

[Time: 2Hours]

[Marks:60]

Please check whether you have got the right question paper.

- N.B.:** (1) Question no. I is compulsory.
 (2) Attempt any three questions from Q. 2 to Q. 6.
 (3) All questions carry equal marks.
 (4) Figures to the right indicate full marks.
 (5) Atomic weights: H= 1, C =12, O =16, S =32, N =14, Cl = 35.5, Ba =137.3.

1. Answer any five: 15
- Platinum does not undergo oxidation corrosion. Give reason.
 - Write a note on 'Green Solvents'
 - What is biodiesel? Write transesterification reaction.
 - What are the constituents of composites? Give functions of matrix phase.
 - Give composition, properties and uses of Wood's metal.
 - What is stress corrosion? Explain with the help of example.
 - 2.48 gm of coal sample was subjected to Kjeldahl's method and liberated ammonia required 16.5 ml $\frac{1}{2}$ N H_2SO_4 . Calculate the amount of nitrogen.
2. a) What are the conditions for electrochemical corrosion? With the help of diagram and reactions, explain the mechanism of electrochemical corrosion of iron in neutral medium. 6
- b) Explain fixed bed catalytic cracking with the help of neat and labelled diagram. 5
- c) Calculate the atom economy of toluene with respect to the following reaction: 4
- $$C_6H_6 + CH_3Cl \xrightarrow{AlCl_3} C_6H_5CH_3 + HCl$$
3. a) The percentage composition of a sample of coal was found to be: C = 86%, H= 8%, N= 1%, S = 1.5%, moisture = 1.5%, and the remaining Carbon dioxide. Calculate the minimum weight and volume of air at STP required for complete combustion of 10 kg of coal. 6
- b) Give the conventional and alternate routes of synthesis of Carbaryl and explain the principle of green chemistry involved in it. 5
- c) Explain the following factors affecting rate of corrosion: - 4
- Area of cathode and anode
 - position of metal in galvanic series
4. a) What are shape memory alloys? Explain with the help of example. Give their properties and applications. 6
- b) Explain the impressed current method used for protecting the series of underground pipes with the help of diagrams 5

- c) Give an account of sandwich panels with the help of diagram 4
5. a) What is refining of petroleum? What are the steps involved in it? Explain with the help of neat and labelled diagram. 6
- b) Give classification of plain carbon steels. What is the function of Carbon in steel? 5
- c) Describe the process of hot compaction with the help of neat and labelled diagram. 4
6. a) i) Define paint and list the constituents of paint. 2
- ii) Distinguish between anodic and cathodic coating. 4
- b) A gaseous fuel has following composition: $H_2 = 8\%$, $C_2H_2 = 39\%$, $C_4H_{10} = 18\%$, $O_2 = 4\%$, $CO = 12\%$, $H_2O = 5\%$, $C_2H_4 = 9\%$ and rest is ash. Calculate the volume and weight of air required for the complete combustion of $1m^3$ gas. 5
- c) What is powder metallurgy? Explain the process of atomization with the help of neat and labelled diagram. 4
