

30/11/2023

Q.P. Code :13125

[Time: Two 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 out of remaining five.
 3. Figures to the right indicate full marks.
 4. Atomic weights:- C=12, S=32, N=14, H=1, O=16, Cl=35.5

1. Answer any five from the following 15
 - a) Select the compound which possesses highest octane number and highest cetane number out of n-heptane, n-octane and isooctane.
 - b) Iron does not rust even if the zinc coating is broken in a galvanized iron pipe. Give reasons.
 - c) Calculate the higher and lower calorific values of coal sample containing 84% carbon, 1.5% sulphur, 0.6 Nitrogen, 5.5% hydrogen and 8.4% oxygen.
 - d) What are the drawbacks of plain carbon steel.
 - e) Explain the principle 'Prevention of waste' in Green Chemistry.
 - f) Define and classify composite materials.
 - g) Mention three functions of thinner in paint.
2.
 - a) Define corrosion of metals. Explain the electrochemical theory of wet corrosion, giving its mechanism. 6
 - b) i) 1.56 g of a coal sample was kjeldahlised and NH₃ gas thus evolved was absorbed in 50ml of 0.1N H₂SO₄. After absorption the excess (residual) acid required 6.25 mL of 0.1N NaOH for exact neutralization. Calculate the percentage of N in the coal sample. 3
ii) What is super critical CO₂? Why is it considered a green solvent 2
 - c) Write a short note on Particle reinforced composites. 4
3.
 - a) What is cracking? Explain in detail -fixed bed catalytic cracking. 6
 - b) i) Write a brief note on Heat resistant steel 3
ii) A metal rod half immersed in water starts corroding at the bottom. Give reasons. 2
 - c) Calculate the percentage atom economy for the following reaction with respect to allyl chloride. 4
$$\text{CH}_3\text{-CH=CH}_2 + \text{Cl}_2 \rightarrow \text{Cl-CH}_2\text{-CH=CH}_2 + \text{HCl}$$

Allylchloride.
4.
 - a) Explain how the following factors affect the rate of corrosion 6
 - i) pH
 - ii) Ratio of anode to cathode areas
 - iii) Position of metal in galvanic series.

- b) i) Write a brief note on products obtained from natural materials
 ii) Define structural composites. 3
2
- c) Define Shape memory Alloys and mention its applications (at least four) 4
5. a) A sample of coal was found to contain the following constituents. C=81%; O=8% S=1%; H=5%, N=1% and Ash=4%
 Calculate the minimum weight and volume of air required for the complete combustion of 1kg of coal. 6
- b) i) Discuss in brief sacrificial anode method of corrosion protection. 3
 ii) What is powder metallurgy? Mention any two advantages and two limitations of powder metallurgy. 2
- c) Explain with suitable equations conventional and green synthesis of carbaryl. Also mention the principle of green chemistry involved. 4
6. a) Mention the composition, properties and uses of (Any two)
 i) Duralumin
 ii) German silver
 iii) Gun metal 6
- b) i) Mention the advantages of composite materials 3
 ii) Distinguish between anodic and cathodic coating 2
- c) What is biodiesel? Discuss the method to obtain biodiesel. What are the advantages of biodiesel? 4