

Con. 3148-11.

RK-1134

(2 Hours)

[Total Marks : 75

- N.B. :** (1) Question No. 1 is **compulsory**.  
(2) Attempt any **four** questions from remaining **six** questions.  
(3) **Figures** to the **right** indicate **full** marks.  
(4) Atomic weights :- C - 12, H - 1, O - 16, S - 32, N - 14, Cl - 35.5, Ba - 137.3.

1. Solve any **five** from the following :- 15
- (a) Why silver, gold and platinum do not undergo oxidation corrosion ?
  - (b) Give composition and uses of Duralumin.
  - (c) Define fuels ? Classify fuels with suitable example.
  - (d) What are the characteristic properties of composite materials ?
  - (e) Explain the prevention of waste principle in green chemistry with suitable example.
  - (f) Give important properties of pillared clay.
2. (a) What is cracking ? Describe the manufacture of gasoline by fixed-bed catalytic cracking. What are its advantages ? 5
- (b) Calculate the mass of Hydrogen evolved by passing a current of 0.5 ampere for 40 minutes through acidified water. 5
- (c) What are ceramic powder ? Explain the manufacture of aluminium oxide ceramic powder. 5
3. (a) What are the necessary conditions for electrochemical corrosion ? Give the mechanism of electrochemical corrosion in acidic medium with diagram and electrode reaction. 5
- (b) A sample of coal has the following composition by mass. 5  
C = 85%, H = 6% , O = 8%  
S = 0.5% and Ash = 0.5%  
Calculate the H.C.V. and L.C.V. using Dulong's formula.
- (c) Give conventional and green chemistry route of production of Indigo and express the green chemistry principle addressed in this case. 5
4. (a) What are structural composites ? Give their types and applications. 5
- (b) Calculate the Weight and Volume of air needed for complete combustion of 1 kg of coal containing. 5  
C = 65%, H = 4% , O = 7% , N = 3.0%  
Moisture = 15% and remaining is Ash.  
(Molecular weight of air = 28.949 g)
- (c) Explain Adsorption theory and how it explains - 5
- (i) Efficiency of Catalyst
  - (ii) Selectivity of a Catalyst
  - (iii) Specificity of a Catalyst.

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5. (a) Write a notes on any **two** of the following factors influence the corrosion rate – 5  
 (i) Passivity (ii) Cathodic protection (iii) Effect of pH.
- (b) 1.95 g of a coal sample was taken for Nitrogen estimation by Kjeldahl method. 5  
 The ammonia liberated required 9.5 ml of 0.4 N  $\text{H}_2\text{SO}_4$  for neutralization. The  
 same sample of coal weighing 1.5 g in a Bomb's calorimeter experiment  
 produced 0.35 g of  $\text{BaSO}_4$ . Calculate the percentage of N and S.
- (c) Define an alloy. What is the purpose of making alloys ? Explain with examples. 5
6. (a) What is knocking ? What are antiknocking agents ? 5  
 (b) Write a informative notes on – 6  
 (i) Atomization (ii) Compacting.
- (c) Calculate the Percent atom economy for the following reactions – 4  
 (i)  $\text{CH}_3\text{CH}=\text{CH}_2 + \text{H}_2 \xrightarrow{\text{Ni}} \text{CH}_3\text{CH}_2\text{CH}_3$ .  
 (ii)  $\text{C}_6\text{H}_6 + \text{CH}_3\text{Cl} \xrightarrow{\text{AlCl}_3} \text{C}_6\text{H}_5\text{CH}_3 + \text{HCl}$ .
7. (a) What is Catalysis ? Give the various types with examples. 5  
 (b) 2.5 of air dried coal sample was taken in a silica crucible, after heating it in 5  
 an electric oven at  $105^\circ\text{--}110^\circ\text{C}$  for 1 hour, the residue was weighed 2.410g,  
 The residue was heated in a silica crucible covered with vented lid at a temperature  
 $950 \pm 20^\circ\text{C}$  for exactly 7 minutes. After cooling the weight of residue was found  
 to be 1.78g. The residue was then ignited at  $750^\circ\text{C}$  to a constant weight of  
 0.246g. Calculate the percentage of fixed carbon in a coal sample.
- (c) Distinguish between brass and bronze. 5