ANANDALAYA
PREBOARD EXAMINATION
Class: X

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Subject: Science	MM : 80
Date : 06-01-2026	Time: 3 hours

General Instructions:
1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

SECTION A

1. An ecosystem is represented in the figure given below. (1)

   This ecosystem will be self-sustaining if
   (A) the type of organisms represented by B are eliminated.
   (B) materials cycle between the organisms labelled A and the organisms labelled B.
   (C) the organisms labelled A outnumber the organisms labelled B.
   (D) the organisms labelled A are equal in number to the organisms labelled B.

2. Two individuals are shown using geometric shapes. (1)
   What are the possible combinations of sex chromosomes for their male and female offspring respectively?
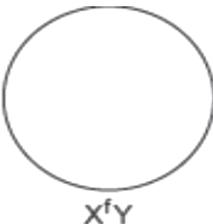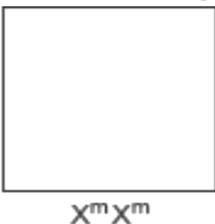
   (A) $X^f X^m$ and $X^m X^m$ (B) $X^m Y$ and $X^m X^m$
   (C) $X^f Y$ and $X^m Y$ (D) $X^m Y$ and $X^m X^f$

3. A plant gets rid of excess water through transpiration. Which method is used by plants to get rid of solid waste products? (1)
   (A) Shortening of stem   (B) Dropping down of fruits
   (C) Shedding of old leaves   (D) Expansion of roots into the soil

4. Which of the following life processes can be considered as an example of anabolism? (1)
   (A) Transportation   (B) Respiration   (C) Transpiration   (D) Photosynthesis

5. Hormones that help in the maturation of lymphocytes and strengthen the body's immune system are released by the endocrine gland: (1)
   (A) Adrenal   (B) Pituitary   (C) Thyroid   (D) Thymus

6. Which of the following statements about food chain and energy flow through the ecosystem is false? (1)
   (A) Food webs include two or more food chains.
   (B) All organisms that are not producers are consumers.
   (C) A single organism can feed at several trophic levels.
   (D) Detritivores feed at all trophic levels except the producer level.

7. Identify the correct statement about receptors. (1)
   (A) Gustatory receptors detect taste while olfactory receptors detect smell.
   (B) Both gustatory and olfactory receptors detect smell.
   (C) Auditory receptors detect smell and olfactory receptors detect taste.
   (D) Olfactory receptors detect taste and gustatory receptors smell.

   The following two questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:
   (A) Both A and R are true, and R is the correct explanation of A.
   (B) Both A and R are true, and R is not the correct explanation of A.
   (C) A is true but R is false.
   (D) A is false but R is true.

8. A: Height in pea plants is controlled by efficiency of enzymes and is thus genetically controlled. (1)
   R: Cellular DNA is the information source for making proteins in the cell.

9. A: Accumulation of harmful chemicals is maximum in case of organisms at higher trophic level. (1)
   R: Food chains normally do not go beyond 3 or 4 trophic levels.

10. In each of the following situations, what happens to the rate of photosynthesis? (2)
    (a) Cloudy days   (b) Stomata get blocked due to dust

11. A. "The number of trophic levels in a food chain is limited." Give two reasons to justify the statement. (2)
    OR
    B. (a) What will be the amount of energy available to the organism at the 2nd trophic level of a food chain, if the energy available at the first trophic level is 10,000 Joules?
       (b) The first trophic level in a food chain is always a green plant. Why?

12. "In the human heart, the right and left sides are separated." Justify this statement by giving two scientific reasons. (2)

13. (a) Write the location and function of pons present in the brain. (3)
    (b) Name the part of human brain which perform the following functions:
        (i) Picking up a pencil   (ii) Riding a bicycle
    (c) Write one example each for the following tropic movements:
        (i) Phototropism   (ii) Geotropism

14. A pea plant with violet colour flower (VV) is cross-bred with a pea plant with white flower (vv). (3)
    (a) What is the phenotype in the F_1 progeny?
    (b) Show the cross that derives the phenotype and genotype ratio of F_2 generation.

15. The Angiospermic plants rely on pollination before fertilization. Pollination is the transfer of pollen from anthers to the stigma of a flower/s. The major pollinators are honey bees but other pollinating agents like wind, water and other insects also help in pollination.

    (i) Write one example from angiosperms that shows (A) and (B) phenomena. (1)
   (ii) Mention the site and the product of fertilisation in a flower? (1)

(iii) (a) Distinguish between pollination and fertilisation by stating two major differences. (2)

OR

(iii) (b) Differentiate between cross pollination and hybridisation method.

16. A. The diagram below shows the Excretory (5)
System of a Human being. Study the
diagram carefully and then answer the
questions that follow:
a) Name the parts labelled 1, 2, 3 and 4.
b) Give the main function of the parts
labelled 5, 6, 7 and 8.
c) Name the endocrine gland which could be
added in the diagram and state its
location/ position.
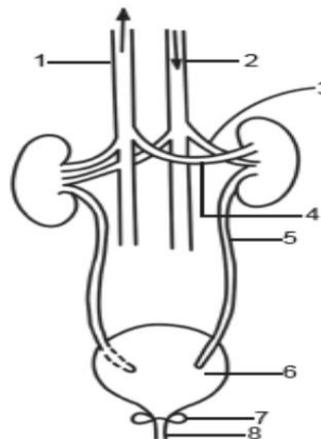
OR

B. (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) Give one point of difference between the arteries and veins.

SECTION B

17. Which of these is a redox reaction? (1)
   (A) $KBr + H_2SO_4 \rightarrow KHSO_4 + HBr$ (B) $Ca + S \rightarrow CaS$
   (C) $Li_2O + H_2SO_4 \rightarrow Li_2SO_4 + H_2O$ (D) $MgO + SiO \rightarrow MgSiO_3$

18. A salt solution is tested with phenolphthalein and no colour change is observed. When treated (1)
   with methyl orange it turns red. What do you infer about the salt?
   (A) It is derived from a strong acid and strong base.
   (B) It is derived from a weak acid and a strong base.
   (C) It is neutral in nature.
   (D) It is amphoteric in nature.

19. A metal 'X' loses two electrons and a non-metal 'Y' gains one electron. Which statement about (1)
   the compound formed is incorrect?
   (A) It has a high melting point.   (B) It conducts electricity in the molten state.
   (C) It conducts electricity in the solid state.   (D) It is soluble in water.

20. A student heated a few crystals of copper sulphate in a dry boiling tube. What will be the colour (1)
   of the copper sulphate after heating and why will water droplets be noticed in the boiling tube?
   (A) The crystals turn blue again; water comes from the air.
   (B) The crystals turn white; water comes from the crystallization of the salt.
   (C) The crystals turn green; water is formed by decomposition.
   (D) The crystals turn white; water is from the test tube's moisture.

21. A solution has a pH pf 4. When it is diluted by adding water, its pH changes to 5. This indicates (1)
   that _____.
   (A) the concentration of H^+ ions have doubled.
   (B) the concentration of H^+ ions have decreased ten times.
   (C) the solution has turned basic.
   (D) the concentration of H^+ ions remain unchanged.

22. When excess of carbon dioxide is passed through lime water, the milkiness disappears because (1)
   (A) Water soluble calcium carbonate converts to water soluble calcium bicarbonate.
   (B) Insoluble calcium carbonate converts to water soluble calcium bicarbonate.
   (C) Water soluble calcium carbonate converts to insoluble calcium bicarbonate.
   (D) Insoluble calcium carbonate converts to insoluble calcium bicarbonate

23. In the electrolytic decomposition of water, why is the volume of gas collected over one electrode (1) double that of the gas collected over the other electrode?
(A) Hydrogen is twice as heavy as oxygen.
(B) The chemical formula for water is H_2O
(C) Hydrogen is highly reactive, while oxygen is not.
(D) Oxygen is twice as heavy as hydrogen

24. The following two questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:
(A) Both A and R are true, and R is the correct explanation of A.
(B) Both A and R are true, and R is not the correct explanation of A.
(C) A is true but R is false.
(D) A is false but R is true.
A: C_4H_8, C_4H_6 and C_4H_{10} are members of the same homologous series (1)
R: C_4H_8, C_4H_6, C_3H_4, C_3H_6, C_2H_4, C_2H_2 are unsaturated hydrocarbons

25. Aluminium is more reactive than iron, yet aluminium does not corrode like iron. Explain why (2) aluminium is considered corrosion-resistant while iron rusts easily.

26. (A) An element A burns with golden flame in the air. It reacts with another element B, atomic (3) number 17, to give a product C. An aqueous solution of product C on electrolysis gives a compound D and liberates hydrogen. Identify A, B, C and D. Also, write down the equations for the reactions involved.

OR

(B) Two ores A and B were taken. On heating, ore A gives CO, whereas ore B gives SO_2. What steps will you take to convert them into metals?

27. Raju made the following observations during the reaction of some metals with dilute hydrochloric (3) acid. State the reasons for the following observations.
(a) Silver metal does not show any change
(b) The temperature of the reaction mixture rises when aluminium (Al) is added.
(c) The sodium metal reaction is highly explosive.

28. A piece of magnesium ribbon is added to a flask containing dilute hydrochloric acid. Hydrogen gas is formed which is collected in the measuring cylinder. The amount of hydrogen formed with time is plotted on a graph. The line on the graph indicates the rate of chemical reaction occurring in the flask.
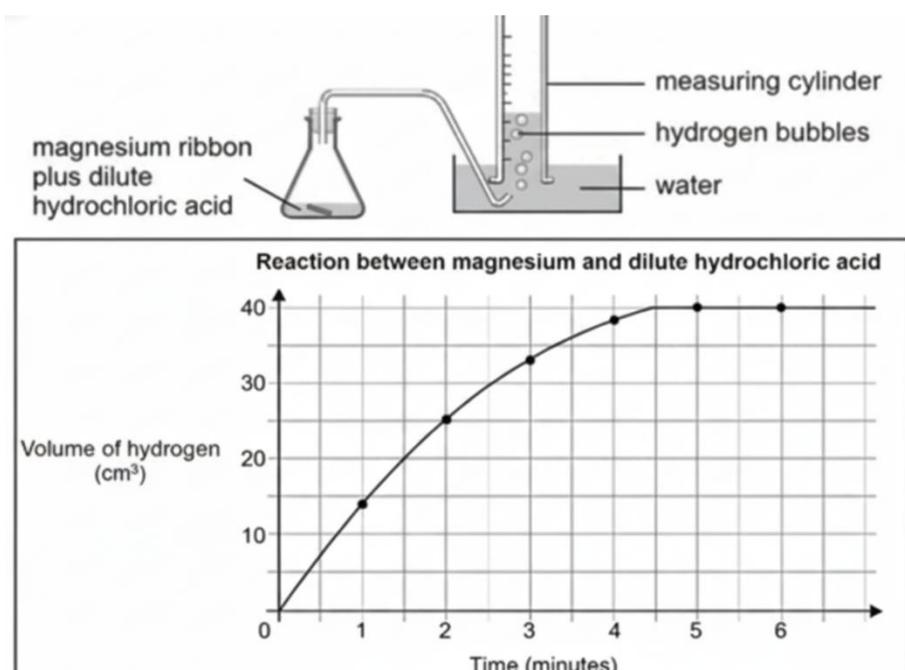
(i) At what time is the reaction rate the fastest in the flask? (1)
   (A) 1 minute   (B) 4 minutes   (C) 3 minutes   (D) 6 minutes
(ii) The reaction is repeated with magnesium powder in place of magnesium ribbon under the (1)
   same conditions. Will the reaction rate increase or decrease? Explain your answer with
   reference to the volume of hydrogen formed in the flask at 2 minutes.
(iii) (a) Which of these could increase the rate of reaction in the flask. Write 'Yes' or 'No' for (2)
   each row.

	Will this increase the rate of reaction?	Yes/No
1.	Adding more acid to the flask	Yes/No
2.	Heating the acid in the flask	Yes/No
3.	Using a higher concentration of acid	Yes/No

OR

(iii) (b) Write a balanced chemical reaction between magnesium and Nitrogen gas.

29. A. A compound A ($C_2H_4O_2$) reacts with Na metal to form a compound 'B' and evolves a gas (5)
   which burns with a pop sound. Compound 'A' on treatment with an alcohol 'C' in presence of
   an acid forms a sweet-smelling compound 'D' ($C_4H_8O_2$). On addition of NaOH to 'D' gives
   back B and C. Identify A, B, C and D write the reactions involved.   .

OR

B. A carbon compound 'A' having melting point 156K and boiling point 351K, with molecular
   formula C_2H_6O is soluble in water in all proportions.
   (a) Identify 'A' and draw its electron dot structure.
   (b) Give the molecular formulae of any two homologues of 'A'.
   (c) How many isomers are possible for the compound with the molecular formula C_4H_8?
       Draw the electron dot structure of branched chain isomer

SECTION C

30. The focal length of a concave mirror is _____. (1)
   (A) the distance from pole to centre of curvature   (B) half the radius of curvature
   (C) equal to aperture size   (D) infinite in length

31. The potential difference across a resistor can be measured using _____ with the resistor. (1)
   (A) an ammeter connected in series   (B) an ammeter connected in parallel
   (C) a voltmeter connected in series   (D) a voltmeter connected in parallel

The following two questions consist of two statements – Assertion (A) and Reason (R). Answer
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C. A is true but R is false.
D. A is false but R is true.

32. A: Two magnetic field lines do not cross each other. (1)
   R: Magnetic field lines always run away from north pole and towards south pole outside the
      magnet

33. (a) A lens of certain focal length can produce real as well as virtual image. What is the type of (2)
      this lens?
   (b) The same lens forms a real image at a distance of 20 cm when the object is at 30 cm. Calculate
      its power.

34. A. (i) State Joule's law of heating. (2)
      (ii) An electric refrigerator rated 400 W operates 8 hour/day. What is the cost of the energy
           to operate it for 30 days at Rs 3.00 per kWh?

OR

B. (i) Why is tungsten used almost exclusively for filament of electric lamps?

(ii) Why are the conductors of electric heating devices, such as bread-toasters and electric irons, made of an alloy rather than a pure metal?

(iii) Why is the series arrangement not used for domestic circuits?

35. A student complains that distant objects appear blurred while nearby objects are clear. (3)
    (a) Identify the defect and explain its cause.
    (b) Suggest a suitable corrective measure and show through a ray diagram.

36. The refractive index of water is 1.33 and that of alcohol is 1.36. (3)
    (a) In which medium, the light travels faster? Calculate the speed of light in this medium.
    (b) Sketch a ray diagram to show the path of a ray of light passing obliquely from alcohol to water.

37. (i) Write an activity to demonstrate that a current carrying conductor placed in a magnetic field experiences force. Draw the necessary diagram. (3)
    (ii) State Fleming left hand rule.

38. When an electric current flows through a straight conductor, it produces a magnetic field around it. The direction of this magnetic field can be determined using the *right-hand thumb rule*, which states that if a current-carrying conductor is held in the right hand with the thumb pointing in the direction of the current, the curled fingers show the direction of the magnetic field lines.

    Similarly, a current flowing through a circular loop produces a magnetic field at the centre of the loop. The strength of this field increases with the increase in current and with an increase in the number of turns in the coil.

    An electromagnet is formed when a coil is wound around a soft iron core and current is passed through it. Electromagnets are widely used in electric bells and cranes used in scrap yards. A permanent magnet, on the other hand, retains its magnetism, whereas an electromagnet loses its magnetism when the current is switched off.

    (i) The magnetic field at the centre of a circular loop increases when: (1)
        (A) Current decreases   (B) Number of turns increases
        (C) Loop is made smaller   (D) Both (B) and (C)

    (ii) The direction of the magnetic field around a straight conductor is determined using: (1)
        (A) Fleming's left-hand rule   (B) Right-hand thumb rule
        (C) Fleming's right-hand rule   (D) Right hand palm rule

    (iii) (a) Write two properties of magnetic field lines. (2)

    OR

    (iii) (b) Draw the magnetic field around a solenoid carrying a current.

39. A. (i) Draw a ray diagram of a concave mirror in which the image distance from the mirror is the same as that of the object. Mark the positions of the object and image in the diagram. (5)
    (ii) An object is placed 18 cm from a concave mirror of focal length 12 cm. Find the position of the image. What is the nature of the image? Is the image enlarged, diminished or the same size?
    (iii) Give any one use of a concave mirror.

    OR

    B.
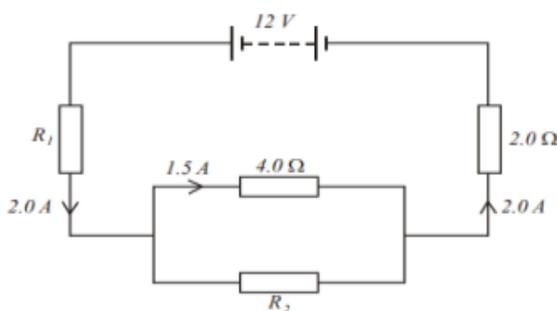
    The circuit is a part of an electrical device. Use the information given in the question to calculate the following.
    (i) Potential Difference across R_2.
    (ii) Value of the resistance R_2.
    (iii) Value of resistance R_1