

DESIGN OF THE QUESTION PAPER

SCIENCE AND TECHNOLOGY – CLASS X (THEORY)

Time : Three Hours

Max. Marks : 75

The weightages of the distribution of marks over different dimensions of the question paper shall be as follows :

1. Weightage to Learning Outcomes

S.No.	Learning Outcomes	Marks	Percentage of Marks
1.	(K)	30	40
2.	(U)	37	50
3.	(A)	08	10

2. Weightage to content/subject units

S.No.	Learning Outcomes	Marks
1.	Chemical Reactions and some important chemical compounds	06
2.	Energy	22
3.	Life Processes	19
4.	Natural Resources	18
5.	Our Environment	05
6.	Exploring Space	05

3. Weightage to forms of questions

S. No.	Form of Question	Marks for each question	Number of questions	Total Marks
1.	Long Answer Type (LA)	5	4	20
2.	Short Answer Type SA-I	3	11	33
3.	SA-II	2	07	14
4.	Very Short Answer Type (VSA)	1	08	08

TOTAL

30

75

Note : A weightage of 7 marks has been given to numerical questions.

The expected time for different types of question would be as follows :

S. No.	Form of question	Expected time for each question (minutes)
1.	Long Answer Type (LA)	10-15
2.	Short Answer Type : SA-I	6-8
	SA-II	3-5
3.	Very Short Answer Type (VSA)	1-2

As the total time is calculated on the basis of the number of questions required to be answered and the length of their anticipated answers, it would, therefore, be advisable for the candidates to budget their time properly by cutting out the superfluous words and be within the expected time limits.

4. Scheme of Options : There will be no overall choice. However, there is an internal choice in few questions as per the following details :

- (a) Long Answer Questions (5 marks) : In any two questions
- (b) Short Answer Questions (3 marks) : In any two questions.
- (c) Short Answer Questions (2 marks) : In one question

Note : Internal choice as per above scheme will be provided in questions which test higher mental abilities of the students.

5. Weightage to Difficulty level of questions :

S. No.	Estimated Difficulty Level of Questions	Percentage
1.	Easy	15
2.	Average	70
3.	Difficult	15

A question may vary in difficulty level from individual to individual. As such, the approximation in respect of each question will be made by the paper-setter on the basis of general anticipation from the group as a whole. The provision is only to make the paper balanced in its weightage rather than to determine the pattern of marking at any stage.

Note : There are two blue-prints based on this design followed by two separate sample question papers. While the design of the question papers will remain same, blue prints based on this design may change from year to year.

Science and Technology
Class X (Theory)
Sample Question Paper - I

Time : 3 Hours

Max Marks : 75

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 Section 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.*

SECTION A

- Q1.** What is the effect of an increase in temperature on the rate of a chemical reaction? 1
- Q2.** Name any two isotopes which readily undergo nuclear fission. 1

Q3. Name the functional groups present in : 1

- (a) CH_3COOH
- (b) CH_3COCH_3

Q4. Why does it take longer to burn wet wood? 1

Q5. Why are Zirconium, Titanium and Chromium classified as strategic metals? 1

Q6. Define the terms

- (a) Astronomical Unit
- (b) Light year

Give approximate value of each in SI units. 2

Q7. Explain giving reasons :

- (i) Tartaric acid is a component of baking powder used in making cakes.
- (ii) Gypsum, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ is used in the manufacture of cement.

DDT, paper, cotton cloth, plastics 2

Q8. Calculate the energy released (in MeV) when 1 kg mass is completely converted into energy. (Take $1\text{ MeV} = 1.6 \times 10^{-13}\text{ J}$, $c = 3.0 \times 10^8\text{ ms}^{-1}$) 2

OR

When Uranium undergoes fission, 0.1% of the total mass is converted into energy. Calculate the total amount of energy released in Joules during an explosion of an atom bomb which contains 5 kg of Uranium.

Q9. When a copper wire is left in silver nitrate solution, it is observed that the solution turns bluish green.

- (a) Explain this observation.
- (b) Write the balanced chemical equation to represent the change taking place. 2

Q10. State Right Hand Thumb rule to find the direction of the magnetic field around a current carrying straight conductor. How will this magnetic field be affected on?

- (a) increasing the current through the conductor?
- (b) changing the direction of flow of current in the conductor? 2

Q11. (a) Name the product formed when methanol undergoes controlled oxidation.

- (b) Describe with necessary chemical equations the test you would perform to identify the above product.
- (c) Name the compound formed when ethanoic acid reacts with ethanol in the presence of concentrated sulphuric acid. 3

OR

- (a) Propanone can be manufactured from Cumene. Write the corresponding chemical equation.
- (b) Name the compound formed when propanone is reduced. Which reducing agent is generally used in this process?
- (c) How is propanone converted to ethanoic acid?

Q12. Two identical resistors, each of resistance 10 ohms, are connected (i) in series (ii) in parallel, in turn, to a battery of 6 volts. Calculate the ratio of power consumed in the combination of resistors in two cases. 3

Q13. An aqueous solution has hydrogen ion concentration,

$$[H^+] = 1.0 \times 10^{-10} \text{ mol L}^{-1}$$

- (a) Determine the pH of this solution.
- (b) Is the solution acidic, basic or neutral?
- (c) Will the pH of the above solution increase or decrease on adding a drop of 1M HCL to it? Justify your answer. 3

Q14. Draw a labeled diagram of a dry cell. Write the chemical equations involved

- i) at the anode
- ii) at the cathode
- while the cell is working. 3

Q15. Distinguish between polar and equatorial orbits of artificial satellites. Which of the above two orbits is suitable for a

- (i) geostationary satellite
- (ii) satellite used for weather forecasting? 3

OR

How do we locate the position of the pole star in the sky? Why is the pole star so special?

Q16. (a) Draw a flow diagram illustrating the principle used in the manufacture of ammonia by Haber process.

(b) Describe an activity to show that ammonia is basic and is highly soluble in water. 3
Q17. Explain giving reasons :

- (i) Detergent made up of molecules in which branching is minimum are preferred these days.
- (ii) In the manufacture of condensation polymers, each monomer should have at least two reactive sites. Why? Cite an example to support your answer. 3

Q18. Biogas technologies are gaining acceptance by both rural and urban population. Why? What is biogas? How is it obtained from cow dung? Draw a labelled diagram of a fixed dome type biogas plant. 5

OR

What is meant by the term 'refining of petroleum'? Draw a labeled diagram of petroleum distillation tower. Why is CNG considered an environment friendly fuel?

Q19. Name the lightest element. Why is its presence in the free state in the earth's atmosphere negligible? With a labelled diagram, describe how this element can be prepared in the laboratory. How is this element used in:

- a) Space programmes
- b) Oil industry? 5

OR

- a) Name the chief ore of iron. How is it concentrated?
- b) Describe the extraction of iron from the concentrated ore with the help of
 - (i) a labelled diagram of the furnace used.
 - (ii) necessary chemical equations representing the chemical changes occurring during the process.
- c) How is the conversion of iron into iron oxide prevented during the extraction of iron?

Q20. Explain Myopia with the help of suitable ray diagrams. How can this defect of vision be corrected?

A boy uses spectacles of focal length -50 cm. Name the defect of vision he is suffering from. Compute the power of this lens. 5

SECTION B

- Q21.** What is the name given to a set of unpaired chromosomes of an organism? 1
- Q22.** What clue does the fossil Archeopteryx provide in regard to organic evolution? 1
- Q23.** What is meant by 'homologous organs'? 1
- Q24.** Differentiate between biodegradable and non-biodegradable pollutants. Classify the following under the above two categories 2
DDT, Paper, Cotton cloth, plastics
- Q25.** Name any two organs that are homologous to human hand. To which category of organs would you place wings of birds and wings of insects?
- Q26.** (a) Draw a labelled diagram of a neuron.
(b) Which part of the human brain is responsible for
i) intelligence and memory
ii) adjustment of movement of posture? 3
- Q27.** Name the types of sex chromosomes present in
(i) Human male and
(ii) Human female
What will be the sex of the child produced if a sperm carrying 'Y' chromosome fertilizes the egg? Name an insect in which similar type of sex determination takes place. 3
- Q28.** Draw a labelled diagram of the longitudinal section of pistil of a flower. What will happen to the pollen of mango flower if it falls in the stigma of guava flower? 3
- Q29.** Write the sequence of steps and processes in the primary and secondary treatments of the sewage before it is passed into the final (tertiary) step. 3
- Q30.** How do (i) temperature (ii) water and (iii) carbon dioxide affect the rate of photosynthesis? During which state of photosynthesis do the following occur :
(a) Synthesis of ATP and DPH
(b) Synthesis of Carbohydrates? 5

Science and Technology

Class X (Theory)

Sample Question Paper – II

Time : 3 Hours

Max. Marks : 75

General Instructions :

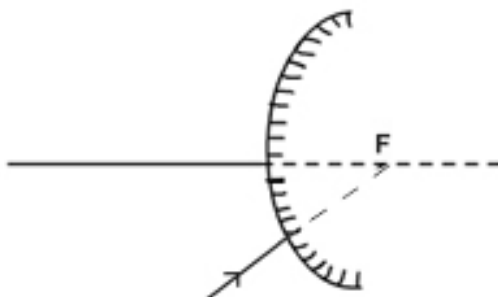
1. *The question paper comprises of two sections, A and B. You are to attempt both the sections.*
2. *The candidates are advised to attempt all the questions of Section A separately and Section B separately.*
3. *All questions are compulsory.*
4. *There is no overall choice. However, internal choice 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.*

SECTION – A

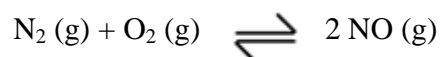
1. Name one gaseous fossil fuel.

(1)

2. Complete the path of ray of light after reflection at the mirror in the given diagram : (1)



3. Express one light year in terms of SI unit of distance. (1)
4. Give an example of a photochemical reaction. (1)
5. An organic component is a constituent of beer, whisky and some cough syrup. It is produced by the fermentation of sugar. Identify the organic compound. (1)
6. Name any two Jovian Planets. Write their common features. (2)
7. A current carrying straight conductor is placed in east-west direction. What will be the direction of the force experienced by this conductor due to earth's magnetic field? How will this force get affected on : (2)
- (a) reversing the direction of flow of current?
- (b) doubling the magnitude of current?
8. How do we obtain information about the interior of earth? (2)
9. What kind of energy transformation takes place in an electric motor? Name any two devices which use electric motor as an essential component in their working. (2)
10. Write the equilibrium constant expression for the following chemical reaction : (2)



What does a very small value of $K_c = 4.8 \times 10^{-31}$ for this reaction indicate?

11. An object of size 5 cm is placed at a distance of 25 cm from the pole of a concave mirror of radius of curvature 30 cm. Calculate the distance and size of the image so formed. What will be the nature of the image? (3)

OR

An object of size 3 cm is placed at a distance of 15 cm from a convex lens of focal length 10 cm. Calculate the distance and size of the image so formed. What will be the nature of the image?

12. Two electric lamps rated 100 W, 220 V and 25 W, 220 V are connected in parallel to a 220 V supply. Calculate the total electric current in the circuit. (3)

OR

A metallic coil connected to a 220 V supply, has a resistance of 110 ohms (while hot). How long will it take this coil to heat 1 kg of water from 20°C to 70°C? Assume that whole of heat produced by the coil is taken up by water. (Sp. Heat capacity of water = 4186 J/kg°C)

13. Describe with chemical equations, what happens when, (3)

- i. Carbon-di-oxide gas reacts with ammonical brine in Solvay process.
- ii. Bleaching powder is left exposed to the air containing carbon-di-oxide gas.
- iii. A mixture of finely powdered sand and sodium carbonate is heated in a tank furnace.

14. Give Chemical tests to: (3)

- i. detect the presence of ethanol.
- ii. show that methanol contains an aldehyde group.
- iii. show a saponification reaction.

15. An organic compound A having molecular formula $C_2H_4O_2$ reacts with sodium metal and evolves a gas B which readily catches fire. A also reacts with ethanol in the presence of concentrated sulphuric acid to form sweet smelling substance C used in making perfumes. (3)

- i. Identify the compounds A, B and C.
- ii. Write balanced chemical equations to represent the conversion of:
 - a. Compound A into Compound B
 - b. Compound A into Compound C

16. a. Explain the role of the following in the extraction of Aluminium from Bauxite ore: (3)

- i. Cryolite.
 - ii. Inside lining of graphite of the electrolyte tank
- b. Also draw a labeled diagram of the tank used in the electrolytic reduction of Alumina.

17. Which two metals do not corrode easily? Give an example in each case to support that : (3)

- i. Corrosion of some metals is an advantage.
- ii. Corrosion of a metal is serious problem.

18. Draw a labeled diagram of a nuclear reactor. Name its three main parts and explain the function of each. (5)

OR

Draw a schematic diagram showing essential steps in a controlled chain reaction. What is enriched uranium? Why is it essential to use enriched uranium for nuclear fusion reaction? Name one more element other than U-235, which readily undergoes nuclear fission.

19. Draw a labeled diagram of an astronomical telescope. Write an expression for its: (5)
- magnification in normal adjustment position.
 - tube length in normal adjustment position.

You are given four convex lenses of focal length 5 cm, 20 cm, 50 cm and 100 cm. Which of the two lenses will you select for constructing an astronomical telescope and why?

20. a. Name the sulphur compound present as an impurity in natural gas. (5)
- b. What possible valencies are shown by sulphur in its compounds?
- c. Draw a labeled diagram of the Frasch process used in the extraction of sulphur.

OR

- a. Why is sulphuric acid called the 'King of Chemicals'?
- b. Describe with chemical equations how is sulphuric acid manufactured by 'Contact Process'.
- c. Describe an activity to show that concentrated sulphuric acid is a powerful dehydrating agent.

SECTION – B

21. Name the type of chromosome in which the centromere is near the middle and the two arms are almost equal in length. (1)
22. Which organ in human body produce haploid cells through the division of diploid cells? (1)
23. Why do we categorise asbestosis as an occupational hazard? (1)
24. How is acid rain formed? Mention any one of its harmful effects other than the corrosion of monuments? (2)
25. Excessive nutrients in the sewage flowing into the water bodies may lead to the death of fishes and other aquatic animals. Why will it so happen? (2)

OR

What is meant by the term 'Sustainable development'? Suggest any two ways to achieve it.

26. Write the effect of sympathetic nervous system on the following : (3)
- Heart
 - Blood vessels

- iii. Bronchi
- iv. Eyes
- v. Gastric Bladder

27. Define transpiration. How does transpiration help in upward movement of water from roots to leaves? Draw the diagram of the part of the leaf from which transpiration takes place. (3)
28. Why is blood circulation in human heart called double circulation? Explain briefly. How is 'Pace maker' helpful to a heart patient? (3)
29. Differentiate between breathing and respiration. Explain clearly how the air is inhaled and exhaled during breathing in humans. (3)
30. What are two vital functions of the human kidney? Draw labeled diagram of human urinary system. Name the procedure used in the working of an artificial kidney. (5)