

23/5/16 FE Sem II CBGS Applied Chemistry-II

Q.P. Code : 530101

(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) **Figures** to the **right** indicate **full** marks.
 (5) 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 :-

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- What are plain carbon steels? Mention any four drawbacks of plain carbon steels.
- Define Octane number and Cetane number.
- Define 'Corrosion'? Explain how rate of corrosion of the following metals is influenced by atmospheric oxygen.
 - Molybdenum
 - Tin
- Give classification of composite materials.
- Mention any three constituents of Paint and give their functions.
- What is supercritical CO₂? Why is it considered a green solvent? Give one application of supercritical CO₂.
- A sample of coal has the following composition by mass :

C = 70%	H = 9%	O = 4%
S = 2%	N = 1%	and Ash = 14%

 Calculate gross calorific value of the fuel using Dulong's formula.

2. (a) How do the following factors affect the rate of corrosion?

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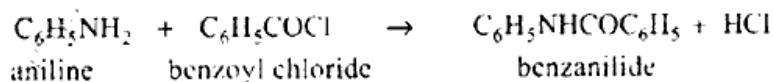
- Purity of metal
- Nature of corrosion products
- Overvoltage

(b) What are propellants? Give their classification with an example of each type. Mention any four characteristics of a good propellant.

5

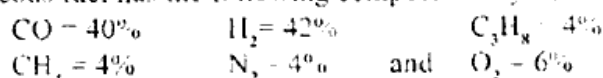
(c) Calculate percentage atom economy for the following reaction with respect to benzanilide

4



3. (a) A gaseous fuel has the following composition by volume.

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Calculate volume and weight of air required for complete combustion of 1m³ of fuel (Molecular wt. of air = 28.949)

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- (b) Explain conventional & green synthesis of Indigo dye. Mention the green chemistry principle involved. 5
- (c) Explain Intergranular corrosion with a suitable diagram and example. 4
4. (a) List composition, properties and uses of the following alloys : 6
(i) Duralumin (ii) Gun metal
- (b) What are metallic coatings ? Explain the following methods of coating. 5
(i) Metal cladding
(ii) Cementation coating (Sherardizing)
- (c) What are glass fibre reinforced composites ? Outline their properties, application and limitations. 4
5. (a) With neat diagram, explain any one method of catalytic cracking. Mention any four advantages of catalytic cracking over thermal cracking. 6
- (b) What is 'compaction' in powder metallurgy ? Explain Powder Injection moulding method of compaction with a suitable diagram. 5
- (c) Define matrix phase of composite material. State functions of matrix phase. 4
6. (a) What is Electrochemical corrosion ? With suitable diagram and electrode reactions explain electrochemical mechanism of rusting of iron in neutral, aqueous medium. 5
- (b) 1.5 g of a coal sample was analysed for nitrogen content by Kjeldahl's method. The liberated ammonia required 14ml of 0.1N H_2SO_4 solution for neutralization. In a separate experiment using Bomb Calorimeter, 1.5g of the same sample gave 0.3 g of BaSO_4 . Calculate percentage nitrogen and sulphur in the sample. 5
- (c) (i) Explain any two purposes of alloying with suitable examples. 2
(ii) Explain manufacture of high purity alumina ceramic powder. 3