (D) given below :

(A) Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A).
(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).
(C) Assertion (A) is true, but Reason (R) is false.
(D) Assertion (A) is false, but Reason (R) is true.

24. **Assertion (A)** : Sodium acetate is a basic salt. 1
Reason (R) : It is because it is a salt of weak acid and strong base.

25. Write chemical equations for the reactions taking place when : 1 + 1

(A) Fe_2O_3 is heated with aluminium powder.
(B) Sodium metal reacts with water.

33. 

2

(A) In the given electric circuit of Ohm's law experiment, identify P and X.

(B) Write the uses of Q and X in the given circuit.

34. (A) What is meant by scattering of light ? 2

How do our observations differ when white light (sun light) is scattered from (i) very fine particles of the medium and (ii) very large particles of the medium ?

OR

(B) With the help of a ray diagram, explain a phenomenon of formation of spectrum in nature.

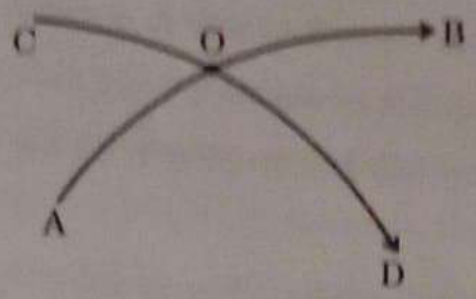
35. (A) Write any two precautions to be taken to avoid electrical accidents. 3

(B) State how these precautions prevent possible damage to the electric circuit.

36. (A) A vertical wire is carrying a current in the upward direction. It is placed in a magnetic field, pointing towards the East direction. Find out the direction of force on the wire. 3

(B) Out of the two current carrying circular coils, coil 'A' has 10 turns while coil B has 15 turns. Which of the two coils will produce a stronger magnetic field at its centre if same current is flowing through both the coils ? Explain with reason.

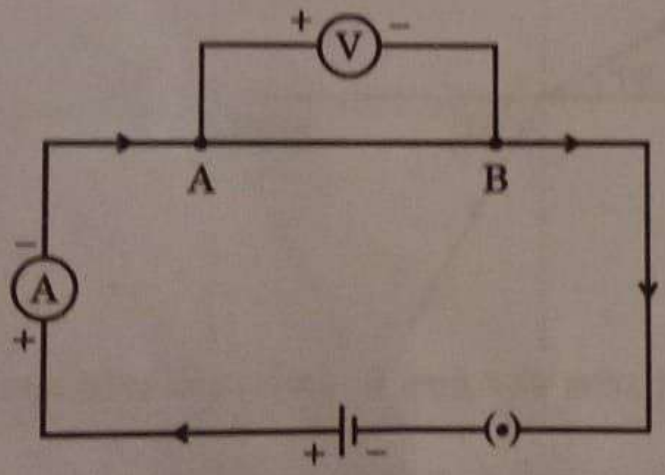
(C)



In the given figure, AB and CD are two magnetic field lines intersecting each other at point O. If a compass is placed at point O, what will happen ? State your conclusions.

37. A person cannot read newspaper placed nearer than 50 cm from his eyes. Name the defect of vision he is suffering from. Draw a ray diagram to illustrate the defect. List two possible causes of this defect also. 3

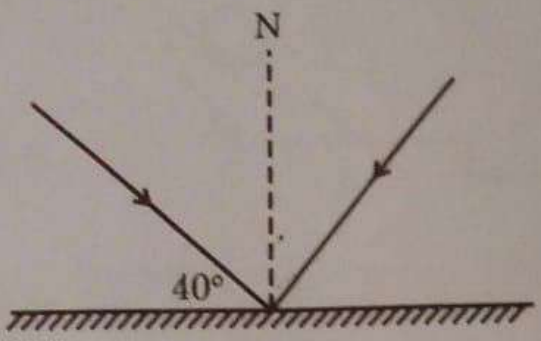
38. Four cells, a thin wire AB, a voltmeter, an ammeter, a plug key and some thick connecting wires are taken. The circuit is set up as shown below. 4



The key is inserted into the plug and readings of ammeter (I) and voltmeter (V) are noted. Then the plug key is removed. Now two cells are connected in the circuit in series. Plugging in the key the new values of 'V' and 'I' are noted. The experiment is repeated by connecting three cells in series and then four cells. In each case 'V' and 'I' are noted.

SECTION – C
(Physics)

30. In the given ray diagram the values of the angle of incidence and the angle of reflection are : 1



(A) $i = 50°, r = 40°$ (B) $i = 40°, r = 50°$

(C) $i = 40°, r = 40°$ (D) $i = 50°, r = 50°$

31. When a convergent beam of light is incident on a convex mirror, the reflected rays appear to be coming from a point 20 cm behind the mirror and retrace their path. The focal length of the mirror is 1

(A) 20 cm (B) 10 cm

(C) 40 cm (D) 30 cm

For question number **32**, **two** statements are given – one labelled as Assertion (A) and the other labelled as Reason (R). Answer this question selecting the appropriate option from (A), (B), (C) and (D) given below :

(A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).

(B) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).

(C) Assertion (A) is true, but Reason (R) is false.

(D) Assertion (A) is false, but Reason (R) is true.

32. **Assertion (A)** : The bending of a straight wire in the form of current carrying circular coil will change the pattern of magnetic field around it. 1

Reason (R) : Strength of magnetic field depends upon number of turns of coil and current flowing through the coil.

(B) (i) Define the focus of a convex lens.

(ii) An object placed on a meter scale at 8 cm mark, was focused on a white screen placed at 92 cm mark, by using a converging lens placed on the scale at 50 cm mark.

(I) Find the focal length of converging lens.

(II) Find the position of object if the image forms at 71 cm mark on meter scale.

(III) State the nature of image formed if the object is kept on 36 cm mark of meter scale.

(A) Why was the plug key removed after each measurement of 'V' and 'I' and inserted again for the next step ?

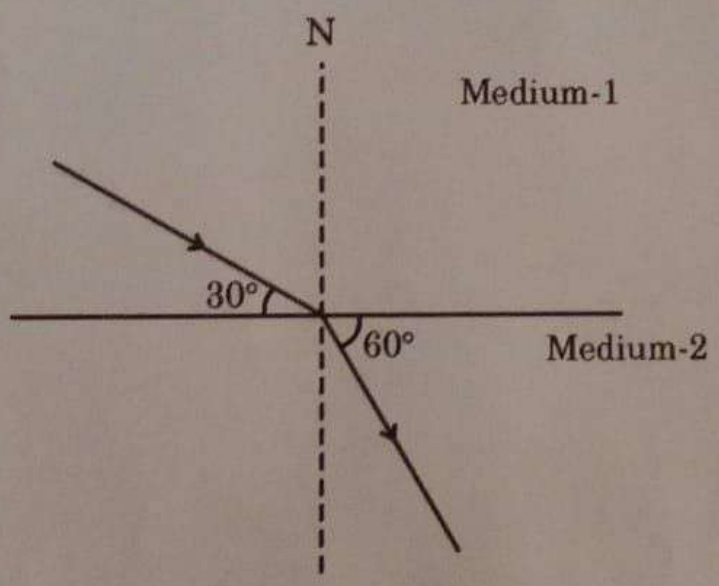
(B) What change takes place in the reading of the voltmeter when a new cell is added in series in the circuit ? Give reason.

(C) In which case will the readings of voltmeter and ammeter be maximum in the above experiment ? What conclusion can be drawn from the straight line graph between 'V' and 'I' ?

OR

(C) Suppose this experiment is carried out using only one cell but wires of same length & thickness but made of different materials like nichrome wire, fuse wire, copper wire and iron wire which are replaced one by one. Out of V and I which will change and why ?

39. (A) (i)



With the help of given ray diagram, calculate the refractive index of medium 2 with respect to medium 1. 5

(ii) If speed of light in medium-1 is 3×10^8 m/s, then calculate the speed of light in medium-2.

(iii) Compare the optical density of medium-1 and medium-2 and justify your answer.

OR