

**Q.P. Code :13126****[Time: Three Hours]****[ Marks:80]**

Please check whether you have got the right question paper.

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

- Q.1.** Answer any five of the following: **15**
- a. Gold does not get corroded due to oxidation. Why?
  - b. Give the composition, properties and uses of Duralumin.
  - c. Define octane number and cetane number.
  - d. Give classification of composite materials.
  - e. List any six principles of green chemistry.
  - f. Explain the advantages of galvanizing over tinning.
  - g. A coal sample contains C=70%, O=23% H=5%, N = 0.4% Ash = 0.1% Calculate GCV and NC V of the fuel.
- Q.2.**
- a. Explain the following factors affecting the rate of corrosion. **6**
    - i) Relative areas of anode and cathode
    - ii) pH of medium
    - iii) Purity of metal
  - b. i) 0.5 gm of coal sample was burnt in Bomb Calorimeter experiment produced 0.06 gm of BaSO<sub>4</sub>. **3**  
Calculate percentage of sulphur.
  - ii) What is supercritical CO<sub>2</sub>? Give one application of it. **2**
  - c. Write a note on sandwich panel type layered composites. **4**
- Q.3.**
- a. With neat and labelled diagram explain fixed bed catalytic cracking. **6**
  - b. i) Write a note on atomization. **3**
  - ii) What is pigment? Give its two functions. **2**
  - c. Calculate the percentage atom economy for the following reaction. **4**  
 $\text{CH}_3\text{NH}_2 + \text{COCl}_2 \rightarrow \text{CH}_3\text{N} = \text{C} = \text{O} + 2\text{HCl}$
- Q.4.**
- a. Explain with the help of diagram wet corrosion in neutral medium. **6**
  - b. i) Explain the green chemistry principle 'prevention of waste'. **3**
  - ii) Write a note on 'Matrix phase' of composite material **2**
  - c. Mention four drawbacks of plain carbon steel **4**
- Q.5.**
- a. Calculate weight of air needed for complete combustion of 2kg of coal containing C=70%, H=10%, O=10%, N=5% and remaining ash. **6**

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- b. i) Explain the method of impressed current cathodic protection. 3
- ii) Give two purposes of alloying. 2
- c. Explain conventional and green route of manufacturing of Adipic acid. 4

- Q.6.**
- a. What is compaction in powder metallurgy?  
Explain powder injection moulding method with suitable diagram. 6
  - b. i) Mention the characteristic properties of composite materials. 3
  - ii) Distinguish between anodic protection and cathodic protection. 2
  - c. Define fuel. Give the characteristics of good fuel. 4

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