

[Time: 2Hours]

[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 Q.2. to Q.6.
 3. Figure to the right indicates full marks.
 4. Atomic weights C=12,S=32,N=14,H=1,O=16,Cl=35.5.

1. Answer any FIVE from the following. 15

- a) Define Corrosion with suitable example.
- b) What is Plain Carbon Steel? Give its classification.
- c) Define Net calorific value of a fuel.
- d) Write the function of Matrix phase of Composites.
- e) List the 12 principles of Green Chemistry.
- f) What is a Paint? List the various constituents of paint.
- g) Calculate the GCV of a coal sample having the following composition:
C = 83%; H = 6%; O = 3%; S = 3.7%; N = 2.5%; Ash = 1.8%.

Q2.

- a) What is Chemical corrosion? Describe the mechanism of Oxidation corrosion with neat diagram. **6 M**
- b) What is Cracking? Explain Fixed Bed catalytic cracking with a neat diagram. **5 M**
- c) Calculate percent atom economy for the following reaction with respect to chlorobenzene **4 M**

$$\text{C}_6\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_6\text{H}_5\text{Cl} + \text{HCl}$$
 (Atomic weights: C = 12, H = 1, Cl = 35.5)

Q3.

- a) A gas has following composition by Volume: $\text{H}_2 = 20\%$, $\text{CO} = 22\%$, $\text{CH}_4 = 6\%$, $\text{CO}_2 = 4\%$, $\text{O}_2 = 8\%$, $\text{N}_2 = 40\%$. **6 M**
 Calculate the volume of Air required for complete combustion of 1m^3 of fuel.
- b) Highlight the Green Chemistry principle involved in the synthesis of Carbaryl. **5 M**
 Also write the greener route of its synthesis.
- c) Differentiate between Galvanizing and Tinning. **4 M**

Q4.

- a) What is the purpose of making Alloys? Explain it with suitable examples. **6 M**
- b) What is Differential Aeration corrosion? Explain it by giving an example and neat diagram. Write the Anodic and Cathodic reaction also. **5 M**
- c) What are Composites? How are they classified? **4 M**

Q5.

- a) Draw a neat labelled diagram of Hydrogen-Oxygen fuel cell and write the Anodic, Cathodic and overall cell reaction. **6 M**
- b) Write the composition, properties & uses of
 - i) Gun Metal
 - ii) Duralumin**5 M**
- c) What are Structural Composites? Explain Sandwich panel composites with a neat diagram. **4 M**

Q6.

- a) How do the following factors influence the rate of corrosion:
 - i) Position of Metal in Galvanic series.
 - ii) Relative area of Anodic & Cathodic parts.**6 M**
- b) 1.5 gram of air-dried coal sample was heated for 1 hour at 110°C , the dry coal sample weighed 0.985g. The crucible was covered with a vented lid and was heated strongly for 7 minutes at 975°C . The sample then weighed 0.813g. The crucible was then heated to a temperature of 750°C for half an hour. The weight of residue was found to be 0.13g. Calculate the % of Moisture, Volatile matter, Ash and Fixed carbon. **5 M**
- c) What is powder metallurgy? Write the various steps involved in Powder Metallurgy. Mention the various applications of powder metallurgy. **4 M**
