

(Time: 2 Hours)

[Marks:60]

N.B. 1) Question No1 is compulsory.

2) Attempt any three questions from remaining five questions.

3) Figures to the right indicate full marks.

4) Atomic wt: Al=27,Ca=40,S=32,Cl=35.5,Fe=56,K=39,C=12,N=14,O=16,Na=23,Mg=24

Q1) Attempt any five of the following

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- Define Fuel. Why a good fuel must have low ash content?
- Name the different methods of applications of metallic coatings. Explain metal cladding.
- A sample of coal contains C=66%,O=28%,H=4%,S=1.5%,N=0.8% and ash=0.2%. Calculate the G.C.V and N.C.V of the coal.
- Give the composition, properties and uses of Gun metal .
- Explain ‘ Design for Energy Efficiency’ principle of Green Chemistry.
- Give the functions of matrix phase.
- State the characteristics of a good paint.

Q2) (a) With a suitable diagram explain electrochemical mechanism of rusting of iron in neutral aqueous medium. 06

(b) (i) 0.5gm of coal sample was burnt in Bomb Calorimeter experiment produced 0.06gm of BaSO<sub>4</sub> .Calculate percentage of Sulphur. 03

(ii) What are Green solvents? Give two industrial applications of Green solvents. 02

(c) Write a short note on ‘Sandwich Panel’ .Mention their applications. 04

Q3) (a) What is Cracking. With the help of diagram explain Fixed Bed Catalytic cracking. 06

(b) (i) Differentiate between Brass and Bronze. 03

(ii) Define Stress corrosion with an example. 02

(c) Calculate the % atom economy of the following reaction w.r.t the product Allyl Chloride. 04



Allyl Chloride

- Q4) (a) How do the following factors affect the rate of corrosion: 06
- (i) Passive character of metal
  - (ii) pH of medium
  - (iii) Purity of metal
- (b) (i) What is Green Chemistry .Give its significance. 03
- (ii) Define the following: a) Matrix Phase b) Dispersed Phase 02
- (c) Write a short note on Shape memory alloy. 04
- Q5) (a) Calculate weight and volume of air required for complete combustion of  $1\text{m}^3$  of gaseous fuel which possess by volume ;  $\text{CH}_4= 35\%$ ,  $\text{C}_2\text{H}_4= 5\%$  ,  $\text{CO}=15\%$ ,  $\text{H}_2= 40\%$ ,  $\text{N}_2=1\%$ , 06  
 watervapour = 4%. (Molecular weight of air = 28.949)
- (b) (i) Explain Galvanic corrosion with a neat labeled diagram. 03
- (ii) What is meant by cracking of petroleum. 02
- (c) Explain conventional and Green route of manufacturing of Carbaryl. By this reaction which principle of Green Chemistry is shown. 04
- Q6) (a) What is Powder metallurgy? Explain Injection moulding method of compaction 06
- (b) (i) Explain characteristics of composite materials. 03
- (ii) Define Paint? Give any 2 functions of Thinners. 02
- (c) Explain the determination percentage of Moisture content in the coal sample. Give its significance. 04