

**N.B.**

1. Question No.1 is compulsory
2. Attempt any Three Questions from the remaining Five Questions
3. Figures to the right indicate full marks
4. Atomic weight: C = 12, H = 1, O = 16, N = 14, S = 32, Cl = 35.5

**Q.1 Answer any five from the following:****15**

- a. Write a note on Galvanic corrosion.
- b. Define knocking. Give its disadvantages.
- c. Give the difference between fluorescence and phosphorescence.
- d. Explain in brief electrolytic cell with example.
- e. What is Green chemistry? Give its significance.
- f. Explain absorption spectrum in brief with diagram.
- g. 1.4 g coal sample was kjeldahlised. Blank titration required 25 ml of 0.1 N NaOH solution. After absorption of liberated ammonia in 0.1N of sulphuric acid solution, back titration required 5 ml of 0.1N NaOH solution. Calculate percentage of nitrogen.

**Q.2 a)** Explain by which mechanism does rusting of iron takes place in acidic medium with the help of reactions and diagram. **6**

b) Explain trans-esterification method for preparation of biodiesel from vegetable oil with reaction and give its advantages. **5**

c) Write the cell reactions and calculate the standard emf of the following cell: **4**

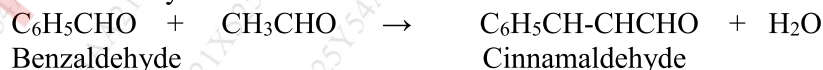


$$\text{Given: } E_{\text{Zn}}^{\circ} = -0.763 \text{ V and } E_{\text{Cu}}^{\circ} = 0.337 \text{ V.}$$

**Q.3 a)** What is Flame photometry? Explain it with respect to principle, working, diagram and applications. **6**

b) Give construction and working of any one reference electrode with the help of diagram and reactions. **5**

c) Calculate %atom economy for the following reaction with respect to cinnamaldehyde: **4**



- Q.4** a) Calculate the volume and weight of air required for complete combustion of  $1\text{m}^3$  of gaseous fuel having the following composition:  $\text{H}_2 = 35\%$ ,  $\text{C}_2\text{H}_6 = 25\%$ ,  $\text{CH}_4 = 35\%$ ,  $\text{N}_2 = 2\%$ ,  $\text{CO}_2 = 1\%$ ,  $\text{O}_2 = 2.0\%$  (Molecular weight of air = 28.949). 6
- b) Explain the conventional and greener pathway for the synthesis of Indigo. 5  
Mention the principle associated with this synthesis.
- c) Explain any two selection rules in spectroscopy. 4
- Q.5** a) Explain the mechanism of 'Rusting of iron in water' with the help of diagram and reactions. 6
- b) Determine %C & %H from the following observations in experiments of analysis of coal. 2.5g coal on burning in a combustion tube and passing the gases through tubes containing anhydrous  $\text{CaCl}_2$  and  $\text{KOH}$ , increases their weight by 1.2 g and 8.5g respectively. 5
- c) Draw a well labelled Jablonski diagram. 4
- Q.6** a) Explain sacrificial anode cathodic protection method of metal from corrosion with its principle, suitable diagram and applications. 6
- b) A sample of coal was found to contain C = 77%, H = 5%, S = 3%, O = 1%, N = 2%, Ash = 12%. Calculate HCV and LCV using Dulong's Formula. 5
- c) Draw a well labelled diagram of electromagnetic spectrum showing various regions. 4

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