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**

Con. 5731–13. **(REVISED COURSE)** **GX–10141**

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

N.B. : (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions from remaining **five** questions.
(3) **All** questions carry **equal** marks.
(4) **Atomic Weights** : H = 1, C = 12, N = 14, O = 16, S = 32, Cl = 35·5, Ba = 137·3.

1. Answer any **five** of the following :– **15**
   (a) Define Octane number of gasoline, Name any two anti-knock agents.
   (b) Why is galvanization of iron articles preferred to tinning ?
   (c) Give composition, properties and uses of Wood's metal.
   (d) Explain 'prevention of waste' principle in Green Chemistry.
   (e) Define 'matrix phase' of composite material. State functions of matrix phase.
   (f) State characteristics of a good paint.
   (g) A coal sample was subjected to ultimate analysis. 1·5g of coal on combustion in a Bomb calorimeter gave 0·42g of $BaSO_4$. Calculate percentage sulphur in the coal sample.

2. (a) How do the following factors affect the rate of corrosion ? **6**
   (i) Retative areas of anodic and cathodic parts.
   (ii) Passive character of metal.
   (iii) pH of medium.
   (b) What is Biodiesel ? Give 'Trans-estinfication reaction in preparation of Biodiesel from vegetable oils. What are the advantages of Biodiesel ? **5**
   (c) Calculate percentage atom economy for the following reaction with respect to acetophenone :– **4**

$$\underset{\text{benzene}}{C_6H_6} + CH_3COCl \xrightarrow{AlCl_3} \underset{\text{acetophenone}}{C_6H_5COCH_3} + HCl$$

3. (a) A gaseous fuel has the following composition by volume :– **6**
   H_2 = 50%, CO = 10%, CH_4 = 30%, C_2H_4 = 5%, N_2 = 1%, O_2 = 2% and CO_2 = 2%.
   Calculate volume and weight of air required for complete combustion of 1 m^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) Discuss differential aeration corrosion with the help of a suitable example. **4**

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4. (a) What are alloy steels ? Explain special effects of the following metals on properties of alloy steels :– 6
   (i) Chromium
   (ii) Nickel
   (iii) Cobalt
   (iv) Tungsten.
   (b) What is the principle of cathodic protection method of corrosion control ? Discuss any *one* method of corrosion control by cathodic protection. 5
   (c) Write a note on 'sandwich panel' type layered composites. 4

5. (a) What is cracking ? With a schematic diagram, explain any *one* method of catalytic cracking. 6
   (b) What is powder metallurgy ? How are metal powders prepared ? 5
   (c) Discuss the influence of *any two* physical factors on adhesive action. 4

6. (a) What is 'oxidation corrosion' ? Discuss the role of nature of oxide formed in oxidation corrosion. 5
   (b) A sample of coal has the following composition by weight :– 5
   C = 82%, H = 6%, O = 8%, S = 0·5%, N = 3% and Ash = 0·5%. Calculate the Gross and Net Calorific value using Dulong's formula.
   (c) What is an alloy ? Explain any four purposes of alloying with suitable examples. 5

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A·C-II

28·949 → 10 mention.

Con. 6921–13. **(REVISED COURSE)** **GS–5481**

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

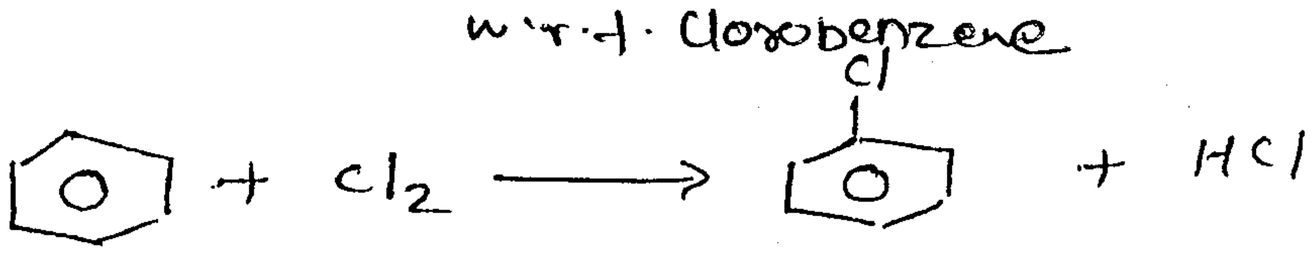
N.B. (1) Question No. **1** is **compulsory.**
(2) Attempt any **three** from remaining **five** questions.
(3) **All** questions **carries** equal marks.
(4) **Atomic weight :—**

H = 1,	**Cl = 35·5,**
C = 12,	**Ba = 137·3,**
N = 14,	**Mg = 24,**
O = 16,	**Na = 23,**
S = 32,	**Ca = 40**

1. Answer any **five** from the following :— **15**
   (a) Why silver, gold and platinum do not undergo oxidation corrosion ?
   (b) Define Octane number and Cetane number. Give their significance.
   (c) Give the composition, properties and uses of German silver.
   (d) Give classification of composite material.
   (e) What is Green chemistry ? List the 12 principles of Green chemistry.
   (f) State the characteristics of a good paints.
   (g) A coal sample was subjected to ultimate analysis, 0·6 gm of coal on combustion in a Bomb colorimeter, produces 0·05 gm $BaSO_4$. Calculate the percentage of 'S' in coal sample.

2. (a) What are metallic coatings ? Distinguish between Galvanizing and Tinning. **6**
   (b) Explain refining of petroleum with suitable diagram. **5**
   (c) Calcualte % atom economy for following reactions :— **4**

w.r.t. Clorobenzene



3. (a) A coal sample has the following composition by weights : C = 82%, H = 3%, O = 8%, S = 2%, N = 2% and Ash = 3%. Calculate the minimum amount of air required both by weight and volume for complete combustion of 2 kg of coal. (mol-wt. of air = 28·949 gm). **6**
   (b) Explain traditional and greener route of production of *Indigo dye*. By this reactions which principle of green chemistry is shown ? **5**
   (c) How is the rate of corrosion influenced by :— **4**
      (i) pH of medium
      (ii) Relative area of cathode and anode parts ?

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Con. 6921–GS–5481–13. 2

4. (a) Write a note on Compacting and Sintering. **6**
   (b) Explain wet corrosion in acidic medium with schematic diagram and mechanism. **5**
   (c) Explain Laminar composite with suitable ~~diagram~~. example . **4**

5. (a) What is bio-diesel ? Explain the method to obtain bio-diesel from vegetable oil. Give advantages of bio-diesel as a fuel. **6**
   (b) Distinguish between Brass and Bronze. **5**
   (c) State the chemical factors influencing adhesive action. **4**

6. (a) What is cathodic protection ? Describe impressed current method of corrosion control. **5**
   (b) A gaseous fuel has the following composition by volume : **5**

$H_2 = 10\%$, $CH_4 = 30\%$, $C_3H_8 = 20\%$, $CO = 20\%$, $CO_2 = 15\%$, $N_2 = 5\%$.

Calculate the volume of air required for complete combustion of $1 m^3$ of this gas.

   (c) Explain the effect of following elements on alloying :— **5**
      (i) Nickel
      (ii) Chromium
      (iii) Cobalt
      (iv) Molybdenum
      (v) Tungsten.
