

SET – 1

Series : TYM

कोड नं. 31/1
Code No.

रोल नं.

Roll No.

--	--	--	--	--	--	--

परीक्षार्थी कोड को उत्तर-पुस्तिका के मुख-पृष्ठ पर अवश्य लिखें ।

Candidates must write the Code on the title page of the answer-book.

- कृपया जाँच कर लें कि इस प्रश्न-पत्र में मुद्रित पृष्ठ 12 हैं ।
- प्रश्न-पत्र में दाहिने हाथ की ओर दिए गए कोड नम्बर को छात्र उत्तर-पुस्तिका के मुख-पृष्ठ पर लिखें ।
- कृपया जाँच कर लें कि इस प्रश्न-पत्र में 27 प्रश्न हैं ।
- कृपया प्रश्न का उत्तर लिखना शुरू करने से पहले, प्रश्न का क्रमांक अवश्य लिखें ।
- 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 छात्र केवल प्रश्न-पत्र को पढ़ेंगे और इस अवधि के दौरान वे उत्तर-पुस्तिका पर कोई उत्तर नहीं लिखेंगे ।
- Please check that this question paper contains 12 printed pages.
- Code number given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- Please check that this question paper contains 27 questions.
- **Please write down the Serial Number of the question before attempting it.**
- 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 students will read the question paper only and will not write any answer on the answer-book during this period.

विज्ञान

SCIENCE

निर्धारित समय : 3 घंटे

अधिकतम अंक : 80

Time allowed : 3 hours

Maximum Marks : 80

31/1

1

[P.T.O.]

सामान्य निर्देश :

- (i) इस प्रश्न-पत्र को दो भागों, भाग अ और भाग ब, में बाँटा गया है। आपको दोनों भागों के प्रश्नों के उत्तर लिखने हैं।
- (ii) सभी प्रश्न अनिवार्य हैं।
- (iii) आपको भाग अ और भाग ब के सभी प्रश्नों के उत्तर पृथक्-पृथक् भाग के आधार पर लिखने हैं।
- (iv) यहाँ भाग अ के तीन अंक के तीन प्रश्नों, पाँच अंक के दो प्रश्नों और भाग ब में दो अंक के एक प्रश्न में आंतरिक चयन दिया गया है।
- (v) भाग अ के प्रश्न संख्या 1 और 2 एक-एक अंक के प्रश्न हैं। इनके उत्तर एक शब्द अथवा एक वाक्य में दीजिए।
- (vi) भाग अ के प्रश्न संख्या 3 से 5 दो-दो अंकों के प्रश्न हैं। इनके उत्तर लगभग 30 शब्दों में देने हैं।
- (vii) भाग अ के प्रश्न संख्या 6 से 15 तीन-तीन अंकों के प्रश्न हैं। इनके उत्तर लगभग 50 शब्दों में देने हैं।
- (viii) भाग अ के प्रश्न संख्या 16 से 21 पाँच-पाँच अंकों के प्रश्न हैं। इनके उत्तर लगभग 70 शब्दों में देने हैं।
- (ix) भाग ब के प्रश्न संख्या 22 से 27 प्रयोगात्मक कौशल पर आधारित दो-दो अंकों के प्रश्न हैं। इनके उत्तर संक्षिप्त में देने हैं।

General Instructions :

- (i) The question paper comprises **two** Sections, A and B. You are to attempt both the sections.
- (ii) All questions are **compulsory**.
- (iii) All questions of Section A and Section B are to be attempted separately.
- (iv) There is an internal choice in **three** questions of **three** marks each, **two** questions of **five** marks each in Section A and in **one** question of **two** marks in Section B.
- (v) Question numbers 1 and 2 in Section A are **one**-mark questions. They are to be answered in **one** word or in **one** sentence.
- (vi) Question numbers 3 to 5 in Section A are **two**-marks questions. These are to be answered in about **30** words each.
- (vii) Question numbers 6 to 15 in Section A are **three**-marks questions. These are to be answered in about **50** words each.
- (viii) Question numbers 16 to 21 in Section A are **five**-marks questions. These are to be answered in about **70** words each.
- (ix) Question numbers 22 to 27 in Section B are based on practical skills. Each question is a **two**-marks question. These are to be answered in brief.

भाग – अ

Section – A

1. मेंडल के एक प्रयोग में बैंगनी रंग के पुष्पों वाले मटर के पौधों का संकरण सफेद फूलों वाले मटर के पौधों से कराया गया। F_1 संतति में क्या परिणाम प्राप्त होंगे ? 1

A Mendelian experiment consisted of breeding pea plants bearing violet flowers with pea plants bearing white flowers. What will be the result in F_1 progeny ?

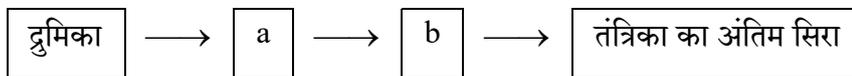
2. जल विद्युत संयंत्र में होने वाले ऊर्जा-रूपान्तरण लिखिए। 1

Write the energy conversion that takes place in a hydropower plant.

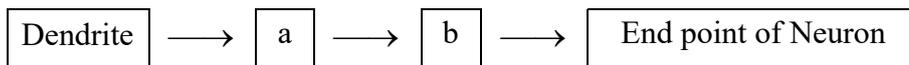
3. कोई यौगिक 'X' आधिक्य सांद्र सल्फ्यूरिक अम्ल के साथ 443 K पर गर्म करने पर कोई असंतृप्त यौगिक 'Y' बनाता है। यौगिक 'X' सोडियम धातु से भी अभिक्रिया करता है जिसमें कोई रंगहीन गैस 'Z' निकलती है। 'X', 'Y' तथा 'Z' को पहचानिए। 'Y' उत्पन्न होने की रासायनिक अभिक्रिया का समीकरण भी लिखिए तथा इसमें सांद्र सल्फ्यूरिक अम्ल की भूमिका का उल्लेख भी कीजिए। 2

A compound 'X' on heating with excess conc. sulphuric acid at 443 K gives an unsaturated compound 'Y'. 'X' also reacts with sodium metal to evolve a colourless gas 'Z'. Identify 'X', 'Y' and 'Z'. Write the equation of the chemical reaction of formation of 'Y' and also write the role of sulphuric acid in the reaction.

4. (a) मानवों में पाए जाने वाले एक रस संवेदी ग्राही तथा एक घ्राणग्राही का नाम लिखिए। 2
- (b) नीचे दिए गए न्यूरोन के प्रवाह आरेख, जिसमें सूचना विद्युत आवेग के रूप में गमन करती है, को अपनी उत्तर पुस्तिका पर खींचकर इसमें a और b का नाम लिखिए।



- (a) Name one gustatory receptor and one olfactory receptor present in human beings.
- (b) Write a and b in the given flow chart of neuron through which information travels as an electrical impulse.



5. यदि किसी गोलीय दर्पण द्वारा उसके सामने रखें बिम्ब की किसी भी स्थिति के लिए सदैव ही बिम्ब का सीधा और साइज में छोटा प्रतिबिम्ब बनता है, तो यह दर्पण किस प्रकार का है ? अपने उत्तर की पुष्टि के लिए नामांकित किरण आरेख खींचिए ।

2

If the image formed by a spherical mirror for all positions of the object placed in front of it is always erect and diminished, what type of mirror is it ? Draw a labelled ray diagram to support your answer.

6. वियोजन (अपघटन) अभिक्रियाओं में अभिकारकों को तोड़ने के लिए या तो ऊष्मा अथवा प्रकाश अथवा विद्युत ऊर्जा की आवश्यकता होती है । प्रत्येक प्रकार की वियोजन अभिक्रिया, जिसमें ऊष्मा, प्रकाश और विद्युत ऊर्जा की आपूर्ति की जाती है, के लिए एक-एक रासायनिक समीकरण लिखिए ।

3

Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity.

7. किसी परखनली में दानेदार जिंक के कुछ टुकड़े लेकर उसमें 2 mL सोडियम हाइड्रॉक्साइड का विलयन डाला गया । परखनली की सामग्री को गर्म करने पर कोई गैस उत्सर्जित हुई जिसका परीक्षण करने से पूर्व उसे साबुन के विलयन से प्रवाहित किया गया जिसमें गैस के बुलबुले बने । होने वाली अभिक्रिया का समीकरण तथा इस गैस के संसूचन के लिए परीक्षण लिखिए । यदि यही धातु किसी प्रबल अम्ल के तनु विलयन से अभिक्रिया करे, तो जो गैस उत्सर्जित होगी उसका नाम लिखिए ।

3

अथवा

पकौड़ों को स्वादिष्ट और खस्ता बनाने के लिए उपयोग किए जाने वाले किसी लवण का pH मान 14 है । इस लवण को पहचानिए तथा इसके निर्माण के लिए रासायनिक समीकरण लिखिए । इसके दो उपयोगों की सूची बनाइए ।

2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation of the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with dilute solution of a strong acid.

OR

The pH of a salt used to make tasty and crispy pakoras is 14. Identify the salt and write a chemical equation for its formation. List its two uses.

8. (a) कार्बन के अधिकांश यौगिक विद्युत के कुचालक क्यों होते हैं ? 3
 (b) किसी ऐसे संतृप्त यौगिक का नाम और उसकी संरचना दीजिए जिसमें कार्बन परमाणु वलय के रूप में व्यवस्थित होते हैं। इस यौगिक में उपस्थित एकल आबन्धों की संख्या लिखिए।
 (a) Why are most carbon compounds poor conductors of electricity ?
 (b) Write the name and structure of a saturated compound in which the carbon atoms are arranged in a ring. Give the number of single bonds present in this compound.
9. निम्नलिखित अन्तःस्रावी ग्रंथियों द्वारा स्रावित हॉर्मोनों का नाम तथा प्रत्येक का एक प्रकार्य लिखिए। 3
 (a) अवटु ग्रंथि (b) पीयूष ग्रंथि (c) अग्न्याशय
 Name the hormones secreted by the following endocrine glands and specify one function of each :
 (a) Thyroid (b) Pituitary (c) Pancreas
10. अलैंगिक जनन और लैंगिक जनन के बीच एक अन्तर लिखिए। अलैंगिक जनन करने वाली अथवा लैंगिक जनन करने वाली स्पीशीज़ में से किसके द्वारा जनित स्पीशीज़ की उत्तरजीविता के अपेक्षाकृत अधिक संयोग हो सकते हैं ? अपने उत्तर की पुष्टि के लिए कारण दीजिए। 3
 Write one main difference between asexual and sexual mode of reproduction. Which species is likely to have comparatively better chances of survival – the one reproducing asexually or the one reproducing sexually ? Give reason to justify your answer.
11. प्रकाश के अपवर्तन के नियम लिखिए। पद “किसी माध्यम का निरपेक्ष अपवर्तनांक” की व्याख्या कीजिए और इस पद तथा निर्वात में प्रकाश की चाल के बीच के संबंध को दर्शाने के लिए व्यंजक लिखिए। 3
 अथवा
 किसी लेंस की क्षमता से क्या तात्पर्य है ? इसका SI मात्रक लिखिए। कोई छात्र 40 cm फोकस दूरी का लेंस उपयोग कर रहा है तथा कोई अन्य छात्र -20 cm फोकस दूरी का लेंस उपयोग कर रहा है। इन दोनों लेंसों की प्रकृति और क्षमता लिखिए।

State the laws of refraction of light. Explain the term 'absolute refractive index of a medium' and write an expression to relate it with the speed of light in vacuum.

OR

What is meant by power of a lens ? Write its SI unit. A student uses a lens of focal length 40 cm and another of -20 cm. Write the nature and power of each lens.

12. यह दर्शाइए कि तीन प्रतिरोधकों, जिनमें प्रत्येक का प्रतिरोध 9Ω है, को आप किस प्रकार संयोजित करेंगे कि संयोजन का तुल्य प्रतिरोध (i) 13.5Ω , (ii) 6Ω प्राप्त हो ? 3

अथवा

- (a) जूल का तापन नियम लिखिए ।
 (b) दो विद्युत लैम्प जिनमें से एक का अनुमतांक $100 \text{ W}; 220 \text{ V}$ तथा दूसरे का $60 \text{ W}; 220 \text{ V}$ है, किसी विद्युत मॅस के साथ पार्श्वक्रम में संयोजित हैं । यदि विद्युत आपूर्ति की वोल्टता 220 V है, तो दोनों बल्बों द्वारा विद्युत मॅस से कितनी धारा ली जाती है ?

Show how would you join three resistors, each of resistance 9Ω so that the equivalent resistance of the combination is (i) 13.5Ω , (ii) 6Ω ?

OR

- (a) Write Joule's law of heating.
 (b) Two lamps, one rated $100 \text{ W}; 220 \text{ V}$, and the other $60 \text{ W}; 220 \text{ V}$, are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is 220 V .
13. (a) किसी चालक, जिसकी आकृति तार जैसी है, का प्रतिरोध जिन कारकों पर निर्भर करता है, उनकी सूची बनाइए ।
 (b) धातुएँ विद्युत की अच्छी चालक तथा काँच विद्युत का कुचालक क्यों होता है ? कारण दीजिए ।
 (c) विद्युत तापन युक्तियों में सामान्यतः मिश्रतुओं का उपयोग क्यों किया जाता है ? कारण दीजिए । 3
- (a) List the factors on which the resistance of a conductor in the shape of a wire depends.
 (b) Why are metals good conductors of electricity whereas glass is a bad conductor of electricity ? Give reason.
 (c) Why are alloys commonly used in electrical heating devices ? Give reason.

14. किसी विद्यालय के छात्रों ने प्रातःकालीन सभा में यह समाचार सुना कि दिल्ली में कूड़े का कोई पर्वत अचानक फट गया और कई गाड़ियाँ उस मलबे में दब गयीं । कुछ लोग भी जख्मी हो गए और हर ओर ट्रैफिक जाम हो गया । शिक्षक महोदय ने बौद्धिक सत्र में भी इसी विषय पर चर्चा की तथा छात्रों से कूड़े की समस्या का हल खोजने के लिए कहा । अन्ततः छात्रों ने दो बिन्दुओं का निष्कर्ष निकाला – पहला यह है कि जो कूड़ा हम उत्पन्न करते हैं उसका प्रबन्धन हम स्वयं करें, तथा दूसरा यह कि निजी स्तर पर हम कम कूड़ा उत्पन्न करें ।

3

- (a) जो कूड़ा हम उत्पन्न करते हैं उसके प्रबन्धन के दो उपाय सुझाइए ।
- (b) निजी तौर पर, कम से कम कूड़ा उत्पन्न करने के लिए हम क्या कर सकते हैं ? दो बिंदु दीजिए ।
- (c) इस प्रसंग में शिक्षक महोदय ने जिन मूल्यों के विषय में छात्रों को शिक्षा दी उनमें से दो मूल्यों की सूची बनाइए ।

Students in a school listened to the news read in the morning assembly that the mountain of garbage in Delhi, suddenly exploded and various vehicles got buried under it. Several people were also injured and there was traffic jam all around. In the brain storming session the teacher also discussed this issue and asked the students to find out a solution to the problem of garbage. Finally they arrived at two main points – one is self management of the garbage we produce and the second is to generate less garbage at individual level.

- (a) Suggest two measures to manage the garbage we produce.
- (b) As an individual, what can we do to generate the least garbage ? Give two points.
- (c) List two values the teacher instilled in his students in this episode.
15. बांध क्या होता है ? हम बड़े बांध क्यों बनाना चाहते हैं ? बड़े बांधों का निर्माण करते समय किन तीन समस्याओं का ध्यान रखना चाहिए, ताकि स्थानीय लोगों में शांति बनी रहे, उनका उल्लेख कीजिए ।

3

What is a dam ? Why do we seek to build large dams ? While building large dams, which three main problems should particularly be addressed to maintain peace among local people ? Mention them.

16. (a) सक्रियता श्रेणी के मध्य की धातु के कार्बोनेट अयस्कों से शुद्ध धातुओं के निष्कर्षण की विधि के चरणों को लिखिए ।
- (b) कॉपर (तांबे) के सल्फाइड अयस्क से कॉपर का निष्कर्षण किस प्रकार किया जाता है ? निष्कर्षण के विभिन्न चरणों की व्याख्या रासायनिक समीकरणों सहित कीजिए । कॉपर के विद्युत अपघटनी परिष्करण का नामांकित आरेख खींचिए । 5
- (a) Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores.
- (b) How is copper extracted from its sulphide ore ? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper.
17. (a) आधुनिक आवर्त सारणी का विकास डॉबेराइनर, न्यूलैण्ड तथा मेण्डेलीफ के प्रारंभिक प्रयासों के कारण हो पाया है । इन तीनों प्रयासों की एक-एक उपलब्धि और एक-एक सीमा की सूची बनाइए ।
- (b) उस वैज्ञानिक का नाम लिखिए जिसने सर्वप्रथम यह दर्शाया कि किसी तत्व की परमाणु संख्या उसके परमाणु द्रव्यमान की तुलना में अधिक आधारभूत गुणधर्म है ।
- (c) आधुनिक आवर्त नियम लिखिए । 5
- (a) The modern periodic table has been evolved through the early attempts of Dobereiner, Newland and Mendeleev. List one advantage and one limitation of all the three attempts.
- (b) Name the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass.
- (c) State Modern periodic law.
18. (a) रुधिर के किन्हीं दो अवयवों का उल्लेख कीजिए ।
- (b) शरीर में ऑक्सीजन-प्रचुर रुधिर के गमन का पथ लिखिए ।
- (c) आलिन्द और निलय के बीच वाल्वों का कार्य लिखिए ।
- (d) धमनी और शिरा के संघटनों के बीच कोई एक संरचनात्मक अन्तर लिखिए । 5

अथवा

- (a) उत्सर्जन की परिभाषा लिखिए ।
- (b) वृक्क में उपस्थित आधारी निस्स्यंदन एकक का नाम लिखिए ।
- (c) मानव के उत्सर्जन तंत्र का आरेख खींचिए और उस पर उत्सर्जन तंत्र के उस भाग का नामांकन कीजिए -
- (i) जो मूत्र तैयार करता है ।
- (ii) जो लम्बी नलिका है और वृक्क से मूत्र संचित करती है ।
- (iii) जिसमें मूत्र त्यागने तक मूत्र भण्डारित रहता है ।
- (a) Mention any two components of blood.
- (b) Trace the movement of oxygenated blood in the body.
- (c) Write the function of valves present in between atria and ventricles.
- (d) Write one structural difference between the composition of artery and veins.

OR

- (a) Define excretion.
- (b) Name the basic filtration unit present in the kidney.
- (c) Draw excretory system in human beings and label the following organs of excretory system which perform following functions :
- (i) form urine.
- (ii) is a long tube which collects urine from kidney.
- (iii) store urine until it is passed out.
19. (a) मानव मादा जनन तंत्र के नीचे दिए गए प्रत्येक भाग का कार्य लिखिए :
- (i) अण्डाशय, (ii) अंडवाहिनी, (iii) गर्भाशय
- (b) प्लैसेन्टा की संरचना और कार्य का संक्षेप में वर्णन कीजिए । 5
- (a) Write the function of following parts in human female reproductive system :
- (i) Ovary (ii) Oviduct (iii) Uterus
- (b) Describe in brief the structure and function of placenta.

20. (a) कोई छात्र लगभग 3 m दूरी पर स्थित श्यामपट्ट पर लिखे अक्षरों को स्पष्ट नहीं देख पाता । यह छात्र जिस दृष्टि-दोष से पीड़ित है उसका नाम लिखिए । इस दोष के संभावित कारण लिखिए और इसके संशोधन की विधि की व्याख्या कीजिए ।
- (b) तारें क्यों टिमटिमाते हैं ? व्याख्या कीजिए ।

5

अथवा

- (a) मानव नेत्र के नीचे दिए गए प्रत्येक भाग का कार्य लिखिए :
- (i) पुतली, (ii) परितारिका, (iii) क्रिस्टलीय लेंस, (iv) पक्ष्माभी पेशियाँ
- (b) प्रातःकाल सूर्य रक्ताभ क्यों प्रतीत होता है ? क्या कोई अंतरिक्षयात्री इस परिघटना का प्रेक्षण चन्द्रमा पर भी कर सकता है ? अपने उत्तर की पुष्टि के लिए कारण दीजिए ।
- (a) A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.
- (b) Why do stars twinkle ? Explain.

OR

- (a) Write the function of each of the following parts of human eye :
- (i) Cornea (ii) Iris (iii) Crystalline lens (iv) Ciliary muscles
- (b) Why does the sun appear reddish early in the morning ? Will this phenomenon be observed by an astronaut on the Moon ? Give reason to justify your answer.
21. (a) फ्लेमिंग का वाम हस्त नियम लिखिए ।
- (b) विद्युत मोटर का कार्यकारी सिद्धान्त लिखिए ।
- (c) विद्युत मोटर के नीचे दिए गए भागों का कार्य लिखिए ।
- (i) आर्मेचर (ii) ब्रुश (iii) विभक्त वलय
- (a) State Fleming's left hand rule.
- (b) Write the principle of working of an electric motor.
- (c) Explain the function of the following parts of an electric motor.
- (i) Armature (ii) Brushes (iii) Split ring

5

भाग – ब

Section – B

22. किसी छात्र ने दो परखनलियों A और B में लिए गए आयरन सल्फेट तथा कॉपर सल्फेट के जलीय विलयनों में ऐलुमिनियम धातु के कुछ टुकड़े डाले। प्रयोग के दूसरे भाग में उसने C और D परखनलियों में क्रमशः लिए गए ऐलुमिनियम सल्फेट और कॉपर सल्फेट के जलीय विलयनों में आयरन धातु के टुकड़े डाले। किस अथवा किन परखनलियों में उस छात्र को रंग में परिवर्तन दिखाई देगा ? इस प्रयोग के आधार पर उल्लेख कीजिए की कौन सी धातु सर्वाधिक अभिक्रियाशील है और क्यों।

2

A student added few pieces of aluminium metal to two test tubes A and B containing aqueous solutions of iron sulphate and copper sulphate. In the second part of her experiment, she added iron metal to another test tubes C and D containing aqueous solutions of aluminium sulphate and copper sulphate.

In which test tube or test tubes will she observe colour change ? On the basis of this experiment, state which one is the most reactive metal and why.

23. क्या प्रेक्षण किया जाता है जब किसी परखनली में लिए गए बेरियम क्लोराइड के विलियन में सोडियम सल्फेट विलयन मिलाया जाता है ? सम्मिलित रासायनिक अभिक्रिया का रासायनिक समीकरण तथा इस प्रकरण में होने वाली अभिक्रिया के प्रकार का नाम लिखिए।

2

What is observed when a solution of sodium sulphate is added to a solution of barium chloride taken in a test tube ? Write equation for the chemical reaction involved and name the type of reaction in this case.

24. किसी पत्ती के छिलके में रंध्रों का प्रेक्षण करने के लिए अस्थायी आरोपण तैयार करने की प्रक्रिया के चरणों की सूची बनाइए।

2

List the steps of preparation of temporary mount of a leaf peel to observe stomata.

25. अमीबा के जनन की प्रक्रिया का नाम लिखिए। इसके जनन की प्रक्रिया के विभिन्न चरणों को उचित क्रम में चित्रित कीजिए।

2

अथवा

कोई छात्र यीस्ट में मुकुलन द्वारा अलैंगिक जनन के विभिन्न चरणों की स्थायी स्लाइड का सूक्ष्मदर्शी द्वारा प्रेक्षण कर रहा है। वह स्लाइड में जो कुछ प्रेक्षण करता है उसे ओरख खींचकर (क्रमवार) दर्शाइए।

Name the process by which an amoeba reproduces. Draw the various stages of its reproduction in a proper sequence.

OR

A student is viewing under a microscope a permanent slide showing various stages of asexual reproduction by budding in yeast. Draw diagrams of what he observes. (in proper sequence)

26. 4.0 cm ऊँचाई का कोई बिम्ब 20 cm फोकस दूरी के किसी उत्तल लेंस के प्रकाशिक केन्द्र 'O' से 30 cm दूरी पर स्थित है। बनने वाले प्रतिबिम्ब की स्थिति और साइज़ ज्ञात करने के किरण आरेख खींचिए। इस आरेख में प्रकाशिक केन्द्र 'O' तथा मुख्य फोकस 'F' अंकित कीजिए। प्रतिबिम्ब की ऊँचाई और बिम्ब की ऊँचाई का लगभग अनुपात भी ज्ञात कीजिए।

2

An object of height 4.0 cm is placed at a distance of 30 cm from the optical centre 'O' of a convex lens of focal length 20 cm. Draw a ray diagram to find the position and size of the image formed. Mark optical centre 'O' and principal focus 'F' on the diagram. Also find the approximate ratio of size of the image to the size of the object.

27. किसी प्रतिरोधक, जिसका प्रतिरोध (R) है, से प्रवाहित विद्युत धारा (I) और उसके सिरों के बीच तदनुरूपी विभवान्तर (V) के मान नीचे दिए गए अनुसार हैं :

V (वोल्ट)	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
I (एम्पियर)	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0

धारा (I) और विभवान्तर (V) के बीच ग्राफ खींचिए और प्रतिरोधक का प्रतिरोध (R) ज्ञात कीजिए।

2

The values of current (I) flowing through a given resistor of resistance (R), for the corresponding values of potential difference (V) across the resistor are as given below :

V (volts)	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
I (amperes)	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0

Plot a graph between current (I) and potential difference (V) and determine the resistance (R) of the resistor.

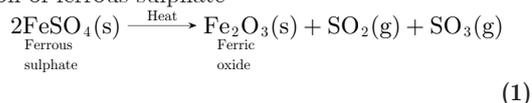
QUE 6

Decomposition reactions require energy either in the form of heat or light or electricity for breaking down the reactants. Write one equation each for decomposition reactions where energy is supplied in the form of heat, light and electricity.

Ans :

Energy Supplied in the form of Heat

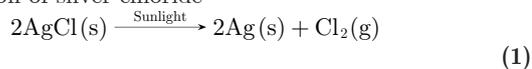
Decomposition of ferrous sulphate



(1)

Energy Supplied in the form of Light

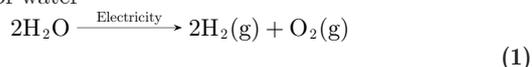
Decomposition of silver chloride



(1)

Energy Supplied in the form of Electricity

Electrolysis of water

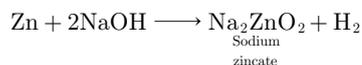


(1)

QUE 7

2 mL of sodium hydroxide solution is added to a few pieces of granulated zinc metal taken in a test tube. When the contents are warmed, a gas evolves which is bubbled through a soap solution before testing. Write the equation of the chemical reaction involved and the test to detect the gas. Name the gas which will be evolved when the same metal reacts with dilute solution of a strong acid.

Ans :



The gas is detected by bringing a burning candle near the soap bubbles. A pop sound is heard. Hydrogen gas will be evolved in this case also.

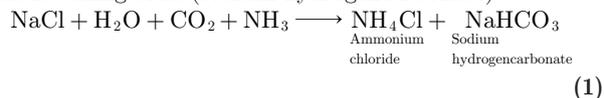
(3)

QUE 7 OR

The pH of a salt used to make tasty and crispy pakoras is 14. Identify the salt and write a chemical equation for its formation. List its two uses.

Ans :

The salt is baking soda (sodium hydrogencarbonate).



(1)

Uses

1. It is used in soda-acid fire extinguishers.
2. It is an ingredient of antacids. It neutralises excess acid in the stomach and provides relief.

(2)

QUE 8

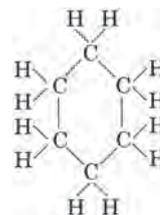
1. Why are most carbon compounds poor conductors of electricity?
2. Write the name and structure of a saturated compound in

(1)

which the carbon atoms are arranged in a ring. Give the number of single bonds present in this compound.

Ans :

1. Most carbon compounds have covalent bonds in the molecules. Therefore they are poor conductors of electricity.
2. Name of the compound = Cyclohexane Structure.



Total number of single bonds = 18

(2)

QUE 9

Name the hormones secreted by the following endocrine glands and specify one function of each :

1. Thyroid
2. Pituitary
3. Pancreas.

Ans :

	Glands	Hormone	Function
1.	Thyroid	Thyroxine	Maintains the Basal Metabolic Rate (BMR).
2.	Pituitary	Growth Hormone	Regulates growth of the organism.
3.	Pancreas	Insulin	Regulates blood-sugar level.

(3)

QUE 10

Write one main difference between asexual and sexual mode of reproduction. Which species is likely to have comparatively better chances of survival - the one reproducing asexually or the one reproducing sexually? Give reason to justify your answer.

Ans :

Difference between asexual and sexual mode of reproduction is :

	Asexual Reproduction	Sexual Reproduction
1.	Only parent is involved.	Gametes from one or two parents are involved.
2.	Progeny has characters of one parent only.	The progeny has characters of both the parents.

The species that reproduces sexually has better chances of survival. This is because sexual reproduction leads to more variation due to fusion of gametes. Hence, results in more chances of adaptability to the changing environment, and hence better survival.

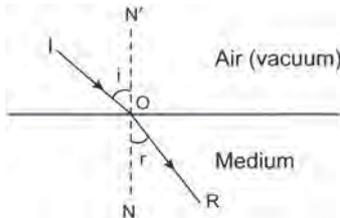
(3)

QUE 11

State the laws of refraction of light. Explain the term ‘absolute refractive index of a medium’ and write an expression to relate it with the speed of light in vacuum.

Ans :

Two basic laws of refraction of light are :



1. The incident ray, the refracted ray and the normal to the separating surface at the point of incidence, all lie in the same plane.
2. The ratio of sine of the angle of incidence (i) to the sine of angle of refraction (r) is a constant. It is known as Snell’s law. Thus, according to Snell’s law (1½)

$$\frac{\sin i}{\sin r} = a \text{ constant} = n$$

Generally, the constant n is known as the absolute refractive index of given medium. Thus, absolute refractive index of a medium is defined as the ratio of sine of angle of incidence of a light ray in air (or vacuum) to the sine of angle of refraction of the ray in given medium.

Absolute refractive index of a medium is a unitless quantity and its value is one or greater than one.

In terms of speed of light, the absolute refractive index of a medium is defined as :

Absolute refractive index of a medium,

$$n = \frac{\text{Speed of light in vacuum (or air) } c}{\text{Speed of light in given medium } v} \quad (1½)$$

QUE 11 OR

What is meant by power of a lens? Write its SI unit. A student uses a lens of focal length 40 cm and another of -20 cm. Write the nature and power of each lens.

Ans :

The power P of a lens is defined as the reciprocal of its focal length f expressed in metre.

Thus,
$$P = \frac{1}{f(\text{in } m)}$$

SI unit of power is dioptre D ,

where, $1D = 1 \text{ m}^{-1}$

The focal length of lens used by one student,

$$f_1 = +40 \text{ cm} = +0.4 \text{ m}$$

The lens is a convex lens and the power of lens,

$$P_1 = \frac{1}{f_1} = \frac{1}{0.4} = +2.5 D \quad (1½)$$

Again the focal length of lens used by another student,

$$f_2 = -20 \text{ cm} = -0.2 \text{ m}$$

The lens is a concave lens and the power of lens,

$$P_2 = \frac{1}{f_2} = \frac{1}{(-0.2)} = -5.0 D \quad (1½)$$

QUE 12

Show how would you join three resistors, each of resistance 9Ω so that the equivalent resistance of the combination is

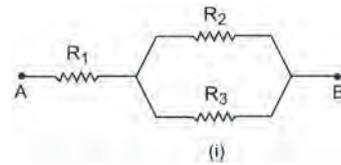
1. 13.5Ω
2. 6Ω ?

Ans :

Here, resistances,

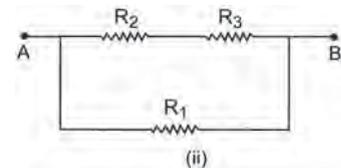
$$R_1 = R_2 = R_3 = 9 \Omega$$

1. To obtain an equivalent resistance $R_{eq} = 13.5 \Omega$, we connect one resistor R_1 in series to the parallel combination of R_2 and R_3 as shown in figure (i). Then



$$R_{eq} = R_1 + \left(\frac{R_2 R_3}{R_2 + R_3} \right) = 9 + \left(\frac{9 \times 9}{9 + 9} \right) = 9 + 4.5 = 13.5 \Omega \quad (1½)$$

2. To obtain equivalent resistance $R_{eq} = 6 \Omega$, we connect resistor R_1 in parallel to the series combination of R_2 and R_3 as shown in figure (ii). Then



$$R_{eq} = \frac{R_1(R_2 + R_3)}{R_1 + (R_2 + R_3)} = \frac{9(9 + 9)}{9 + (9 + 9)} = \frac{9 \times 18}{27} = 6 \Omega \quad (1½)$$

QUE 12 OR

1. Write Joule’s law of heating.
2. Two lamps, one rated $100 \text{ W}; 220 \text{ V}$ and the other $60 \text{ W}; 220 \text{ V}$ are connected in parallel to electric mains supply. Find the current drawn by two bulbs from the line, if the supply voltage is 220 V .

Ans :

1. If on applying, a potential difference V across the ends of a conductor of resistance R , the current I flows for a time t , then as per Joule’s law of heating the electric energy consumed (or heat energy produced) is given by the relation:

$$E = VIT = I^2 Rt = \frac{V^2 t}{R} \quad (1½)$$

2. Here, supply voltage = $V = 220 \text{ V}$
As power of first lamp $P_1 = 100 \text{ W}$, the current drawn by it,

$$I_1 = \frac{P_1}{V} = \frac{100}{220} \text{ A} = \frac{5}{11} \text{ A}$$

As power of second lamp $P_2 = 60 \text{ W}$, the current drawn by it,

$$I_2 = \frac{P_2}{V} = \frac{60}{220} \text{ A} = \frac{3}{11} \text{ A}$$

Since, the lamps are connected in parallel to mains supply, total current drawn by two lamp.

$$I = I_1 + I_2 = \frac{5}{11} + \frac{3}{11} = \frac{8}{11} \text{ A} \quad (1\frac{1}{2})$$

QUE 13

- List the factors on which the resistance of a conductor in the shape of a wire depends.
- Why are metals good conductors of electricity whereas glass is a bad conductor of electricity? Give reason.
- Why are alloys commonly used in electrical heating devices? Give reason.

Ans :

- The resistance of a conductor in the shape of a wire depends on (a) its length (b) its cross section area, and (c) its material. (1)
- Metals are good conductors of electricity because they have a large number of free (conduction) electrons which can easily conduct electricity. On the other hand, glass has no free electrons. Thus conduction of charge is not easily possible in glass and so glass is a bad conductor of electricity. (1)
- Alloys are commonly used in electrical heating devices on account of the following reasons :
 - Resistivity of an alloy is generally higher than that of pure metals, hence for a given resistance we need a coil of lesser length.
 - At high temperatures, an alloy does not oxidise (burn) readily. Hence, coil of an alloy has longer life. (1)

QUE 14

Students in a school listened to the news read in the morning assembly that the mountain of garbage in Delhi, suddenly exploded and various vehicles got buried under it. Several people were also injured and there was traffic jam all around. In the brain storming session the teacher also discussed this issue and asked the students to find out a solution to the problem of garbage. Finally they arrived at two main points- one is self management of the garbage we produce and the second is to generate less garbage at individual level.

- Suggest two measures to manage the garbage we produce.
- As an individual, what can we do to generate the least garbage? Give two points.

Ans :

- Methods of garbage management :
 - Segregation** : Biodegradable and non-biodegradable waste to be segregated and decomposed/broken down accordingly.
 - Waste compaction** : All the recyclable waste as metal cans, plastics etc., are compressed and sent for recycling. (1½)
- We can reduce the garbage we generate by :

- Reusing empty bottles, cans etc.
- Printed sheets with on side blank can be spiral bound on the plain side and used.
- Packaging of gifts can be simplified.
- Carry own cloth/jute bags for shopping.
- Old textbooks can be donated in school for reuse.
- Old clothes can be donated for further use. (1½)

QUE 15

What is a dam? Why do we seek to build large dams? While building large dams, which three main problems should particularly be addressed to maintain peace among local people? Mention them.

Ans :

A dam is a huge construction being done to obstruct the river flow at the place. As a result a large artificial lake is created there which can be used to store water.

We want to build large dams so as to store large amount of water, which can then be used to produce electricity by means of a hydropower plant. (1)

While building large dams, following three main problems should particularly be addressed to maintain peace among local people :

- Construction of dam involves submergence of large areas of agricultural and forest land and human habitation.
- Large eco systems are destroyed.
- Problem of satisfactory rehabilitation of displaced people is a major problem. (2)

QUE 16

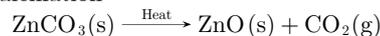
- Write the steps involved in the extraction of pure metals in the middle of the activity series from their carbonate ores.
- How is copper extracted from its sulphide ore? Explain the various steps supported by chemical equations. Draw labelled diagram for the electrolytic refining of copper.

Ans :

- Steps involved :**

Taking the case of zinc carbonate :

- Calcination

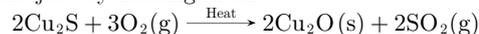


- Reduction

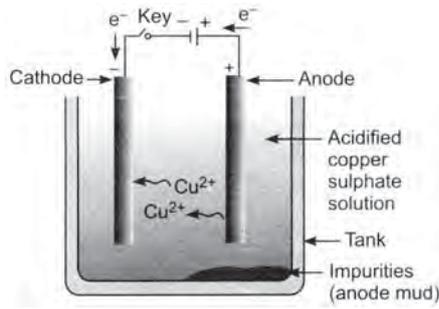


- Purification is done by electrolytic refining. (2)

- Copper is found in nature as Cu_2S . It can be obtained from the ore just by heating in air.



Electrolytic refining of copper is done as shown in the diagram here.



(3)

side of the heart. The left ventricle pushes it out to aorta, which branches further into various parts of the body. (1)

- Valves present between atria and ventricles prevent blood from flowing back into the atria when ventricles are in systole to push the blood out into respective arteries. (1)

- Structural difference :

Artery	Vein
Thick elastic wall.	Thin inelastic wall
Narrow lumen	Wide lumen
Valves absent	Valves present

(2)

QUE 17

- The modern periodic table has been evolved through the early attempts of Dobereiner, Newland and Mendeleev. List one advantage and one limitation of all the three attempts.'
- Name the scientist who first of all showed that atomic number of an element is a more fundamental property than its atomic mass.
- State Modern periodic law.

Ans :

- Dobereiner Attempt :**

Advantage : The atomic mass of the middle element of the triad was the mean of the other two elements.

Limitation : Dobereiner could identify only three triads.

Newland Attempt

Advantage : Every eighth element has properties similar to that of the first. Sodium is the eighth element after lithium. These two elements have similar properties.

Limitation : Newlands law of Octaves was found to be applicable only upto calcium. After calcium, every eight element did not possess properties similar to that of the first.

Mendeleev Attempt

Advantage : The elements were arranged on the basis of their fundamental property, the atomic mass and also on the similarity of chemical properties.

Limitation : No fixed position in the periodic table could be given to hydrogen by Mendeleev classification. (3)

- Henry Moseley. (1)
- Properties of elements are a periodic function of their atomic number. (1)

QUE 18

- Mention any two components of blood.
- Trace the movement of oxygenated blood in the body.
- Write the function of valves present in between atria and ventricles.
- Write one structural difference between the composition of artery and veins.

Ans :

- Components of blood are :
White Blood Cells, Red Cells, Blood Platelets, Blood Plasma. (1)
- Oxygenated blood flows mainly in the arteries. But from its point i.e., lung, it flows through pulmonary vein to the left

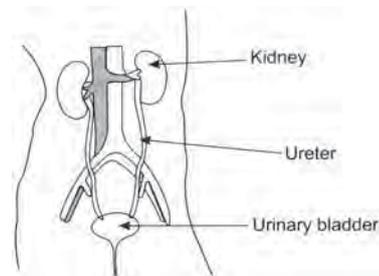
QUE 18 OR

- Define excretion.
- Name the basic filtration unit present in the kidney.
- Draw excretory system in human beings and label the following organs of excretory system which perform following functions :

- form urine
- is a long tube which collects urine from kidney.
- store urine until it is passed out.

Ans :

- Excretion is the process of removal of harmful metabolic wastes from the body. (1)
- Nephron. (1)
- (a) Kidney
(b) Ureter
(c) Urinary bladder.



(3)

QUE 19

- Write the function of following parts in human female reproductive system :
(a) Ovary
(b) Oviduct
(c) Uterus.

- Describe in brief the structure and function of placenta.

Ans :

Functions :

- (a) **Ovary :** Forms and releases the female gamete/ovum. Produces female hormone oestrogen which is responsible for formation of ovum and development of secondary sexual characters.
(b) **Oviduct :** The ovum is released into oviduct which is the site of fertilisation.

- (c) **Uterus** : Implantation of developing foetus and its proper growth takes place here. (2½)
2. **Structure of placenta** : Placenta is a disc which is embedded in the uterine wall. It contains villi on the embryo's side of the tissue. On the mother's side are blood spaces, which surround the villi.
- Function :**
- Embryo gets nutrition from the mother's blood, through placenta.
 - Respiratory gases like O₂ and CO₂ also pass through the placenta.
 - The developing embryo gives out its wastes into the blood through placenta, for removal. (2½)

QUE 20

- A student is unable to see clearly the words written on the black board placed at a distance of approximately 3 m from him. Name the defect of vision the boy is suffering from. State the possible causes of this defect and explain the method of correcting it.
- Why do stars twinkle? Explain.

Ans :

- The student is suffering from myopia or nearsightedness. It is that defect of vision in which a person can see nearby objects distinctly. Thus, for a myopic eye the near point is at 25 cm but far point has shifted from infinity to a distance of 3 m from his eye.
Two possible causes of myopia are :
 - The power of the eye lens is more, than its normal value, due to excessive curvature of the cornea.
 - The elongation of the eye due to some genetic defect.
To correct the defect myopia student should use a concave lens of focal length f , which may form the virtual image of the distant object clearly. (3)
- Stars twinkle due to atmospheric refraction of starlight. As the stars are very far away, they behave as almost point sources of light. As on account of atmospheric refraction, the path of rays of light coming from the star goes on varying slightly, the apparent position of the star fluctuates and the amount of starlight entering the eye flickers. So, sometimes, the star appears brighter and at some other time, fainter. Thus, the stars twinkle. (2)

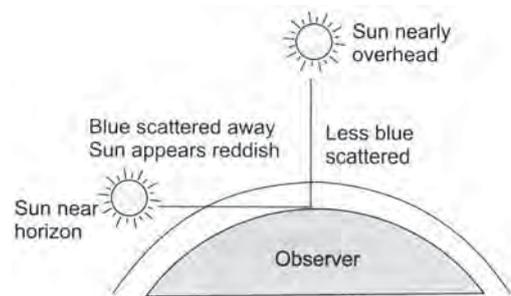
QUE 20 OR

- Write the function of each of the following parts of human eye :
 - Cornea
 - Iris
 - Crystalline lens
 - Ciliary muscles.
- Why does the sun appear reddish early in the morning? Will this phenomenon be observed by an astronaut on the Moon? Give reason to justify your answer.

Ans :

- The function of given parts is stated below :
 - Cornea** is the outer bulged out thin transparent layer of eye and provides most of the refraction for the light entering into the eye.

- The **iris** controls the size of the pupil of eye.
 - The **crystalline lens** provides the finer adjustment of focal length required so as to focus objects situated at different distances in front of the eye on the retina.
 - The **ciliary muscles** help in controlling the curvature of crystalline lens and thus can change the power of the crystalline lens. (2)
2. In early morning (or evening), sun is near the horizon and sunlight passes a longer distance in earth's atmosphere before reaching us. So most of the blue-violet light is scattered away. It gives reddish appearance to the sun. This phenomenon is not observed by an astronaut on the moon. Moon has no atmosphere and therefore scattering of light cannot take place there. So the sun does not appear reddish at any time.



(3)

QUE 21

- State Fleming's left-hand rule.
- Write the principle of working of an electric motor.
- Explain the function of the following parts of an electric motor :
 - Armature
 - Brushes
 - Split ring.

Ans :

- Fleming's left-hand rule states that stretch the forefinger, the central finger and the thumb of your left-hand in mutually perpendicular to each other. If the forefinger shows the direction of the magnetic field and the central finger that of the current, then the thumb will point towards the direction of motion of the conductor (i.e., the thumb will point in the direction of force F). (1½)
- An electric motor works on the principle that a coil carrying current, when placed in a uniform magnetic field, experiences a force whose direction is given by Fleming's left-hand rule. As a result, the coil starts rotating about its own axis. (1)
- Function of various parts of an electric motor is as given below :
 - Armature coil carries current** : As a result two long arms of armature coil experience equal force in mutually opposite direction and under their influence the coil begins to rotate.
 - Brushes** draw current from split rings and supply it to the coil.

(c) **Split rings** draw current from the battery. However, split rings change their contacts with brushes after every half rotation. As a result current supplied to the armature

coil through brushes changes its direction after every half rotation. **(2½)**

SECTION B

QUE 22

A student added few pieces of aluminium metal to two test tubes *A* and *B* containing aqueous solutions of iron sulphate and copper sulphate. In the second part of her experiment, she added iron metal to another test tubes *C* and *D* containing aqueous solutions of aluminium sulphate and copper sulphate. In which test tube or tests tubes will she observe colour change? On the basis of this experiment, state which one is the most reactive metal and why.

Ans :

There will be a colour change in test tubes *A*, *B* and *D*. Aluminium is the most active element because it can displace Fe and Cu from their salt solution. **(2)**

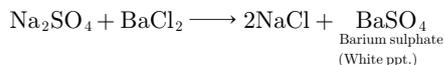
QUE 23

What is observed when a solution of sodium sulphate is added to a solution of barium chloride taken in a test tube? Write equation for the chemical reaction involved and name the type of reaction in the case.

Ans :

A white precipitate of barium sulphate is obtained.

Reaction :



This is a double displacement reaction. **(2)**

QUE 24

List the steps of preparation of temporary mount of a leaf peel to observe stomata.

Ans :

Steps for preparation of temporary mount of leaf peel to study stomata are :

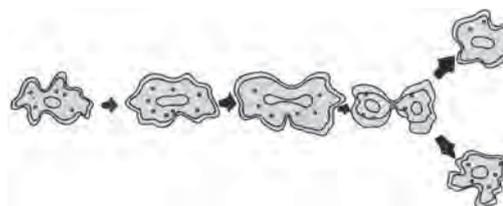
1. Remove the peel from the lower surface of leaf.
2. Put it on glass slide and add a drop of safranin.
3. Put the coverslip so as not to get any air bubbles.
4. Observe under low power of the compound microscope. **(2)**

QUE 25

Name the process by which an Amoeba reproduces. Draw the various stages of its reproduction in a proper sequence.

Ans :

Binary fission is the process by which Amoeba reproduces.



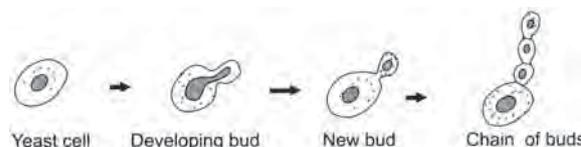
Binary fission in Amoeba

(2)

QUE 25 OR

A student is viewing under a microscope a permanent slide showing various stages of asexual reproduction by budding in yeast. Draw diagrams of what he observes (in proper sequence).

Ans :



Budding in Yeast

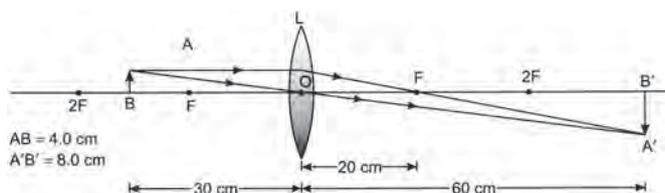
(2)

QUE 26

An object of height 4.0 cm is placed at a distance of 30 cm from the optical centre 'O' of a convex lens of focal length 20 cm. Draw a ray diagram to find the position and size of the image formed. Mark optical centre 'O' and principal focus 'F' on the diagram. Also find the approximate ratio of size of the image to the size of the object.

Ans :

Choosing a scale that 10 cm distance/height be represented by a line of length 1 cm, we draw the ray diagram which is shown here. The optical centre *O* and principal focus *F* have been marked on the diagram.



(1)

The image is obtained at 60 cm from lens and size of image is 8.0 cm.

$$\frac{\text{Size of image}}{\text{Size of object}} = \frac{8.0 \text{ cm}}{4.0 \text{ cm}} = \frac{2}{1} = 2:1 \quad (1)$$

QUE 27

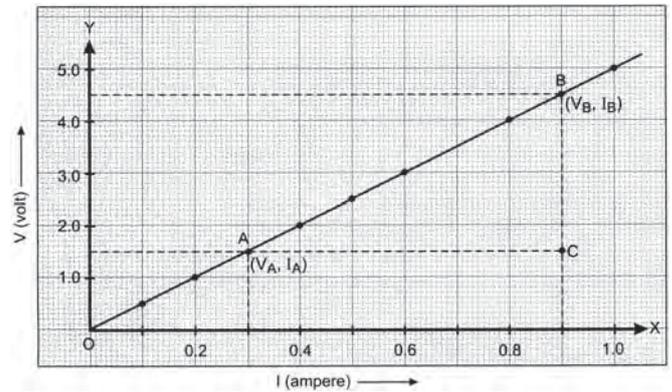
The values of current (I) flowing through a given resistor of resistance (R), for the corresponding values of potential difference (V) across the resistor are as given below :

V (volts)	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
I (amperes)	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0

Plot a graph between current (I) and potential difference (V) and determine the resistance (R) of the resistor.

Ans :

$V-I$ graph has been plotted here.



Selecting two points A and B on the graph, we find that resistance of the resistor. (1)

$$\begin{aligned} R &= \frac{V_B - V_A}{I_B - I_A} = \frac{(4.5 - 1.5) \text{ V}}{(0.9 - 0.3) \text{ A}} \\ &= \frac{3.0 \text{ V}}{0.6 \text{ A}} = 5.0 \Omega \end{aligned} \quad (1)$$

□□□□□□