

[Time: 02 Hours]

[Marks:60]

Please check whether you have got the right question paper.

- N.B:
- 1) Questions no.1 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.

Q.1 Attempt any five of the following

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- (a) Define power alcohol. Give any two advantages of power alcohol.
- (b) Explain why cathodic coating is preferred over anodic coating for manufacturing of containers to store food stuffs.
- (c) A sample of coal has the following composition:-

C = 70%, O = 23%, H = 5%, S = 1.5%, N = 0.4%, Ash = 0.1%,

calculate the G.C.V. of this fuel.

- (d) Give the composition, properties and uses of high phosphorus bronze.
- (e) Why is it essential to design safer chemicals and products w.r.t. green chemistry principle? Explain with an example.
- (f) What is the matrix phase and particle phase in concrete? Give any two properties of concrete.
- (g) Porous film is also called as 'Non protective film'. Explain with an example.

Q.2 (a) Define electrochemical corrosion. Explain Intergranular corrosion with a neat labelled diagram. 06

(b) i) 1.95 gm of a coal sample was taken for nitrogen estimation by Kjeldahis's method. The ammonia liberated required 9.5ml of 0.4 N H<sub>2</sub>SO<sub>4</sub> for neutralisation. Calculate the percentage of Nitrogen in coal sample. 03

ii) Write a note on Green solvents 02

(c) Explain the structural composition of plywood. 04

Q.3 (a) Define fuel cell. Explain Hydrogen Oxygen fuel cell with a neat labelled diagram. 06

(b) i) Define shape memory Alloy. Give its properties and uses. (Any two) 03

ii) Define Bio-Diesel and give its advantages. 02

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



TURN OVER

- Q.4 (a) What is cathodic protection? Explain impressed current cathodic protection with its applications. 06  
 (b) i) What is Green chemistry? Give its significance. 03  
 ii) Define composite. Give any two applications of composite material 02  
 (c) What is powder metallurgy? Explain hot compaction method with a neat labeled diagram. 04
- Q.5 (a) A gaseous fuel contains  $H_2 = 50\%$ ,  $CH_4 = 30\%$ ,  $N_2 = 2\%$ ,  $CO = 7\%$ ,  $C_2H_4 = 3\%$ ,  $C_2H_6 = 5\%$ , and watervapour=3%, Calculate weight and volume of air required for  $2m^3$  of the gas. [Given: Mol. Wt. of an air =28.949kg] 06  
 (b) i) List the three main constituents of paint and give functions of each. 03  
 ii) Explain the effect of the following alloying elements on steel. 02  
 a) Chromium b)Tungsten  
 (c) Explain conventional and Green chemistry route for production of Ibuprofen Highlight the green chemistry principle involved. 04
- Q.6 (a) Write short notes on:- 06  
 a)Computing b) Sintering  
 (b) i) What are Fiber Reinforced composite 03  
 ii) Explain how areas of anode and cathode effect the rate of corrosion 02  
 (c) Explain the determination of % moisture and % volatile matter in a coal sample. 04

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