General Instructions. Read the following instructions carefully.

a) **There are 19 questions in this question paper. All questions are compulsory.**

b) **Section A: Q. No. 1 is case-based questions having four MCQs based on given passage each carrying 1 mark.**

c) **Section A: Question 2 to 11 are MCQs and assertion reason type questions each carrying 1 mark.**

d) **Section B and C: Q. No. 12 to 18 are short answer questions and carry 2 and 3 marks.**

e) f) **Section C: Q. No. 19 is a long answer question carrying 5 marks.**

g) **There is no overall choice. However, internal choices have been provided.**

h) **Use of calculator is not permitted. Write chemical equations wherever it necessary**

Atomic masses (in u): H=1, Na=23, K=39,Mg = 24 C=12,O=16,N=14 Cl=35.5, S=32 P=31, Ca=40, Fe=56, Mn= 55, Al=27,Cu= 63.5, Zn=65, I=127 Br=80

Section A

1. **Read the passage given below and answer the following questions:**

   The number of reactants take part in a chemical reaction or number of products formed in a chemical reaction is called stoichiometric coefficient. The stoichiometric coefficient of a chemical reaction can be represented by number of moles of reactants/products, molar mass of reactants/ products or molar volume of reactants/ products (for gaseous reactants and products). Using stoichiometric coefficients, we can calculate the amount of reactant(s) used up in a chemical reaction or product(s) formed during a chemical reaction.

   i)   For the reaction, $C_2H_4 + xO_2 \rightarrow yCO_2 + 2H_2O$ The value of x and y are
          a) 3 and 2   b) 2 and 3   c) 3 and 3   d) 3/2 and 2

   ii)   The amount of CO_2 formed for the complete combustion of 1.5 mole of CH_4 is
          a) 44g   b) 66g   c) 88g   d) 110g

   iii)   The volume of O_2 gas liberated at STP for the thermal decomposition of one mole of $KClO_3$ is
          a) 33600 mL   b) 67200mL   c) 22400mL   d) 24000mL

   iv)   The number of moles of methane are required to produce 18g of water after combustion is
          a) 1 mole   b) 16mole   c) 0.5 mole   d) 1.5 mole

2. Which of the following does not depends temperature
   a) molarity   b) mole fraction   c) molality   d) mass percentage

3. If the concentration of glucose ($C_6H_{12}O_6$) in is 0.9 g L^{-1}, what will be the molarity of glucose in blood?
   a) 5 M   b) 50 M   c) 0.005 M   d) 0.5 M

4. The number of Significant figures in 0.0256 is
   a) 5   b) 3   c) 4   d) 2

5. How many number of atoms are present in 52 u of He ?
   a) 4 atoms   b) 6.023×10^{23} c) 13 atoms   d) 24 atoms

6. The number of water molecule is maximum in:
   a) 1.8 g of water   b) 18 g of water   c) 18 moles of water   d) 18 molecules of water

7. The number of moles of ethane are required to produce 56g of water after its complete combustion is
   a) 1 mole   b) 30 mole   c) 0.5 mole   d) 1.5 mole
8. The molarity of 4g of caustic soda per one litre of water is
   a) 1M   b) 0.1M   c) 0.001M   d) 10M

   Questions 09 to 11 :
   (A)Both assertion and reason are correct statements, and reason is the correct explanation of the assertion.
   (B) Both assertion and reason are correct statements, but reason is not the correct explanation of the assertion.
   (C) Assertion is correct, but reason is wrong statement.
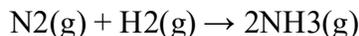   **(D) Assertion is wrong, but reason is correct statement.**

9. **Assertion:** the volume occupied by one mole of a gas at STP is 22.4L
   Reason : 22.4L of all gases contain Avogadro's number of gaseous molecules.
10. **Assertion:** the mass ratio of carbon and oxygen in CO2 is 3:8
    Reason : for a given compound always contain same proportion of elements by mass.
11. **Assertion:** the number of reacting species take part in a chemical reaction is called stoichiometric coefficient.
    Reason : stoichiometric coefficient is the representation of reactant or product used or formed in a reaction by means of moles, mass or volume.

SECTION B
12. Calculate the percentage composition of hydrogen and oxygen in water
13. How are 0.5 mole Na_2CO_3 and 0.5M Na_2CO_3 different?
14. If 500 mL of 2.5M solution is diluted to 150 mL . What will be the molarity of solution obtained?
15. Identify the number of significant figures in   i) 0.00201   ii) 2.05800
16. Define the terms a)Molecular mass (b) Formula mass
17. The density of 3 molal solution of NaOH is 1.110 g mL^{-1}. Calculate the molarity of this solution (3)
18. What is the difference between empirical and molecular formula? A compound contains 4.07 % hydrogen, 24.27 % carbon and 71.65 % chlorine. Its molar mass is 98.96 g. What are its empirical and molecular formulas?   (3)

SECTION C
19. Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation:
$$N2(g) + H2(g) \rightarrow 2NH3(g)$$
(i) Calculate the mass of ammonia produced if 2.00×10^3 g dinitrogen reacts with 1.00×10^3 g of dihydrogen.
(ii) Will any of the two reactants remain unreacted?
(iii) If yes, which one and what would be its mass?