F.E. Sem II (CBGS) 1/12/15.

App. Chemistry — II

Q.P. Code : **5816**

(2 Hours) [Total Marks : 60

N.B. : (1) Question No. 1 is **compulsory.**
(2) Attempt any **three** questions out of the remaining five questions.
(3) **All** questions carry **equal** marks.
(4) **Figures** to the **right** indicate **full** marks.
(5) Atomic weights : H = 1, C = 12, N = 14, O = 16, S – 32, Cl = 35.5

1. Answer any **five** of the following :- **15**
   (a) What is 'Oxidation corrosion' ? Why do gold and platinum metal not get corroded in atmospheric oxygen ?
   (b) Give composition, properties and uses of German silver.
   (c) What is 'cracking' of heavy oil ? Mention any four advantages of catalytic cracking over thermal cracking.
   (d) Explain 'prevention of waste' principle in Green Chemistry.
   (e) What are composite materials ? Mention any four characteristics of composite materials.
   (f) What is metal cladding ? How is 'alclad' obtained ?
   (g) 1.5g of a coal sample was burnt in a combustion apparatus and the products of combustion were collected in previously weighed KOH bulb and $CaCl_2$ tube. The increase in weights of KOH bulb and $CaCl_2$ tube were found to be 3.92g and 1.25g respectively. Calculate percentage carbon and hydrogen in the sample.

2. (a) How do the following factors affect the rate of corrosion ? **6**
   (i) Relative areas of anodic and cathodic parts
   (ii) Purity of metal
   (iii) pH of medium
   (b) What is meant by 'Knocking' in internal combustion engine ? Define Octane number. Name any two anti-knock agents. **5**
   (c) Calculate percentage atom economy for the following reaction with respect to cinnamaldehyde. **4**

$$\underset{\text{benzaldehyde}}{C_6H_5CHO} + \underset{\text{acetaldehyde}}{CH_3CHO} \xrightarrow{NaOH} \underset{\text{cinnamaldehyde}}{C_6H_5CH=CHCHO} + H_2O$$

3. (a) A gaseous fuel has the follwing composition by volume. **6**
   $CO = 46\%$ $H_2 = 30\%$ $CH_4 = 10\%$
   $C_2H_4 = 4\%$ $N_2 = 1\%$ $CO_2 = 2\%$ and $O_2 = 7\%$

   Calculate volume and weight of air required for complete combustion of $1m^3$ of fuel (Mol. wt. of air = 28.949)

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(b) Explain conventional and greener route of production of Indigo dye. Highlight the green chemistry principle involved. 5

(c) Explain Galvanic corrosion with the help of a suitable example and diagram. 4

4. (a) What is power metallurgy ? List various steps involved in powder metallurgy. Mention the aim of each step. 6

(b) With the help of a diagram and electrode reactions, explain mechanism of electrochemical corrosion of iron by hydrogen evolution, in acidic medium. 5

(c) Explain 'sandwich panel' type layered structural composites, with a suitable diagram. Mention their application. 4

5. (a) With a suitable diagram, explain process of refining of petroleum. Name any two fractions obtained. 6

(b) How are plain carbon steels classified based on carbon content ? What are the drawbacks of plain carbon steels ? 5

(c) Discuss influence of any two chemical factors on adhesive action. 4

6. (a) Define 'Paint'. Mention any four constituents of paint with their functions. 5

(b) A sample of coal has the following composition by mass : 5

C = 70%, H = 10%, O = 4%

S = 2% N = 2% and Ash = 12%

Calculate Gross and Net calorific value using Dulong's formula.

(c) Distinguish between Brass and Bronze. 5