

(2 Hours)

[Total Marks : 60

- N.B. :** (1) Question No. 1 is compulsory.
 (2) Attempt **any three** from remaining **five** questions.
 (3) **Figures** to the **right** indicates **full** marks.
 (4) Atomic weights : H=1, C=12, N=14, O=16, S=32, Cl = 35.5, Ba= 137.3
 Mg =24, Na =23, Ca=40,

1. Answer **any five** from the following :-

15

- (a) Gold and platinum do not get corroded in atmospheric oxygen. Explain.
 (b) Define octane number of gasoline, Name any two anti-knock agents.
 (c) Give compositions, properties and uses of Duralumin.
 (d) Give classifications of composite material.
 (e) What is green chemistry? List the six principles of green chemistry.
 (f) A coal sample was subjected to ultimate analysis. 2.45 g of coal on combustion in a Bomb-Colorimeter gave 0.673g of BaSO₄. Calculate percentage of sulphur.

2. (a) How do the following factors affect the rate of corrosion?

6

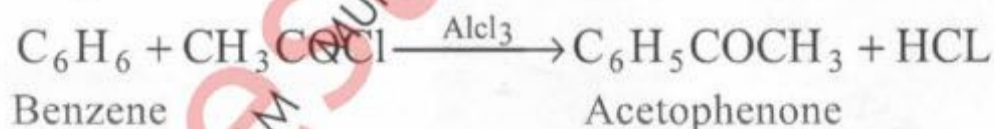
- (i) Position of metal in galvanic series.
 (ii) pH of medium
 (iii) Relative areas of anodic and cathodic parts.

(b) What is Biodiesel? Explain method to obtain biodiesel from vegetable oil. What are the advantages of biodiesel.

5

(c) Calculate percentage atom economy for the following reactions with respect to Acetophenone.

4



3. (a) A Gaseous fuel has the following compositions by volume :-

6

H₂ = 25%, CO = 20%, CH₄ = 30% C₃H₈ = 20%
 O₂ = 2% N₂ = 1%, CO₂ = 2% .

Calculate volume and weighted of air required for complete combustion of 1m³ of fuel (molut of air = 28.949)

(b) Explain conventional and greener route of synthesis of Adipic Acid. Highlight the green chemistry principle involved.

5

Discuss Differential Aeration corrosion with a suitable examples.

4

4. (a) What is powder -metallurgy? List the various steps involved in powder metallurgy mention the aim of each step. 6
- (b) What is cathodic protection? Describe impressed current method of corrosion control. 5
- (c) Discuss the influence of any two chemical factors on adhesion action. 4
5. (a) What is cracking? Explain in detailed fixed bed catalytic cracking with suitable diagram. 6
- (b) What is an alloy? Explain any four purposes of alloying with suitable examples. 5
- (c) Write a note on ' Sandwich panel' type layered composites. 4
6. (a) What are metallic coatings? Distinguish between galvanizing and Tinning. 5
- (b) Calculate the weight and volume of air needed for complete combustion of 2 kg of coal containing :- 5
 $C=54\%$, $H=6.5\%$, $O=3\%$, $N=1.8\%$
 mol. wt of air = 28.949).
- (c) Write a note on following :- 5
- (i) Compacting (ii) Sintering