

Con. 5731–13.

(REVISED COURSE)

GX–10141

(2 Hours)

[Total Marks : 60

- N.B. :** (1) Question No. 1 is **compulsory**.
 (2) Attempt any **three** questions from remaining **five** questions.
 (3) **All** questions carry **equal** marks.
 (4) **Atomic Weights** : H = 1, C = 12, N = 14, O = 16, S = 32, Cl = 35.5, Ba = 137.3.

1. Answer any **five** of the following :– 15
- Define Octane number of gasoline, Name any two anti-knock agents.
 - Why is galvanization of iron articles preferred to tinning ?
 - Give composition, properties and uses of Wood's metal.
 - Explain 'prevention of waste' principle in Green Chemistry.
 - Define 'matrix phase' of composite material. State functions of matrix phase.
 - State characteristics of a good paint.
 - A coal sample was subjected to ultimate analysis. 1.5g of coal on combustion in a Bomb calorimeter gave 0.42g of BaSO₄. Calculate percentage sulphur in the coal sample.
2. (a) How do the following factors affect the rate of corrosion ? 6
- Relative areas of anodic and cathodic parts.
 - Passive character of metal.
 - pH of medium.
- (b) What is Biodiesel ? Give 'Trans-esterification reaction in preparation of Biodiesel from vegetable oils. What are the advantages of Biodiesel ? 5
- (c) Calculate percentage atom economy for the following reaction with respect to acetophenone :– 4
- $$\text{C}_6\text{H}_6 + \text{CH}_3\text{COCl} \xrightarrow{\text{AlCl}_3} \text{C}_6\text{H}_5\text{COCH}_3 + \text{HCl}$$
- benzene acetophenone
3. (a) A gaseous fuel has the following composition by volume :– 6
- H₂ = 50%, CO = 10%, CH₄ = 30%, C₂H₄ = 5%, N₂ = 1%, O₂ = 2% and CO₂ = 2%.
- Calculate volume and weight of air required for complete combustion of 1 m³ of fuel. (Mol. wt. of air = 28.949).
- (b) Explain conventional and green chemistry route of production of adipic acid. 5
 Highlight the green chemistry principle involved.
- (c) Discuss differential aeration corrosion with the help of a suitable example. 4

[TURN OVER

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4. (a) What are alloy steels ? Explain special effects of the following metals on properties of alloy steels :- **6**
- (i) Chromium
 - (ii) Nickel
 - (iii) Cobalt
 - (iv) Tungsten.
- (b) What is the principle of cathodic protection method of corrosion control ? Discuss any *one* method of corrosion control by cathodic protection. **5**
- (c) Write a note on 'sandwich panel' type layered composites. **4**
5. (a) What is cracking ? With a schematic diagram, explain any *one* method of catalytic cracking. **6**
- (b) What is powder metallurgy ? How are metal powders prepared ? **5**
- (c) Discuss the influence of *any two* physical factors on adhesive action. **4**
6. (a) What is 'oxidation corrosion' ? Discuss the role of nature of oxide formed in oxidation corrosion. **5**
- (b) A sample of coal has the following composition by weight :- **5**
C = 82%, H = 6%, O = 8%, S = 0.5%, N = 3% and Ash = 0.5%. Calculate the Gross and Net Calorific value using Dulong's formula.
- (c) What is an alloy ? Explain any four purposes of alloying with suitable examples. **5**
