

[Time: 2 Hours]

[Marks: 60]

Please check whether you have got the right question paper.

- N.B:
1. Question No.1 is Compulsory.
 2. Attempt any **three** questions from remaining **five** questions.
 3. Figures to the right indicate Full marks.
 4. All questions carry equal marks.
 5. Atomic weights: - H=1, C=12, N=14, O=16, S=32, Cl=35.5, Ba=137.3, Ca=40. Mg=24, Na=23.

1. Answer any five from the following:-

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- a) Distinguish between anodic and cathodic coatings for corrosion prevention.
- b) What are Fuels? Give its classification.
- c) Give Composition, Properties and Uses of **magnalumin**.
- d) What are composite materials? Mention its applications.
- e) Explain the green chemistry principal 'Accident prevention'.
- f) Explain with example, how the nature of volatile oxide film formed on the surface of metal influences the rate of corrosion.
- g) 1.5 g of the same coal sample in a Bomb-calorimeter experiment gave 0.36 g BaSO₄. Calculate percentage of S in the coal sample.

2. a) Explain the mechanism of following types of corrosion:-

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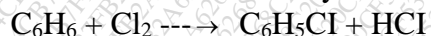
- i) Galvanic corrosion
- ii) Waterline corrosion

b) Define cracking of hydrocarbons. Explain fixed bed catalytic cracking.

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c) Calculate % Atom Economy for the following reaction

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3. a) A fuel sample has the following composition: C₂H₄ = 38%, C₂H₆ = 14%, CO = 7%, water vapour = 2.0% and rest is nitrogen. Calculate the volume of oxygen and air required for complete combustion of 5m³ of fuel.

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b) Explain Conventional and Greener route for synthesis of Adipic acid. Mention the green Chemistry principle involved.

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c) How do the following factors related to nature of environment affect corrosion?

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- i) Relative area of anode and cathode
- ii) Temperature

4. a) What are nonferrous alloys? Distinguish between brass and bronze.

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b) What is the principle of cathodic protection? Explain impressed current protection method.

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c) Write a note on sandwich panel composites.

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Turn Over

5. a) What is Biodiesel? Give 'Trans-esterification', reaction to obtain Biodiesel from vegetable oils. Mention its advantages. **06**
- b) What is powder metallurgy? Explain Mechanical Pulverisation and Atomization methods for manufacturing metal powders. **05**
- c) What are the important properties of composite materials? **04**
6. a) Mention methods for applying metal coatings on the metals? Give brief account of Metal cladding **05**
- b) A coal sample contains, C=82%, O=6%, H= 4%, S =1.5%, N =1 % and Ash= 5.5%. Calculate the GCV and NCV of given coal sample. **05**
- c) Discuss the various steps involved in powder metallurgy and mention its application. **05**
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