Time: 1.30 Hours **Marks: 45**

N.B.
1. **Question number 1 is compulsory.**
2. **Attempt any two questions from Q.2 to Q.5.**
3. **Draw neat diagrams and write chemical equations wherever necessary.**
4. **Figures to right indicate full marks.**

1. Solve any Five.

(a) What are the characteristics of good fuel? 3

(b) Define corrosion, how you will join the metals to prevent corrosion, justify with diagram. 3

(c) Give the purposes of making of an alloy. 3

(d) Explain the term 'glass transition temperature' with significance. 3

(e) Define Matrix phase and dispersed phase with example. 3

(f) Write are the principles of Green Chemistry. 3

(g) 0.5 gm. of coal sample was burnt in Bomb calorimeter produced 0.06 gm. of $BaSO_4$. calculate percentage of sulphur 3

2 . (a) What is cathodic protection? How is it done by using impressed current and sacrificial anode? Explain with suitable examples. 6

(b) Explain with neat suitable diagram determination of Carbon and hydrogen. by ultimate analysis 5

(c) What do you mean by green solvent, explain it with suitable example. 4

3. (a) A Polymer has the following composition: 100 Molecules of molecular mass 1000, 200 molecules of molecular mass 2000 and 500 molecules of molecular mass 5000.Calculate the number and weight average of molecular weight and the polydispersity index. (PI) 6

(b) What is condensed phase rule equation? Explain its application with the help of phase diagram to two component lead-silver system. 5

(c) Explain Laminar and sandwich panel of structural composite. 4

4. (a) Explain following properties of polymer a) Electrical b) Optical. 6

(b) Explain synthesis of Indigo dye by traditional way and by green pathway. 5

(c) A sample of coal has the following composition C = 80 %, O = 8%, H = 6 %, S = 1.5%, N = 1 %, Calculate the higher and lower calorific values of coal. 4

5. (a) Explain the effect of following factors on the rate of corrosion : 6

(1) Nature of corrosion product. (2) pH

(3) Anodic and cathodic areas (4) purity of metal

(b) Explain a) Fiber glass reinforced composite. 5
b) Carbon fiber reinforced composite.

(c) An alloy of tin and lead contain 73% tin. Find the mass of eutectic in 1kg of solid Alloy, if the eutectic contains 64% of tin. 4
