[Time: 2 Hours]   **[Marks: 60]**

Please check whether you have got the right question paper.

N.B: 1. Question No.1 is Compulsory.
2. Attempt any **three** questions from remaining **five** questions.
3. Figures to the right indicate Full marks.
4. All questions carry equal marks.
5. Atomic weights: - H=1, C=12, N=14, O=16, S=32, Cl=35.5, Ba=137.3, Ca=40. Mg=24, Na=23.

1. Answer **any five** from the following:-   15
    a) Distinguish between anodic and cathodic coatings for corrosion prevention.
    b) What are Fuels? Give its classification.
    c) Give Composition, Properties and Uses of **magnalumin**.
    d) What are composite materials? Mention its applications.
    e) Explain the green chemistry principal 'Accident prevention'.
    f) Explain with example, how the nature of volatile oxide film formed on the surface of metal influences the rate of corrosion.
    g) 1.5 g of the same coal sample in a Bomb-calorimeter experiment gave 0.36 g $BaSO_4$. Calculate percentage of S in the coal sample.

2.   a) Explain the mechanism of following types of corrosion:-   06
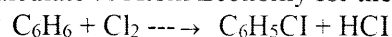   i) Galvanic corrosion   ii) Waterline corrosion
    b) Define cracking of hydrocarbons. Explain fixed bed catalytic cracking.   05
    c) Calculate % Atom Economy for the following reaction   04
        $C_6H_6 + Cl_2 \text{---}\rightarrow C_6H_5Cl + HCl$

3.   a) A fuel sample has the following composition: C_2H_4 = 38%, C_2H_6 = 14%, CO = 7%, 06
        water vapour = 2.0% and rest is nitrogen. Calculate the volume of oxygen and air required for complete combustion of $5m^3$ of fuel.
    b) Explain Conventional and Greener route for synthesis of Adipic acid. Mention the 05
        green Chemistry principle involved.
    c) How do the following factors related to nature of environment affect corrosion?   04
        i) Relative area of anode and cathode   ii)Temperature

4.   a) What are nonferrous alloys? Distinguish between brass and bronze.   06
    b) What is the principle of cathodic protection? Explain impressed current protection 05
        method.
    c) Write a note on sandwich panel composites.   04

Turn Over

5. a) What is Biodiesel? Give 'Trans-esterification', reaction to obtain Biodiesel from **06** vegetable oils. Mention its advantages.
    b) What is powder metallurgy? Explain Mechanical Pulverisation and Atomization **05** methods for manufacturing metal powders.
    c) What are the important properties of composite materials? **04**

6. a) Mention methods for applying metal coatings on the metals? Give brief account of **05** Metal cladding
    b) A coal sample contains, C=82%, O=6%, H= 4%, S =1.5%, N =1 % and Ash= 5.5%. **05** Calculate the GCV and NCV of given coal sample.
    c) Discuss the various steps involved in powder metallurgy and mention its application. **05**