General instructions:

1. The question paper comprises of two Sections, A and B. You are to attempt both the Sections.
2. The candidates are advised to attempt all the questions of Section A separately and Sectior. B separately.
3. All questions are compulsory.
4. There is no overall choice. However, internal choice has been provided in some questions. You are to attempt only one option in such questions.
5. Marks allocated to every question are indicated against it.
6. Question numbers **1—5** in Section A and **21—23** in Section B are very short answer questions. These are to be answered in **one word** or **one sentence**.
7. Question numbers **6—10** in Section A and **24—25** in Section B are short answer questions. These are to be answered in **30—40** words each.
8. Question numbers **11—17** in Section A and **26—29** in Section B are also short answer questions. These are to be answered in **40—50** words each.
9. Question. numbers **18—20** in Section A and **30** in Section B are long answer questions. These are to be answered in **70** words each.
10. **SECTION A**
11. **Q. 1.** Draw a figure to show how the rate of a chemical reaction in general changes as the temperature of reactants is increased step-wise. **1**
12. **Q. 2.** Name the classes of organic compounds represented by the following formulae: **1**
    (i) $C_2H_5NH_2$
    (ii) $H_3C\text{-}\overset{\overset{O}{\|}}{C}\text{-}CH_3$
13. **Q. 3.** Name any two neutral oxides. **1**
14. **Q. 4.** What type of force or forces keep the Sun and its planets in their respective places? **1**
    Or
    What force makes an apple on a tree to fall to the ground and what force makes a balloon filled with hydrogen to rise into air? **1**
15. **Q. 5.** How can it be shown that a magnetic field exists around a wire through which a direct electric current is passing? **1**
16. **Q. 6.** What is the chemical name of washing? Name the three chief raw materials used for making washing soda by the Solvay Process. **2**
17. **Q. 7.** What is meant by 'fermentation'? Write chemical equations for the two steps involved preparing ethanol by the fermentation of molasses. **2**
    Or
    Name the main products formed when
    a) ethanol is oxidised by an alkaline solution of $KMnO_4$
    b) propanone and hydrogen cyanide form an addition compound.
    c) sodium ethanoate is heated with soda lime.
    d) methanal is reduced with hydrogen in the presence of finely divided palladium. **2**
18. **Q. 8.** To which galaxy does our earth belong? How is the shape of this galaxy described? 'Our universe is expanding.' What does it mean? **2**
19. **Q. 9.** In cases of artificial satellites what are equatoria1' and polar' orbits? Which type of these satellite orbitals will be suitable for collecting data for weather prediction and why? **2**
20. **Q. 10.** Which type of nuclear process is currently used in nuclear electricity generators? Give one example each for the substances used in this context as
    (i) coolants, (ii) moderators, and (iii) nuclear fuel. **2**
21. **Q. 11.** When will the reversible reaction,
    $N_2(g) + 0_2\ (g)$ ----- $2NO(g)$

be said to be in equilibrium state? Write the formula co-relating the concentration of involved substances in this equilibrium state. A reversible reaction has a very low value of its equilibrium constant. What does it signify for the rate of progress of the reaction? **3**

22. **Q. 12.** Besides being large molecules what is the other essential similar structural character of all polymers? Give one example each for the formation of (i) an addition polymer, and (ii) a condensation polymer. 3

    Or

    State the monomers used and one use each for (a) Neoprene, (b) Teflon and (c) Natural rubber.
23. **Q. 13.** (a) What are strategic metals? Give one example also.

    (b) State the reason for the following behaviour of zinc metal:
24. On placing a piece of zinc metal in a solution of mercuric chloride it acquires a shining silvery surface but when it is placed in a solution of magnesium sulphate no change is observed. **1, 2**
25. **Q. 14.** Write chemical equations for the reactions taking place when: 3

    a) a piece of calcium metal is placed in water.

    b) ammonia gas comes in contact with hydrogen chloride gas.

    c) sulphur is heated with concentrated H_2SO_4
26. **Q. 15.** State the formula correlating the electric current flowing in a conductor and the voltage applied across it. Also show this relationship by drawing a diagram.

    What would be resistance of a conductor if the current flowing through it is 0.35 ampere when the potential difference across it 1.4 volt? **3**
27. **Q. 16.** A convex lens has a focal length of 25 cm. Calculate the distance of the object from the lens if the image is to be formed on the opposite side of the lens at a distance of 75 cm from the lens. What will be the nature of the image? **3**
28. **Q. 17.** Name the three primary colours of light. A flower has magenta colour in white light. What will its colour appear to be when viewed separately under each of the lights of primary colours? **3**

    What are complementary colours of light?

    Or

    With the help of ray-diagrams show the phenomenon of total internal reflection of light and the concept of critical angle for a transparent medium. **3**
29. **Q. 18.** (a) Describe briefly the contact process for manufacturing sulphuric acid
    starting with sulphur.

    Write the chemical equations for the involved reactions.

    (b) In this process SO_3 is dissolved in conc. H_2SO_4. and not in water. Why is it so?

    (c) Name one large industry based on using sulphuric acid. **5**

    Or

    (a) Draw a flow-chart for the manufacture of ammonia gas by Haber's
    Process.

    (b) How can we show that ammonia is highly soluble in water and gives an
    alkaline solution.

    (c) Name a major industry using ammonia as basic material. **5**
30. **Q. 19.** (a) State two main causes of a person developing near sightedness. With the help of a ray-diagram suggest how he can be helped to overcome this disability.

    (b) The far point of a myopic person is 150 cm in front of the eye. Calculate the focal length and the power of a lens required to enable him to see distant objects clearly. **5**

    Or

    (a) How is a simple microscope different from a compound microscope in construction and magnifying power?
31. A magnifying lens of focal length 6.25 cm is used by a jeweller during his work. His least distance of distinct vision is 25 cm. What magnification is the jeweller getting?
32. (b) What is 'astigmatism' and how is this vision defect counteracted? **5**

33. **Q. 20.** Name the major fuel component of biogas. What are its other combustible components? Draw a simple labelled diagram of a fixed dome type biogas plant. What is the use for the residual slurry and why? **5**
34. **SECTION B**
35. **Q. 21.** Write the function of hormone ‘thyroxin’ in our bodies. **1**
36. **Q. 22.** Name the part of hind brain which takes part in regulation of respiration. **1**
37. **Q. 23.** Give an example of a vestigial organ present in human body. **1**
38. **Q. 24.** Leaves of a healthy potted plant were coated with vaseline to block the stomata. Will this plant remain healthy for long? State three reasons for your answer. **2**
39. **Q. 25.** Name two natural agents that can cause erosion of soil. Suggest two ways in which erosion of soil can be checked. **2**
40. **Q. 26.** (i) Who put forward the double helical model of DNA?
    (ii) What are the three chemically essential parts of nucleotides constituting a DNA?
    (iii) How many types of nucleotides are present in a DNA molecule? **3**
41. **Q. 27.** What is meant by pollution of air? Write any two harmful effects of pollution of air. Name any three techniques, used for controlling amounts of gaseous pollutants of our atmosphere. **3**
42. **Q. 28.** (i) When does ovulation occur during the menstrual cycle in a normal healthy woman?
    (ii) Draw a labelled diagram to show the reproductive system of a human female. **3**
43. **Q. 29.** Explain the process by which inhalation occurs during breathing in human beings. **3**
    Or
    With the help of a diagram describe the process by which excretion occurs in amoeba. **3**
44. **Q. 30.** (i) Name the blood vessel that brings oxygenated blood to the human heart.
    (ii) Which chamber of human heart receives oxygenated blood?
    (iii) Explain how oxygenated blood from this chamber is sent to all parts of the body. **5**