

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 NH_3 gas thus evolved was absorbed in 50ml of 0.1N H_2SO_4 . 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 CO_2 ? 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.

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- b) i) Write a brief note on products obtained from natural materials **3**
ii) Define structural composites. **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% **6**
Calculate the minimum weight and volume of air required for the complete combustion of 1kg of coal.
- 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) **6**
i) Duralumin
ii) German silver
iii) Gun metal
- 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**
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