

[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 from remaining five questions.
  3. Atomic weights: - H=1, C=12, N=14, O=16, S=32, Cl=35.5, Ba=137.5, mg=24, Na=23, Ca=40.

- Q.1** Answer Any **Five** from the following:- **15**
- a) What is metal cladding? How is 'Alclad' obtained.
  - b) Define fuels. Classify them with examples.
  - c) Give the composition, properties and uses of wood's metal.
  - d) What are composites? What are their advantageous characteristics?
  - e) What are green solvents? Give two Industrial applications of green solvents.
  - f) By kjeldahl's method 1.5 gm of coal sample was analysed. The ammonia evolved was absorbed in 50 ml of 0.1 N H<sub>2</sub>SO<sub>4</sub>. After absorption, the excess H<sub>2</sub>SO<sub>4</sub> required 34ml of 0.1N NaOH for neutralization. Calculate the percentage of Nitrogen.
- Q.2 a)** How do the following factors affect the rate of corrosion? **06**
- i) Purity of metal.
  - ii) Over voltage.
  - iii) Relative areas of anodic and cathodic parts.
- b)** What is cracking? Explain fixed bed catalytic cracking with neat labelled diagram. **05**
- c)** Calculate the % Atom economy for the following reaction with respect to methyl-isocyanate. **04**
- $$\text{CH}_3\text{NH}_2 + \text{COCl}_2 \rightarrow \text{CH}_3\text{N}=\text{C}=\text{O} + 2\text{HCl}$$
- Methylamine                      methyl-isocyanate
- Q.3 a)** The composition of gas was found to be H<sub>2</sub>=10%, C<sub>2</sub>H<sub>6</sub>=16%, CH<sub>4</sub>=20%, CO=18%, CO<sub>2</sub>=22%, O<sub>2</sub>=8%, N<sub>2</sub>=6%. **06**  
Calculate the volume of air required for complete combustion of 1m<sup>3</sup> of this gas.
- b)** Explain conventional and greener route for synthesis of Adipic Acid. Highlights the green chemistry principle involved. **05**
- c)** What are metallic coatings? Distinguish between Galvanizing and Tinning. **04**
- Q.4 a)** What are the effect of following alloying elements on steel? **06**
- i) Ni ii) Cr III) Co iv) Mn v) Mo vi) W
- b)** Explain differential aeration corrosion with the help of a suitable example. **05**
- c)** What is green chemistry? List the 12 principles of green chemistry. **04**
- Q.5 a)** What is petroleum? Describe the refining of petroleum with the help of a diagram **06**
- b)** What are structural composites? Give their types and applications. **05**
- c)** Distinguish between Brass and Bronze **04**
- Q.6 a)** Define an Alloy What is the purpose of making alloys? **05**
- b)** Define paints. Mention any four constituents of paints and state functions of each constituents. **05**
- c)** A coal sample contains C=65%, H=13%, O=6%, S=4%, N=12%, calculate the minimum amount of air needed for Complete combustion of 2kg of coal. **05**