QP Code : 28551

(2 Hours) [Total Marks : 75

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions out of the remaining **six**.
(3) **Figures** to the **right** indicate **full** marks.
(4) Atomic weights : C = 12, H = 1, N = 14, O = 16, Na = 23, Mg = 24, S = 32, Cl = 35.5, Ca = 40, Ba = 137.5.

1. Answer any **five** from the following :- 15
   (a) A coal sample was subjected to ultimate analysis, 0.4gm of coal on combustion in a Bomb carlorimeter produces 0.03 gm $BaSO_4$. Calculate the percentage of sulphur in coal sample.
   (b) Write a short note on super critical CO_2 as a green solvent.
   (c) Write the difference between galvanizing and tinning.
   (d) Write the classification of composite materials.
   (e) Write a short note on zeolite as a catalyst.
   (f) Write the composition, properties and uses of Duralumin.

2. (a) What is cracking ? Explain fluid bed catalytic cracking with the help of neat diagram. 6
   (b) Define corrosion. Explain stress corrosion with appropriate diagram and example. 5
   (c) Calculate the percentage atom economy of the following reaction with respect to allyl chloride. 4

$$CH_3-CH=CH_2 + Cl_2 \longrightarrow Cl-CH_2-CH=CH_2 + HCl$$
Allyl chloride
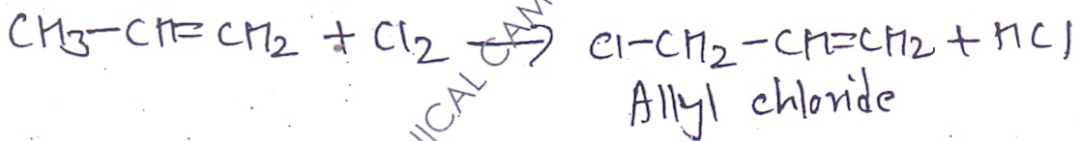
3. (a) Calculate the weight and volume of air required for complete combustion of 1 kg of coal containing :- C = 62%, H = 4%, O = 6%, N = 2% and remaining being ash. (Mol. wt. of air = 28.949) 6
   (b) Explain particles reinforced composite materials. 5
   (c) How these factors influence the rate of corrosion. 4
       (i) Overvoltage   (ii) pH of the medium.

4. (a) What is catalysis ? Explain the adsorption theory of catalysis. 6
   (b) Explain the sacrificial anodic protection method of corrosion control 5
   (c) Write the manufacture and properties of Al_2O_3 ceremics. 4

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5. (a) Explain the production of adipic acid with conventional and green route.   6
   (b) A sample of coal has the following composition by mass C = 78%, H = 5%,   5
       O = 9%, S = 0.6% and remaining being nitrogen. Calculate H.C.V. and L.C.V.
       of coal using Dulong's formula.
   (c) Explain the powder injection moulding method for compacting in powder
       metallurgy.

6. (a) Write the contituents of paint with examples and explain their functions.   6
   (b) Write any five purposes of making alloys.   5
   (c) What is knocking ? Explain the reason of petrol knocking.   4

7. (a) Write the transestrification reation of production of bio-diesel. What are the   6
       advantages of bio-diesel.
   (b) Define and explain activation energy.   5
   (c) Give the functions of matrix phase in composite material with their properties.   4

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