FE | Sem - II CBGS. 27|5|2014
A.C II

Q P Code :NP-17774

(REVISED COURSE)

(2 Hours) **[Total Marks : 60**

N.B. : (1) Question **No. 1** is **compulsory.**
(2) **Attempt any three question from 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, Ba = 137.3

1. Answer any **five** of the following :—
   (a) Define Octane number of gasoline. How is knocking tendency of gasoline related to chemical structure of hydrocarbons present? **15**
   (b) What are metallic coatings? Distinguish between anodic and cathodic coating.
   (c) Give composition, properties and uses of Wood's metal.
   (d) Explain 'prevention of waste' principle in Green Chemistry.
   (e) Give classification of composite materials.
   (f) What is 'Oxidation corrosion'? Explain why pure aluminium metal exhibits good corrosion resistance in atmospheric oxygen.
   (g) A coal sample was subjected to ultimate analysis 1.5g of coal on combustion in a Bomb calorimeter gave 0.24g of $BaSO_4$. Calculate percentage sulphur in the coal sample.

2. (a) How do the following factors affect the rate of corrosion? **6**
   (i) Relative areas of anodic and cathodic parts.
   (ii) Position of metal in galvanic series.
   (iii) pH of medium
   (b) With a suitable diagram, explain process of refining of petroleum. **5**
   (c) Calculate percentage atom economy for the following reaction with respect to acetanilide. **4**

$$C_6H_5NH_2 + (CH_3CO)_2O \rightarrow C_6H_5NHCOCH_3 + CH_3COOH$$
aniline acetanilide

3. (a) A gaseous fuel has the following composition by volume. **6**
$H_2 = 55\%$, $CH_4 = 30\%$, $C_2H_4 = 5\%$ $CO = 5\%$, $N_2 = 1\%$, $CO_2 = 2\%$ and $O_2 = 2\%$.
Calculate volume and weight of air required for complete combustion of $1m^3$ of fuel. (Mol.wt. of air = 28.949)

(b) Explain conventional and green chemistry route of production of adipic acid. Highlight the green chemistry principle involved. **5**

(c) What is the principle of cathodic protection method of corrosion control? Explain the method of Impressed current cathodic protection. **4**

4. (a) What are the drawbakcs of plain carbon steels? Explain special effects of the following metals on properties of alloy steels: **6**
(i) Nickel (ii) Chromium (iii) Cobalt (iv) Tungsten

(b) With a suitable diagram and electrode reactions, explain electrochemical mechanism of rusting of iron in neutral, aqueous medium. **5**

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

5. (a) With a schematic diagram, explain Fixed Bed Catalytic Cracking. Mention any two advantages of catalytic cracking over thermal cracking. **6**

(b) List various steps involved in powder metallurgy. Mention the aim of each step. Give any two advantages of powder metallurgy. **5**

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

6. (a) Define 'Paint'. Mention any four constituents of paint and state functions of each constituent. **5**

(b) A sample of coal has the following composition by mass : C = 80%, H = 4%, O = 6%, S = 3%, N = 2% and Ash = 5%. Calculate Gross and Net Calorific value using Dulong's's formula. **5**

(c) What is an alloy? Explain any four purposes of alloying with suitable examples. **5**
