**[Time: 2 Hours]** **[ Marks:60]**

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. Answer any three questions from remaining five questions.
4. Atomicweights:(Ca=40,Mg=24,Cl=35.5,S=32,H=1,C=12,O=16,Na=23,N=14,Al =27,Fe=56, Ba =137.3 )

**Q.1)** Answer any **five** from the following: - **[15 M]**

**a)** Differentiate between anodic and cathodic coatings.

**b)** What is the significance of proximate analysis of coal?

**c)** Give Composition, Properties and Uses of **Duralumin.**

**d)** Mention any four properties of composite materials.

**e)** State any six principles in green chemistry.

**f)** What are the main constituents of paints?

**g**) 2.5 g of the coal sample in a Bomb-calorimeter experiment gave 0.82g $BaSO_4$. Calculate percentage of S in the coal sample**.**

**Q.2] a)** Explain the mechanism of following types of corrosion:- **[06M]**
i) Pitting corrosion ii) Galvanic cell corrosion

**b)** Write informative note on Fixed bed catalytic cracking. **[05M]**

**c)** Calculate % Atom Economy for the following reaction **[04M]**

$$C_6H_5CHO + CH_3CHO \xrightarrow{NaoH} C_6H_5CH{=}CHCHO + H_2O$$

**Q.3] a)**) A fuel sample has the following composition: $H_2$=15%, $CH_4$ =25%, $C_2H_4$ = 30%, CO = 15%, $CO_2$ = 3%, and remaining nitrogen. Calculate the volume of oxygen and air required for complete combustion of 5 $m^3$ of fuel. **[06M]**

**b)** Explain Conventional and Greener route for synthesis of Indigo dye. Mention the green Chemistry principle involved**.** **[05M]**

**c)** Discuss the following factors influencing the rate of corrosion:

i) Nature of oxide film ii) Moisture **[04M]**

**Q.4] a)** What are alloys? Explain the purpose of making alloys. **[06M]**

**b**) What is the principle of cathodic protection? Explain any one protection method. **[05M]**

**c)** Write note on 'Particle reinforced composites' **[04M]**

**Q.5]** Write informative note on Biodiesel. **[06M]**

**b)** What is powder metallurgy? Explain hot compaction method. **[05M]**

**c)** Write a note on dispersed phase of composite materials. **[04M]**

**Q.6] a)** Define corrosion. Explain the mechanism of electrochemical corrosion in acids. **[05M]**

**b)** A coal sample contains, C=70%, O=23%, H= 5%,N=0.4 and remaining Ash. Calculate the GCV and NCV of given coal sample. **[05M]**

**c)** Write a note on:- **[05M]**

i) powder injection moulding ii) Sintering

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