

Series : LKN3M



SET ~ 1

रोल नं.

Roll No.

प्रश्न-पत्र कोड

Q.P. Code

31/3/1

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विज्ञान SCIENCE

निर्धारित समय : 3 घण्टे

Time allowed : 3 hours

अधिकतम अंक : 80

Maximum Marks : 80

नोट / NOTE

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- (I) कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 31 हैं।
Please check that this question paper contains 31 printed pages.
- (II) प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए प्रश्न-पत्र कोड को परीक्षार्थी उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें।
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.
- (III) कृपया जाँच कर लें कि इस प्रश्न-पत्र में 39 प्रश्न हैं।
Please check that this question paper contains 39 questions.
- (IV) कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, उत्तर-पुस्तिका में यथा स्थान पर प्रश्न का क्रमांक अवश्य लिखें।
Please write down the Serial Number of the question in the answer-book at the given place before attempting it.
- (V) इस प्रश्न-पत्र को पढ़ने के लिए 15 मिनट का समय दिया गया है। प्रश्न-पत्र का वितरण पूर्वाह्न में 10.15 बजे किया जाएगा। 10.15 बजे से 10.30 बजे तक परीक्षार्थी केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे।
15 minute time has been allotted to read this question paper. The question paper will be distributed at 10.15 a.m. From 10.15 a.m. to 10.30 a.m., the candidates will read the question paper only and will not write any answer on the answer-book during this period.

**General Instructions :**

Read the following instructions carefully and follow them :

- (i) This question paper contain **39** questions. **All** questions are **compulsory**.
- (ii) The question paper is divided into **three** sections — **A, B and C**.

Section A : Biology (30 marks)

Section B : Chemistry (25 marks)

Section C : Physics (25 marks)

- (iii) The question paper has MCQs, VSAs, SAs, LAs and CBQs. Marks are given against each question.
- (iv) There are case based questions (CBQs) with three sub-questions and are of 4 marks each.
- (v) **Divide your answer sheet into three sections as per the question paper –**

Section A (Biology), Section B (Chemistry) and Section C (Physics).

It is compulsory to answer each question in its respective section. Do not mix answers of one section into the other section.

- (vi) Instructions are given with each section and question, wherever necessary.
- (vii) Kindly note that a separate question paper has been provided for visually impaired candidates.
- (viii) There is no overall choice in the question paper. However, an internal choice has been provided in few questions. Only one of the choices in such questions must be attempted.

SECTION A
BIOLOGY

1. Pravin was given a list of characteristics associated with the process of anaerobic respiration in humans, in the table given below :

	Location	Condition	End Product
Characteristic	(i) Muscle Cell	(ii) Requires presence of Oxygen (O ₂) and Carbon dioxide (CO ₂)	(iii) 3-Carbon molecules

Which of the above characteristics is/are related to the above process ?

1

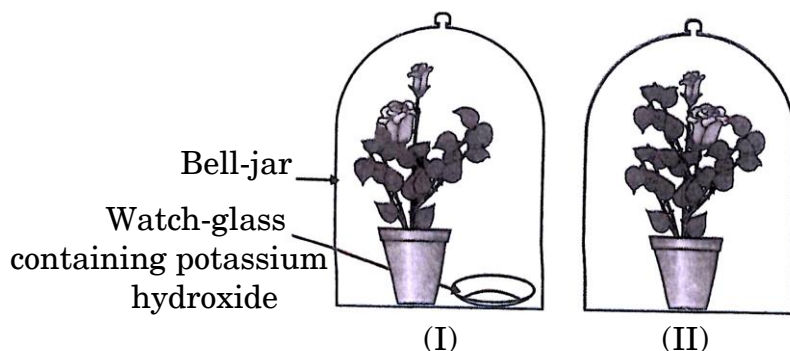
- (A) (i) and (ii)
- (B) (i) and (iii)
- (C) (ii) and (iii)
- (D) (i) only



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2. Observe the figure given below and identify the **incorrect** step for the activity set-up :

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- (A) Both plants are kept in the dark room for three days before placing them in separate glass jars.
- (B) Both plants are covered with separate wooden bell-jars.
- (C) Use vaseline to seal the bottom of the jars with the glass plates.
- (D) Both potted plants were kept in sunlight for a few hours before the iodine test for the presence of starch.

3. Walking in a straight line and riding a bicycle are activities which are possible due to coordination of which part of the brain ?

1

(Part of the Brain) (Name of the area of the Brain)

- | | |
|----------------|------------|
| (A) Fore-Brain | Cerebrum |
| (B) Mid-Brain | Cerebellum |
| (C) Hind-Brain | Cerebellum |
| (D) Hind-Brain | Medulla |

4. In a synapse, the chemical signal is transmitted from :

1

- (A) Dendritic end of one neuron to axonal end of another neuron.
- (B) Axon to cell body of the same neuron.
- (C) Cell body to axonal end of the same neuron.
- (D) Axonal end of one neuron to dendritic end of another neuron.



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5. Organisms of a higher trophic level which feed on several types of organisms belonging to a lower trophic level form the : 1
- (A) Food web (B) Ecosystem
(C) Ecological pyramid (D) Food chain
6. In accumulation of toxic substances at higher trophic levels of an ecosystem through the food chain, which of the following organisms is affected the most ? 1
- (A) Small aquatic plants (B) Human beings
(C) Small fish (D) Large fish
7. The growth of tendrils in grapes plants is due to : 1
- (A) Effect of light
(B) Effect of gravity
(C) Rapid cell division in tendril cells in contact with the support
(D) Rapid cell division in tendril cells that are away from the support

For Questions number 8 and 9, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as 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.
8. *Assertion (A)* : Natural replenishment of soil will not take place in absence of microbes.
Reason (R) : Microbes, comprising of bacteria and fungi, break down dead remains and waste products of organisms, and they go into the soil. 1



9. *Assertion (A)* : The basic filtration unit in the kidneys, like in the lungs, is a cluster of very thin-walled blood capillaries.

Reason (R) : Each capillary cluster in the kidney is associated with the cup-shaped end of a coiled tube called Bowman's capsule. 1

10. (i) Chlorofluorocarbons (CFCs) have been linked to depletion of ozone layer. In 1987, the United Nations Environment Programme (UNEP) succeeded in making an agreement. State this agreement.

(ii) What is the role of ozone in our atmosphere ? 2

11. What kind of respiration provides more energy and why ? 2

12. Separation of right side and left side of the heart is useful to keep oxygenated and deoxygenated blood from mixing. Various organisms have different types of heart.

(I) Fill in the blanks (i) to (iii) correctly according to the type of organisms and their evolution in terms of blood circulation :

Organisms	Number of chambers in heart	Type of blood being circulated	Type of circulation
Fish	(i) _____	Mixed	Single
(ii) _____	3-chambered	Mixed	Incomplete double circulation
Birds and Mammals	4-chambered	Separated circulation path of oxygenated and deoxygenated blood	(iii) _____

(II) Which type of circulation is most efficient ? 2



13. In xylem tissue, vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant. Explain how this is achieved. 3
14. Show the cross and observations made by Mendel when he crossed pure tall pea plant with a pure short pea plant to get F_1 progeny. 3

15. Read the following passage and answer the questions that follow :

Not all plants carry out photosynthesis by the same mechanism. In most plants, it depends directly on gaseous carbon dioxide that diffuses into the leaf. However, some plants can store carbon dioxide in the vacuole of the leaf cells as part of a complex carbon compound. This compound is transported to the chloroplast and releases carbon dioxide when required for photosynthesis. This special mechanism is believed to have evolved as an adaptation in such plants which do not open stomata during the daytime to conserve water for survival in dry conditions (desert conditions).

Attempt either (a) or (b) :

- (a) (i) Which process in these plants is minimised to help the plants survive in dry conditions ?
- (ii) Which part of the leaf is responsible for exchange of gases during photosynthesis ? 4

OR

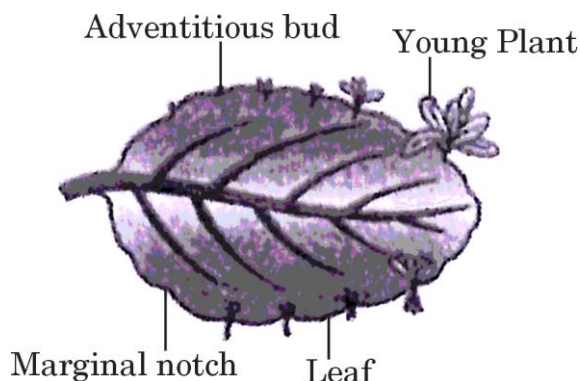
- (b) (i) List the events that occur during the process of photosynthesis.
- (ii) When are such desert plants likely to take in carbon dioxide from the environment, unlike other plants ?
- (iii) Draw a labelled diagram of stomata with open stomatal pore. 4



16. Attempt either (a) or (b) :

(a) Observe the given diagram and answer the questions that follow :

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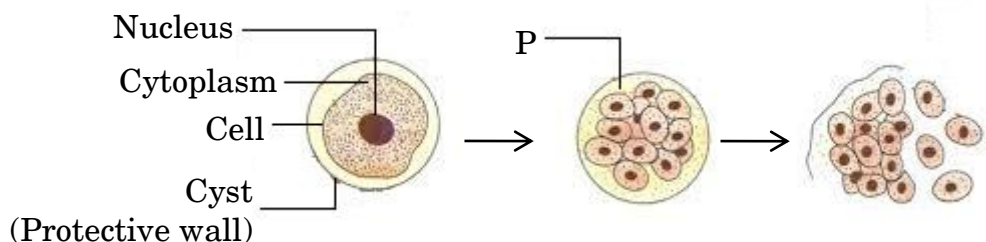


- (i) Give the name of the structure and type of reproduction shown in the above diagram.
- (ii) State one advantage and one disadvantage of the above mentioned method of reproduction.
- (iii) Give reason : Asexual reproduction lacks genetic variation.
- (iv) Why have higher organisms resorted to sexual reproduction in spite of its complexity ?

OR

(b) Observe the given diagram and answer the questions that follow :

5



- (i) Give the name and type of reproduction shown in the above diagram.
- (ii) Comment on the processes taking place in stage P.
- (iii) Name an organism which reproduces by the above mentioned method.
- (iv) Name the method that can be used to raise plants that have lost their capacity to produce seeds. List any two advantages of growing plants by such a method.

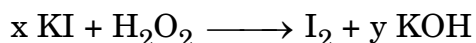


SECTION B
CHEMISTRY

17. Which of the following is an example of a displacement reaction ? 1
- (A) The combustion of natural gas
(B) The reaction of a reactive metal with dilute acid
(C) The electrolysis of water
(D) The reaction of quick lime with water

18. To a small amount of copper oxide in a beaker, when we add dilute hydrochloric acid slowly with stirring, the change in the colour of the solution is due to the formation of : 1
- (A) Copper(II) oxide, which is black in colour.
(B) Copper(I) chloride, which is blue in colour.
(C) Copper(II) chloride, which is blue-green in colour.
(D) Copper(I) oxide, which is black in colour.

19. In the following equation

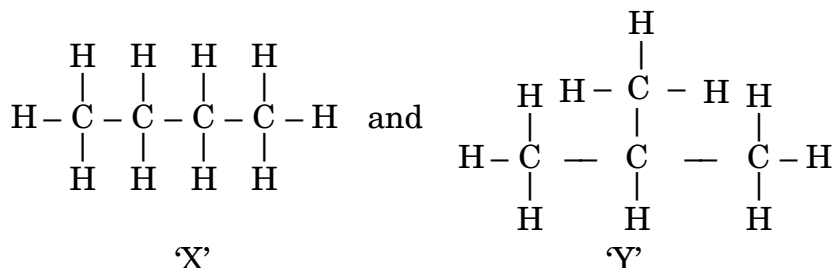


x and y respectively are :

1

- (A) 2, 2 (B) 1, 2
(C) 2, 1 (D) 1, 1

20. Consider the structures 'X' and 'Y' given below :



Which of the following statements are correct ?

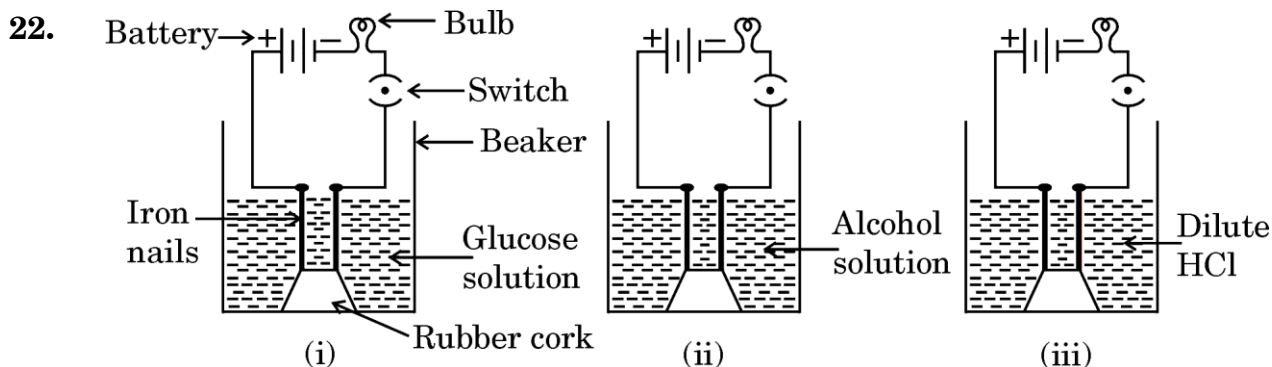
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- (i) 'X' and 'Y' are homologues.
(ii) 'X' and 'Y' have the same structural formula, but different molecular formula.
(iii) 'X' and 'Y' have the same molecular formula, but different structural formula.
(iv) 'X' and 'Y' are structural isomers.
- (A) (i) and (iii) (B) (i) and (iv)
(C) (ii) and (iv) (D) (iii) and (iv)



21. The reaction of calcium with cold water is :

- (A) Less violent, but the heat evolved is sufficient for the hydrogen to catch fire.
- (B) Very violent and exothermic and hydrogen catches fire.
- (C) Exothermic, but the heat evolved is not sufficient for the hydrogen to catch fire.
- (D) Slow and endothermic.



In which case/cases will the bulb glow considering that all other connections of electric circuit are complete and working ?

1

- (A) Case (i) only
- (B) Case (ii) only
- (C) Cases (ii) and (iii)
- (D) Case (iii) only

23. When zinc reacts with NaOH, the product formed is :

1

- (A) Na_2O
- (B) ZnO
- (C) Na_2ZnO_2
- (D) $\text{Zn}(\text{OH})_2$

For Question number 24, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to this question from the codes (A), (B), (C) and (D) as 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)* : There are large number of compounds with many carbon atoms linked to each other.
Reason (R) : Carbon-Carbon bond is very strong and stable. 1
25. Show the formation of the following ionic compounds by transfer of electrons between the combining atoms : 1+1=2
(i) Sodium oxide (Na_2O)
(ii) Magnesium chloride (MgCl_2)
(Given : Atomic number : Na = 11, Mg = 12, O = 8, Cl = 17)
26. 2 g of green coloured crystals of ferrous sulphate are heated in a dry boiling tube. Name the type of chemical reaction taking place. Write the balanced chemical equation for the reaction. Is this an exothermic or an endothermic reaction ? 3
27. Attempt either (a) or (b) :
(a) Give reasons : 3×1=3
(i) For dilution of an acid, acid is added into water and not water into acid.
(ii) Dry HCl gas does not turn blue litmus red whereas dilute hydrochloric acid does.
(iii) Blue colour of Copper(II) sulphate crystals turns white on heating.
OR
(b) Write the preparation of the following compounds with balanced chemical equation : 3×1=3
(i) NaOH by chlor-alkali process
(ii) Baking Soda
(iii) Plaster of Paris
28. Read the following passage and answer the questions that follow :
An electrochemical process is used for refining metals by selectively dissolving and depositing them through electrolysis. Electrolytic refining is used for metals like Copper, Zinc, Tin, Nickel, Silver and Gold.
(a) Define anode mud. 1



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- (b) In electrolytic refining of copper, name the anode and the cathode. 1
- (c) (i) With the help of chemical equations, show the extraction of copper from its ore Cu_2S . 2

OR

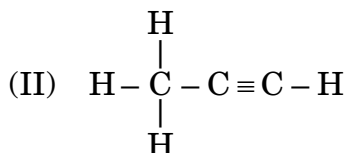
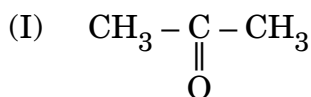
- (c) (ii) Draw a neat and labelled diagram showing electrolytic refining of copper. 2

29. Attempt either (a) or (b) :

- (a) (i) What is homologous series ? Which two of the following organic compounds belong to the same homologous series ?
 C_2H_4 , C_4H_{10} , C_3H_4 , C_4H_8
- (ii) Write the product(s) in the following reactions :
(I) $\text{CH}_3 - \text{CH}_2 - \text{OH} + \text{CH}_3\text{COOH} \xrightarrow{\text{Acid}}$
(II) $\text{C}_2\text{H}_5\text{OH} + \text{O}_2 \xrightarrow{\text{Burning}}$
- (iii) Why does micelle formation take place when soap is added to water ? 2+2+1=5

OR

- (b) (i) Name the following compounds :



- (ii) Name the reaction which is commonly used in the conversion of vegetable oils to fats.
- (iii) Why is the melting point of C_4H_{10} higher than C_3H_8 ?
- (iv) What happens when a piece of sodium is dropped into ethanol ?
- (v) Write the products in the following reaction : 5×1=5
 $\text{CH}_3\text{COOC}_2\text{H}_5 + \text{NaOH} \longrightarrow$



SECTION C

PHYSICS

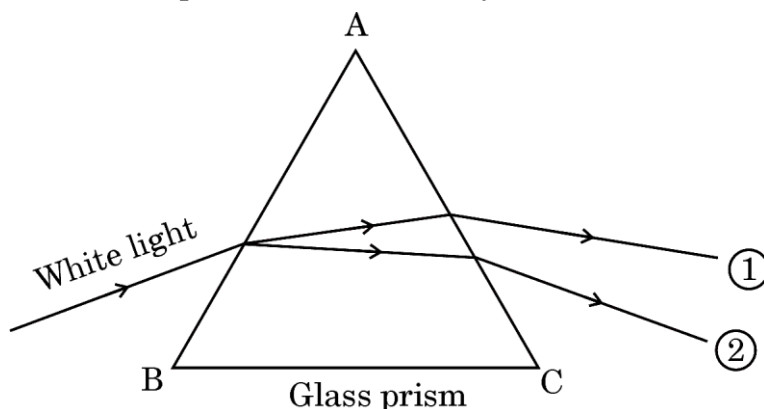
30. The correct way to connect an ammeter and a voltmeter in an electric circuit is :

1

- (A) Ammeter in parallel and voltmeter in series
- (B) Ammeter and voltmeter both in parallel
- (C) Ammeter in series and voltmeter in parallel
- (D) Ammeter and voltmeter both in series

31. Observe the given ray diagram showing refraction through a prism and choose the correct option for colour of rays 1 and 2 :

1



Colour of ray 1 Colour of ray 2

- (A) Blue Red
- (B) Green Yellow
- (C) Red Violet
- (D) Violet Red

For Question number 32, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to this question from the codes (A), (B), (C) and (D) as given below.

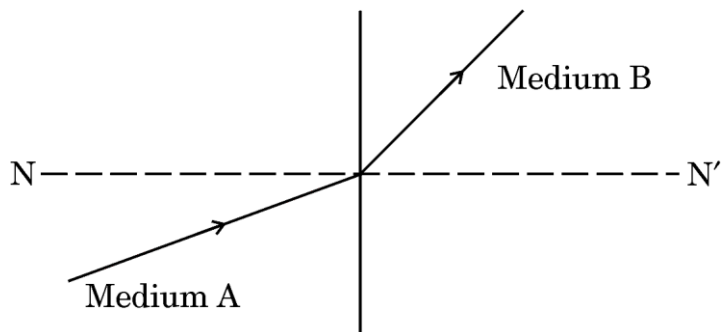
- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
- (B) Both Assertion (A) and Reason (R) are true, but Reason (R) is **not** the correct explanation of Assertion (A).
- (C) Assertion (A) is true, but Reason (R) is false.
- (D) Assertion (A)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



32. **Assertion (A) :** The needle of a compass, kept in an external magnetic field, always aligns itself in the North-South direction of the Earth.

Reason (R) : The behaviour of the needle of the compass is similar to the behaviour of a freely suspended bar magnet. 1

33.



A ray of light enters into medium B from medium A as shown in the given figure :

- (a) Which one of these two media is optically denser than the other medium ? Justify your answer.
- (b) If the speed of light in medium A is V_A and in medium B is V_B , then what is the refractive index of medium B with respect to medium A ? 2

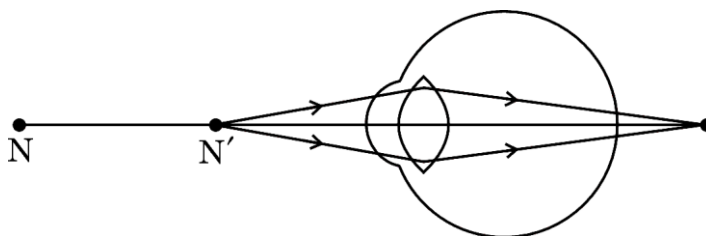
34. Attempt either (a) or (b) :

- (a) What happens when light is scattered from (i) very fine particles and (ii) very large size particles of medium ? Justify your answer in each case. 2

OR

- (b) With the help of a ray diagram, explain any phenomenon of formation of spectrum in nature. 2

35. Study the given diagram and answer the questions that follow :



- (a) Write the name of the eye defect shown in the diagram. Where is the image formed in this eye defect with respect to the retina of the eye ?



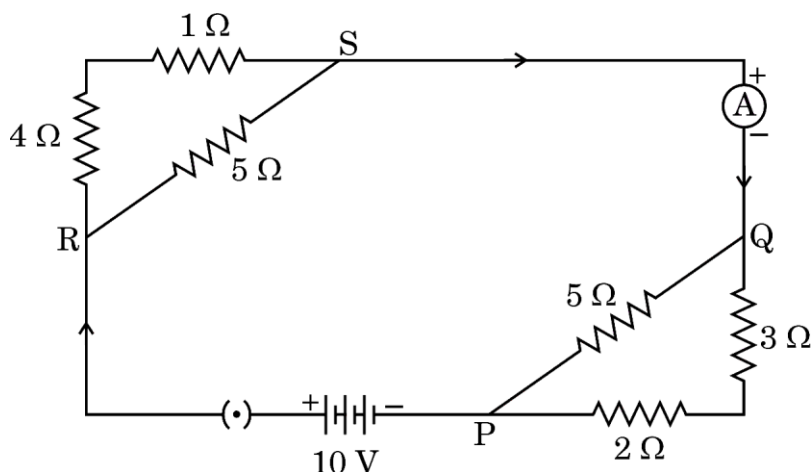
- (b) List two causes of this eye defect.
- (c) With the help of a diagram, show how this eye defect of vision is corrected.

3

36. (a) Name a device which is used to :
- (i) Maintain a constant potential difference in a circuit.
- (ii) Change the electric current in an electric circuit.
- (b) When the potential difference between the terminals of an electric heater is 110 V, a current of 5 A flows through it. What will be the value of current flowing through it when the potential difference is increased to 220 V ?

3

37. Consider the given electric circuit :



Calculate the following :

3

- (a) Total resistance of the circuit
- (b) The electric current drawn from the battery
- (c) Potential difference between points P and Q



38. The variation of image distance (v) with the object distance (u) for a convex lens is given in the following observation table. Analyse it and answer the questions given below :

S.No.	Object distance (u) cm	Image distance (v) cm
1	-150	$+30$
2	-75	$+37.5$
3	-50	$+50$
4	-37.5	$+75$
5	-30	$+150$
6	-15	$+37.5$

- (a) Without calculation, find out the focal length of the given convex lens. Justify your answer. 1
- (b) Which one of the observations given in the table is not correct and why ? 1
- (c) (i) Find out the value of magnification for $u = -30$ cm. Write the nature of the image formed. Give reason for your answer. 2

OR

- (c) (ii) Analyse the data given in the table above and draw the labelled ray diagram for $u = -30$ cm and $v = 150$ cm. 2

39. Attempt either (a) or (b) :

- (a) (i) What is a solenoid ? Draw a diagram showing the magnetic field pattern due to a current-carrying solenoid (inside and outside).
- (ii) Name any two factors on which the magnitude of the magnetic field due to a current-carrying solenoid depends.

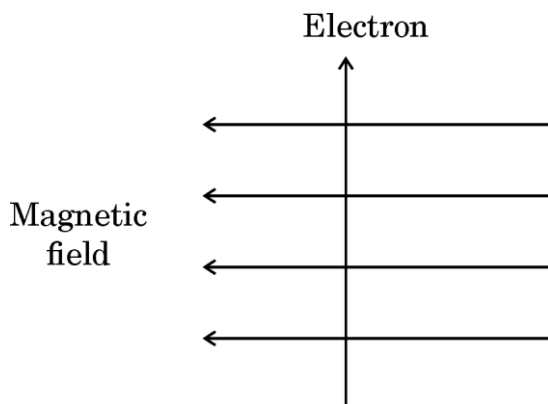


- (iii) A current-carrying solenoid is stretched and converted into a straight wire carrying current. Draw a diagram showing the magnetic field pattern around it and mark the direction of the magnetic field.

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OR

- (b) (i) With the help of a diagram, show that a current-carrying conductor placed in an external magnetic field, experiences a force. Indicate the direction of the field, current and force clearly.
- (ii) The diagram given below shows an electron moving in a uniform magnetic field.



- (I) What will be the direction of the force acting on the electron ?
- (II) What will happen to the direction of the force acting on the electron, if the direction of the magnetic field as well as the direction of motion of the electron, both are reversed ?

5