

**(REVISED COURSE)**Q.P. Code : **1049**

(2 Hours)

[ Total Marks : 60

- N.B. : (1) Question No. 1 is Compulsory.  
 (2) Attempt any **three** from remaining six questions  
 (3) All **questions** carry **equal** marks.  
 (4) Figures to the right indicate full marks.  
 (5) Atomic weights : H=1, C=12, S=32, N=14, O=16, Cl=35.5, Ba=137.3, Na=23, Mg=24.

1. Answer any **five** from the following :- 15
- (a) What are propellants ? State important characteristics of good propellant.  
 (b) Compare Galvanizing and Tinning.  
 (c) Give composition, properties and uses of Wood's Metal.  
 (d) Write a note on 'Green Reagent'.  
 (e) Define terms :-  
 (i) Composite material (ii) Matrix phase (iii) Dispersed phase.  
 (f) List three main constituents of Varnish & give functions of each.  
 (g) A coal sample was subjected to ultimate analysis :  
 1.6 gm of coal on combustion in a Bomb calorimeter gave 0.47 gm of BaSO<sub>4</sub>  
 Calculate % of sulphur in the coal sample.
2. (a) What is dry corrosion ? Explain with example how nature of oxidised product affect the rate of corrosion. 6  
 (b) What is cracking ? Explain fixed bed catalytic cracking with diagram. 5  
 (c) Calculate percentage atom economy for the following reaction w.r. to methyl iso-cyanate 4  

$$\text{CH}_3\text{NH}_2 + \text{COCl}_2 \rightarrow \text{CH}_3\text{-N=C=O} + 2\text{HCl}$$
 methyl iso cyanate.
3. (a) A gaseous fuel has the following composition by volume. 6  
 $\text{CH}_4 = 35\%$ ,  $\text{C}_2\text{H}_4 = 5\%$ ,  $\text{CO} = 15\%$ ,  $\text{H}_2 = 40\%$ ,  $\text{N}_2 = 1\%$ , water vapour = 4%  
 Calculate volume & weight of air required for complete combustion of 1m<sup>3</sup> of fuel  
 [mol.wt of air = 28.94]  
 (b) Explain conventional & green synthesis of adipic acid. Mention the green chemistry principle involved. 5  
 (c) How the rate of corrosion influenced by following factors. 4  
 (i) PH of medium (ii) Over voltage.
4. (a) What is powder Metallurgy ? How are metal powders prepared using. 6  
 (i) Atomization (ii) Chemical reduction  
 (b) What is cathodic protection ? Explain Impressed current method of corrosion control. 5

TURN OVER

- (c) Write a note on 'Sandwich panel' type layered composites. 4
5. (a) What is Bio-diesel ? Explain the trans esterification method for its synthesis. 6  
Mention advantages of biodiesel as fuel.
- (b) What are alloys ? Explain any four purposes of making alloys with suitable example. 5
- (c) Discuss the physical factors influencing adhesive action. 4
6. (a) Write a note on differential aeration corrosion. 5
- (b) 2.5 gm of air dried coal sample was taken in a silica crucible , after heating it in an electric oven at  $110^{\circ}\text{C}$  for 1hr the residue was weighed 2.41 gm. The residue was heated in Silica crucible covered with vented lid at a temperature  $925 \pm 25^{\circ}\text{C}$  for exactly 7 minutes. After cooling the weight of residue was found to contain 1.98 gm. The residue was then ignited to a constant weight of 0.246 gm. Report the results of above analysis. 5
- (c) Explain the effects of following elements on alloying :- 5
- (i) Nickel
  - (ii) Chromium
  - (iii) Cobalt
  - (iv) Molybdenum
  - (v) Carbon.
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