SAMPLE PAPER-02 CHEMISTRY
(Theory) Class – XI

General Instructions:

a)   All the questions are compulsory.
b)   There are **26** questions in total.
c)   Questions **1** to **5** are very short answer type questions and carry **one** mark each.
d)   Questions **6** to **10** carry **two** marks each.
e)   Questions **11** to **22** carry **three** marks each.
f)   Questions **23**is value based question carrying **four** marks.
g)   Questions **24**to **26** carry **five** marks each.
h)   There is no overall choice. However, an internal choice has been provided in one question of two marks, one question of three marks and all three questions in five marks each. You have to attempt only one of the choices in such questions.
i)   Use of calculators is **not** permitted. However, you may use log tables if necessary.

1.   Draw the structure of

    a)   2,3-Dimethylpentane

    b)   4-Phenylbut-1-ene

2.   If a tank is full of water coming in and out at the same rate, then what will happen to the level of water in a tank?

3.   Express 32.392800 to four significant figures.

4.   Write the correct symbol for the nucleus with:

   i.   Atomic number 56 and mass number 138

   ii.   Atomic number 26 and mass number 55.

5.   Why is Ga smaller in size than Al?

6.   (a)   Name the energy which arises due to motion of atoms or molecules in a body.

    (b)   How is this energy affected when the temperature is increased?

            Or

    Give the relationship between isothermal and free expansion of an ideal gas.

7.   Predict the formulae of the stable binary compounds that would be formed by the combination of the following pairs of elements:

    a)   Element 71 and F

b) Al and I

c) Si and O

d) P and F.

8. Why the bottle containing hydrogen peroxide should be cooled before opening?

9. Why Be and Mg does not give colour to flame than the alkaline earth metals?

10. Calculate the molality of the solution if the density of 3M solution of NaCl is 1.25g/mL.

11. (a) Give the importance of measuring BOD of a water body.

(b) What is desirable concentration of fluoride ion pH of drinking water?

(c) Give the harmful effect of nitrogen dioxide.

12. (a) Define:

i) Intensive properties

ii) Adiabatic process

(b) Derive $\Delta G = -T\Delta S_{total}$ from the relationship $G = H - TS$.

13. We know that 75% of solar energy reaching the earth, is absorbed by earth's surface increases its temperature. The rest of heat radiates back to the atmosphere. Some of the heat is trapped by gases such as CO, CH_4, O_3, CFC's and water vapours present in the atmosphere. This causes global warming.

a) Suggest some measures to decrease CO gas in the atmosphere.

b) Give a method to save ozone layer.

c) Will the use of solar energy solve our problems? Comment.
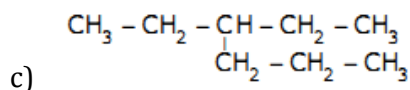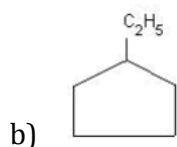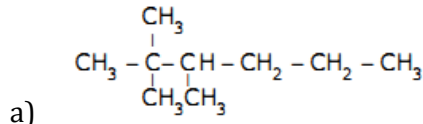
14. Comment on the graph below.
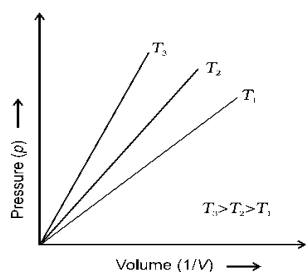
15. If the density of 3M solution of NaCl is 1.25g/mL, calculate the molality of the solution.

16. Calculate the standard enthalpy of formation of one mole of CH_3OH (l), if the combustion of one mole of methanol takes place at 298 K and 1 atm and after combustion CO_2 (g) and H_2O (l) are produced and 726 kJ of heat is liberated. Assume that the standard enthalpies of formation of CO_2 (g) and H_2O (l) are - 393 kJ/mol and -286 kJ mol respectively.

17. What are the uses of sodium carbonate?

18. Describe in detail the expanded octet with suitable examples.

19. How would you prepare alkanes from alkenes?

20. (a) Calculate the concentration of hydroxyl ion in 0.1 M solution of ammonium hydroxide having $K_b = 1.8 \times 10^{-5}$, if K_{sp} value of two sparingly soluble salts Ni $(OH)_2$ and AgCN are 2×10^{-15} and 6.0×10^{-17} respectively.

    (b) Which salt is more soluble?

<div align="center">Or</div>

a) When certain buffer is made by mixing sodium formate and formic acid in water, explain how it neutralizes an addition of a small amount of an acid or a base.

b) When a basic buffer is made by mixing ammonium hydroxide and ammonium nitrate in water, explain how it resists change in its pH on addition of a small amount of an acid or a base.

21. (i) Draw the structural isomers of pentane.

    (ii) Give the IUPAC names of the following compounds.

    a)
    $$CH_3-\underset{\underset{CH_3CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH-CH_2-CH_2-CH_3$$

    b)

    c)
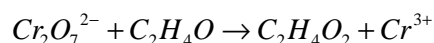 $$CH_3-CH_2-\underset{\underset{CH_2-CH_2-CH_3}{|}}{CH}-CH_2-CH_3$$

22. What are the factors made Thomson to argue about the amount of deviation of the particles from their path in the presence of electrical or magnetic field depends upon?

23. During an educational trip, class XI students saw a beautiful lake in a village. They noticed that some villagers were washing clothes around the lake and at some places waste material from houses was destroying its beauty. After few years back, one of the student went to the same lake again and saw the lake was covered with algae, stinking smell and the water becomes unusable. Explain the reason for this condition.

24. a) Convert :

i) Benzene to p-nitrobromobenzene

ii) Ethyl chloride to ethene.

b)   Give mechanism of addition of HBr to propene.

c)   Write a note on Friedel-Crafts alkylation.

Or

Balance the following equation in acidic medium by half reaction method.

$$Cr_2O_7{}^{2-} + C_2H_4O \rightarrow C_2H_4O_2 + Cr^{3+}$$

25.   From the structures given below, answer the questions.

    I. $CH_3 - CH_2 - CH (OH) - CH_3$

    II. $(CH_3)_2 - C (OH) - CH_3$

    III. $CH_3 - CH_2 - CH_2 - CH_2 - OH$

    IV. $CH_3 - O (CH_3) - CH - CH_3$

    V. $CH_3 - O - CH_2 - CH_2 - CH_3$

    VI. $CH_3 - CH_2 - O - CH_2 - CH_3$

    VII. $CH_3 - CH (CH_3) - CH_2 - OH$

a)   The pair of compounds that represent chain isomerism.

b)   The pair of compounds that represent position isomerism.

c)   The pairs of compounds which are functional group isomers.

d)   The compounds that form pairs of metamers.

e)   Distinguish between position and functional isomerism with an example.

Or

Convert the following:

    a)   Benzene to Benzoic acid

    b)   Bromoethane to Butan-1-ol

    c)   Ethene to Propene

    d)   Ethyne to Methane

    e)   Propene to Propan-2-ol

26. (a) Give one method forindustrial preparationandone forlaboratory preparation ofCO andCO$_2$each.

(b) Select themember(s) of group 14that i) forms the most acidic dioxide ii) used as semiconductors.

(c) Explain structure ofDiborane.

Or

a) Identify the functional groups in the following:
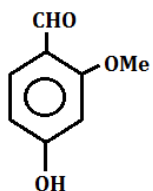
b) Draw the bond notation of heptan-4-one.

c) Give the possible isomers for mono substituted

d) Give the possible isomers for di substituted benzene?