

Series : LMNK2



SET ~ 2

रोल नं.

Roll No.

प्रश्न-पत्र कोड

Q.P. Code

31/2/2

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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. *Spirogyra*, despite being a multi-cellular organism, still shows a simple reproductive method. Select the correct option with regard to reproduction in *Spirogyra* :

1

- (A) Asexual reproduction by division of cells into two cells
- (B) Sexual reproduction by division of cells into many cells
- (C) Asexual reproduction by breaking up of *Spirogyra* filaments into smaller parts
- (D) Sexual reproduction by the formation of gametes after meiosis of cells of filaments followed by fusion of male and female gametes



2. The genotype of green stemmed tomato plant is denoted by 'GG' and that of purple stemmed tomato plant as 'gg'. Hybrid of a cross between these two were self-pollinated to obtain F_2 progeny. What will be the ratio of GG, Gg and gg in this F_2 progeny ? 1
- (A) 2 : 1 : 1 (B) 3 : 1 : 0
(C) 1 : 1 : 2 (D) 1 : 2 : 1
3. Identify the type of tropic movement that is responsible for the movement of the pollen tube towards an ovule from the following options. 1
- (A) Hydrotropism (B) Geotropism
(C) Chemotropism (D) Phototropism
4. If the stomatal pore is open, it indicates which situation from the following ? 1
- (A) The guard cells have shrunk.
(B) The water comes out of the guard cells.
(C) Large amount of water is lost through stomata.
(D) The guard cells have swelled due to inflow of water.
5. Which of the following limits the number of trophic levels in a food chain ? 1
- (A) Availability of water
(B) Deficient food supply
(C) Decrease in energy at higher levels
(D) Pollution in air



6. The following events occur during the process of photosynthesis. Choose the option that indicates the correct events.

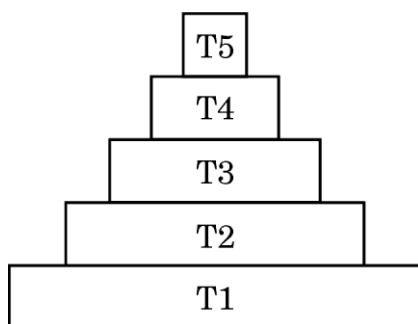
1

- (i) Oxidation of carbon dioxide to carbohydrates
- (ii) Conversion of light energy into chemical energy
- (iii) Absorption of light energy by chlorophyll
- (iv) Conversion of hydrogen and oxygen into water

Options :

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

7.



In the given figure, identify the trophic level having maximum concentration of harmful chemicals.

1

- (A) T1
- (B) T5
- (C) T4
- (D) T3

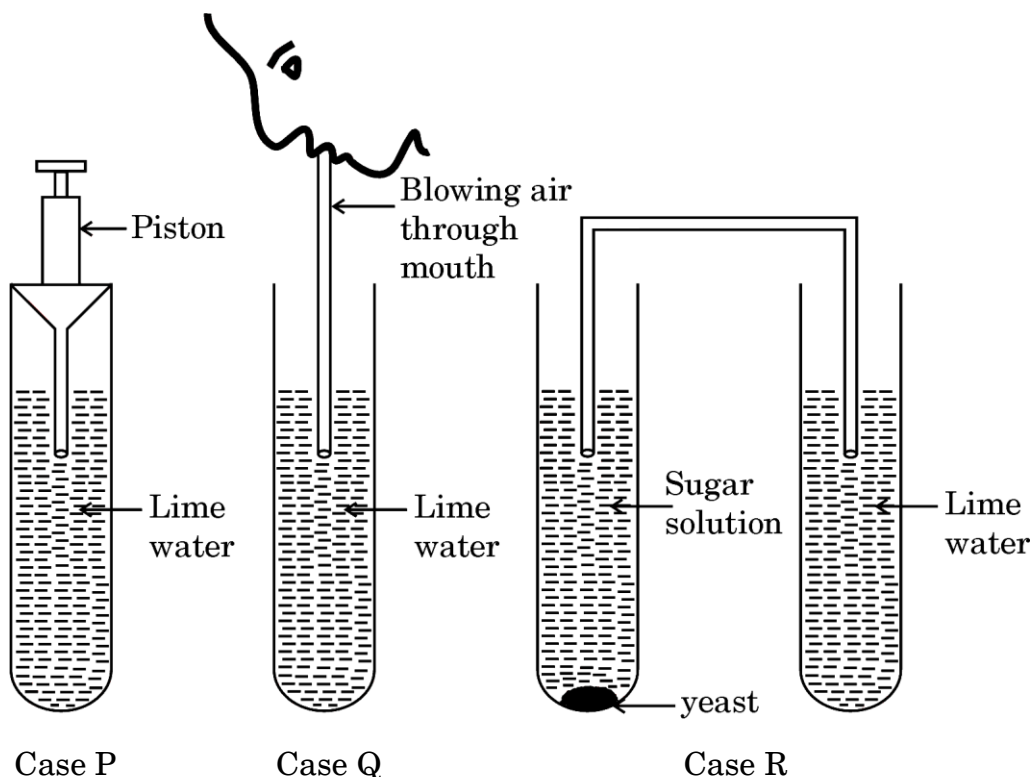
For Questions number 8 and 9, two statements are given — one labelled as Assertion (A) and the other labelled as Reason (R). Select the correct answer to these questions from the codes (A), (B), (C) and (D) as given below.

- (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.



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8. *Assertion (A)* : There are generally a greater number of individuals at the lower trophic levels of an ecosystem.
Reason (R) : The greatest number is of the producers. 1
9. *Assertion (A)* : Blood plasma transports carbon dioxide in dissolved form, while oxygen is transported by respiratory pigments.
Reason (R) : Carbon dioxide is more soluble in water than in oxygen. 1
10. (a) "The timing and the amount of hormone secreted by a gland are regulated in the human body." Justify this statement with the help of an example. 2
- OR**
- (b) Electrical impulse is an excellent means to transmit information in the animal body, but there are some limitations to the use of electrical impulses. State any two limitations. 2
11. Do all variations in a species have equal chances of surviving in the environment in which they find themselves ? Explain. 2
12. Suggest two ways of dealing with waste generated at home. 2
13. Observe the following diagrams : 3



- (a) What change will be observed in Cases 'P', 'Q' and 'R' ? Give reasons.



- (b) In which case :
- (i) is aerobic respiration taking place ?
 - (ii) is fermentation taking place ?

14. (a) Giving two examples, justify the statement that the sex of the offspring in all animals is not always genetically determined.
- (b) Differentiate between the sex chromosomes of male and female human beings.

3

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

- (a) (i) Name an organ that helps in the formation of male germ cells in humans and also mention the condition that favours the formation of male germ cells.
- (ii) In male reproductive system, write the pathway followed to deliver male germ cells to the site of fertilisation.
- (iii) Mention the main physical feature of the male germ cell that helps it move towards the female germ cell. 2+2+1=5

OR

- (b) Radha has three children. She does not want to have more children. Radha visits a nearby hospital, to know the methods to prevent pregnancy.
- (i) Mention the name of any two ways other than the surgical methods, following which Radha can avoid unwanted pregnancies.
- (ii) Name the surgical methods to prevent pregnancy.
- (iii) Give one example each of sexually transmitted diseases caused by bacteria and virus. 2+2+1=5



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

A middle-aged person is facing some cognitive changes in himself. His early symptoms included mild forgetfulness. For example, forgetting where he left his mobile or failing to find words to complete his sentences. He was facing problems in driving a car, climbing up and down the stairs, inserting a plug into an outlet. He slowly developed a sad mood and anxiety.

- (a) What are voluntary actions ? 1
- (b) Which part of the brain is responsible for precision of voluntary actions ? 1
- (c) (i) Explain the role of the medulla. 2
- OR**
- (c) (ii) How do the animal muscles move ? 2

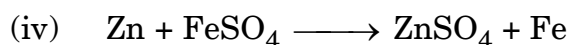
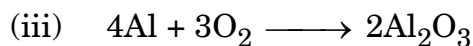
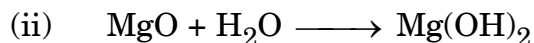
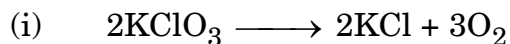
SECTION B
CHEMISTRY

17. Tamarind is a natural source of which acid ? 1
- (A) Acetic acid (B) Tartaric acid
- (C) Oxalic acid (D) Citric acid
18. Rain water is called 'acid rain' when its : 1
- (A) pH falls below 7.2.
- (B) pH falls below 14.
- (C) pH is above 7.
- (D) pH falls below 5.6.



19. Which of the following are combination reactions ?

1



Options :

(A) (i) and (iii)

(B) (iii) and (iv)

(C) (ii) and (iv)

(D) (ii) and (iii)

20. A metal carbonate reacts with a solution X which forms a salt, water and a gas Y. What are X and Y ?

1

(A) X – Sodium hydroxide, Y – Carbon dioxide

(B) X – Sodium hydroxide, Y – Hydrogen

(C) X – Hydrochloric acid, Y – Carbon dioxide

(D) X – Hydrochloric acid, Y – Hydrogen

21. When Mg metal is treated with hot water, it starts floating on the surface of the water. The reason for its different behaviour is :

1

(A) Mg is a lighter element than water.

(B) Mg reacts with water to produce H_2 gas which helps in floating.

(C) Mg reacts with water to produce N_2 gas which helps in floating.

(D) Mg reacts with water to form CO_2 gas which helps in floating.



22. A student notices that her silver jewellery turned dull and had a grey-black coating over it after wearing for a few months. What results in the change in colour of the silver metal ? 1
- (A) The polish over the jewellery was removed after wearing for a few months.
- (B) The jewellery comes in contact with air, moisture and acids and corrodes.
- (C) Dust particles over the jewellery change its colour.
- (D) Its colour changes due to rusting.
23. When ferrous sulphate crystals are heated in a test tube, we observe that : 1
- (A) A colourless gas with no smell is evolved.
- (B) A brown gas is evolved.
- (C) The green colour of the salt fades and a gas with the smell of burning sulphur is evolved.
- (D) The green colour of the salt fades and no gas is evolved.

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) : Carbon shows the property of catenation.

Reason (R) : C – C bond is weak due to its small size.

1



25. Answer the following :

1+1=2

- (a) Why should chemical equations be balanced ?
- (b) Name the oxidising and reducing agent in the following equation :



26. Answer the following :

3×1=3

- (a) Why can the oxides of highly reactive metals not be reduced by carbon ?
- (b) Why do ionic compounds have high melting and boiling points ?
- (c) Why is a solder, an alloy of lead and tin, used for welding electrical wires together ?

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

- (a)
 - (i) Write one example each of one metal that is so soft that it can be cut with a knife, and one non-metal that is a good conductor of electricity.
 - (ii) Using the electronic configuration, explain how Mg atom combines with oxygen to form magnesium oxide by transfer of electrons. [Atomic number : Mg = 12, O = 8]

1+2=3

OR

(b) Give reasons :

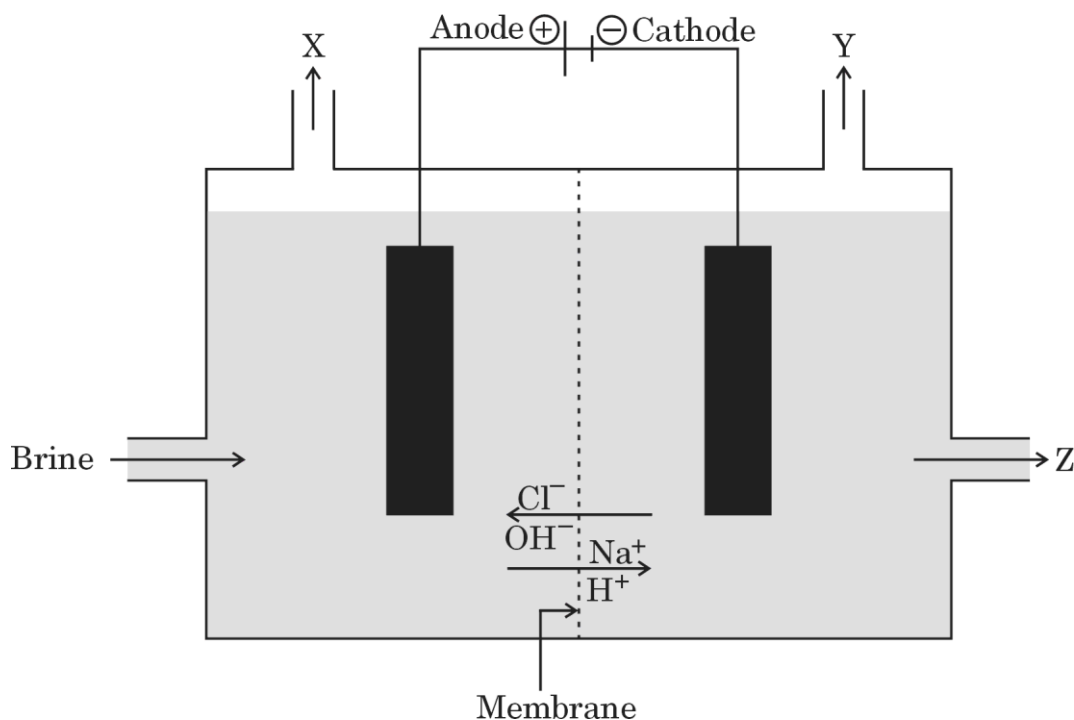
3×1=3

- (i) Metal sulphides and carbonates should be converted to their metal oxides in the process of extraction of metals.
- (ii) Aluminium oxide is considered as an amphoteric oxide.
- (iii) Metals like Na, K, Ca and Mg are never found in their free state in nature.



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

In the given diagram, when electricity is passed through an aqueous solution of a common salt, a substance 'Z' is produced, along with the evolution of gases 'X' and 'Y'. When a burning matchstick is brought near the gas 'Y', it burns with a pop sound, whereas 'X' is used for disinfecting drinking water. When 'X' is passed through slaked lime, an insoluble substance 'A' is produced.



- (a) Write the names of the gases 'X' and 'Y'. 1
- (b) Write the balanced chemical equation for the formation of substance 'Z'. 1
- (c) (i) What happens : 2
- (I) If a drop of red litmus solution is added to the aqueous solution of substance 'Z' ?
- (II) If CO_2 gas is passed through ammoniacal solution of aqueous NaCl ?

OR

- (c) (ii) Identify the substance 'A' and write the balanced chemical equation of the reaction which takes place in its preparation. 2



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

(a) A carbon compound 'P' of molecular formula C_2H_6O is found to be neutral when tested with red and blue litmus. A gas that burns with a pop sound is produced when sodium metal reacts with compound 'P'.

(i) Identify the compound 'P'.

(ii) The carbon compound 'P' is heated with conc. H_2SO_4 at 443 K to produce compound 'Q'.

(I) Write the chemical equation for the reaction.

(II) What is the role of conc. H_2SO_4 in this reaction ?

(iii) What is likely to be observed on heating compound 'P' with ethanoic acid with an acid as a catalyst ? Write the chemical equation for the reaction.

1+2+2=5

OR

(b) (i) Write the structural formula of benzene.

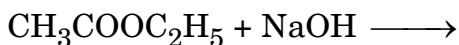
(ii) State the reason why carbon can neither form C^{4+} cation nor C^{4-} anion.

(iii) What type of bond is formed between carbon and hydrogen ?

(iv) How is ethanol converted to ethanoic acid ?

(v) Complete the following chemical equation :

5×1=5





SECTION C
PHYSICS

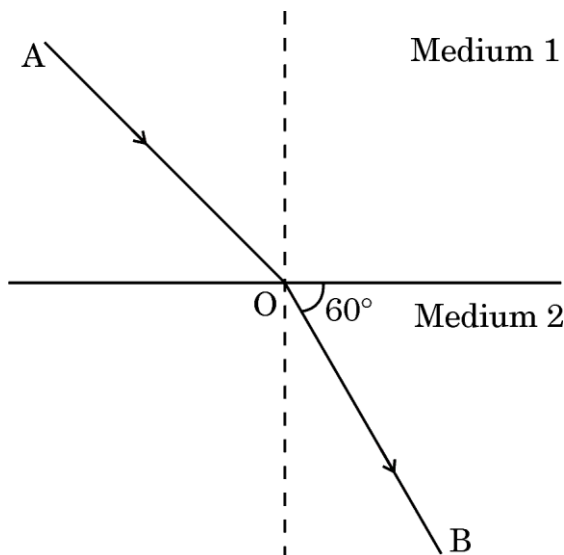
30. A thin beam of white light falls on a face of a glass prism and a spectrum is obtained on a screen. Which of the following options is the correct sequence of colours from top to bottom on the screen ? 1
- (A) Red, Green, Yellow, Violet, Blue
(B) Red, Yellow, Green, Blue, Violet
(C) Violet, Blue, Green, Yellow, Red
(D) Violet, Red, Green, Yellow, Blue
31. From the following options choose the one which gives negative magnification greater than one : 1
- (A) Concave mirror; Nature of image – real
(B) Concave mirror; Nature of image – virtual
(C) Convex mirror; Nature of image – real
(D) Convex mirror; Nature of image – virtual

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) :** Direction of force exerted on a current-carrying conductor placed in a magnetic field remains same if the directions of both magnetic field and current flowing through the conductor are reversed.
- Reason (R) :** The direction of force exerted on a current-carrying conductor placed in an external magnetic field can be determined by using magnetic compass. 1



33.



Use the above given ray diagram to calculate the angle of incidence. Given that the refractive index of Medium 2 with respect to the Medium 1 is $\sqrt{3}$.

2

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

- (a) How does the focal length of eye lens change as the distance of the object from the eyes is altered ? Explain.

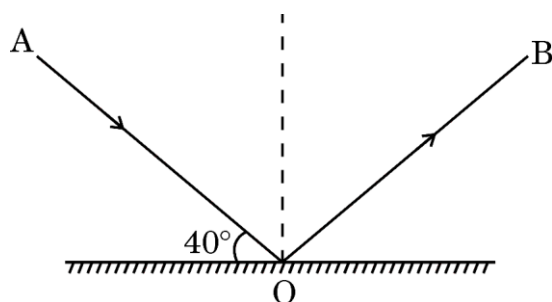
2

OR

- (b) Why is the concave lens used as a corrective lens for a myopic eye ?

2

35.



- (a) State the laws which help to find out the angle of incidence and angle of reflection in the ray diagram given above.
- (b) Find out the angle of incidence and angle of reflection in the given ray diagram.

3



36. The values of current I flowing in a given resistor for the corresponding values of potential difference V applied across the ends of resistor are given below in the table :

I (Amperes)	0.4	0.8	1.2	1.6	2.0
V (Volts)	1.2	2.4	3.6	4.8	6.0

Plot a graph between V and I and calculate the resistance of that resistor. 3

37. What is scattering of light ? How is scattering of light different from reflection of light ? Explain. 3

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

Swati, a class 10 student, observes that when she passes close to the refrigerator in her kitchen, she feels the heat, although the things kept inside the refrigerator are cool.

- (a) Describe the cause of heating in the above-mentioned case. 1
- (b) A current I flows through a resistor of resistance R when the potential difference across it is V . Applying Ohm's law, write the formula for amount of heat produced by the resistor in time t . 1
- (c) (i) Write any two practical applications of heating effect of electric current. 2

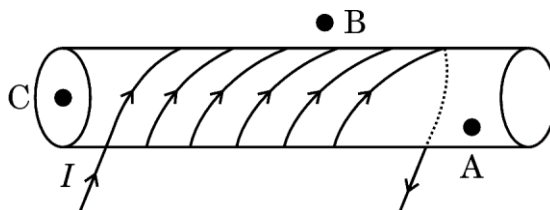
OR

- (c) (ii) Define the commercial unit of electric energy and express it in Joules (J). 2

39. (a) (i) State the rules to determine the following :
- (I) Direction of magnetic field produced around a current-carrying straight conductor.
- (II) Direction of force experienced by a current-carrying straight conductor placed in a magnetic field which is perpendicular to it.
- (ii) (I) Draw the magnetic field lines due to a current-carrying solenoid.



(II)



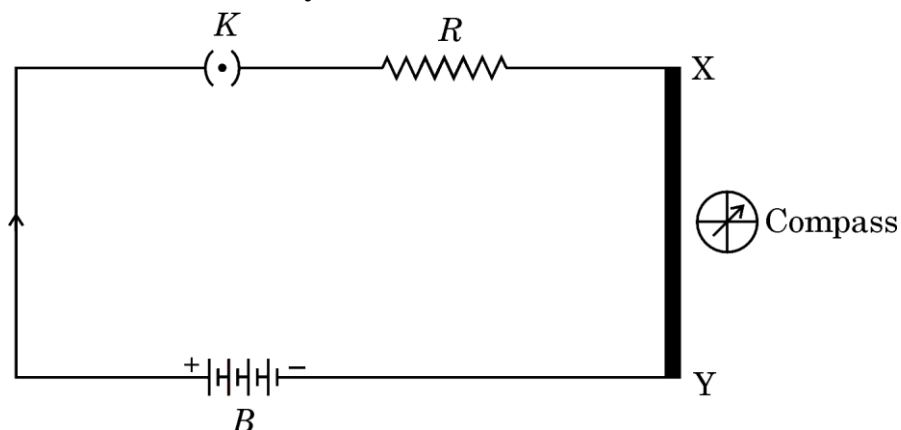
Three points A, B and C are marked in the above given diagram of the current-carrying solenoid. Out of the three points A, B and C, at which point is the magnetic field strength maximum and at which point is it minimum ?

5

OR

- (b) (i) (I) In the given circuit diagram, a battery B , a key K , a resistance R and a thick copper wire XY are connected in series and a compass is placed near the wire. What is the purpose of this arrangement ?

(II) What conclusion do you draw from it ?



(ii) Give reasons :

- (I) There is either a convergence or a divergence of magnetic field lines near the ends of a current-carrying straight solenoid.
- (II) The current-carrying solenoid, when suspended freely, aligns along a particular direction.
- (III) The burnt-out fuse should be replaced by another fuse of identical rating.

5