

B. TECH, B. TECH + MBA DUAL DEGREE  
PROGRAMMES (CSE, IT, CE) &  
B. TECH (CSE) – EVENING

SECOND SEMESTER END TERM EXAMINATION :  
APRIL, 2014

APPLIED CHEMISTRY

*Time : 3 Hrs.*

*Maximum Marks : 70*

*Note: Attempt questions from all sections as directed.*

SECTION – A (30 Marks)

*Attempt any 5 questions.*

*Each question carries 6 marks.*

1. (a) 50 ml of water sample required 12.5 ml of N/50  $H_2SO_4$  at phenolphthalein end point. An additional 2.5 ml of N/50  $H_2SO_4$  was used at methyl orange end point. Calculate the different types of alkalinity present.
- (b) The presence of dissolved gases in boiler feed water should be avoided, why? Give reactions also. (3,3)

P.T.O.

2. Explain the significance of the following constituents present in coal.

- (a) Total carbon      (b) Hydrogen  
(c) Sulphur            (d) Oxygen            (1.5×4)

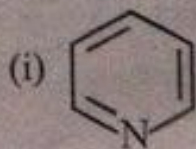
3. Justify the following statements :

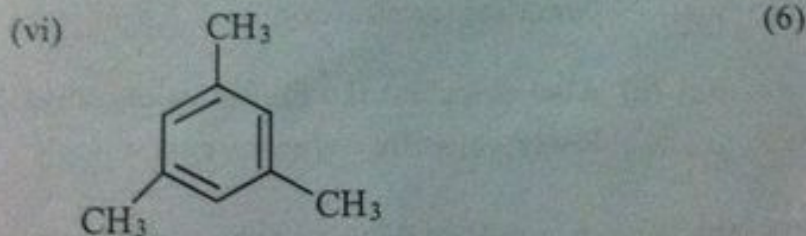
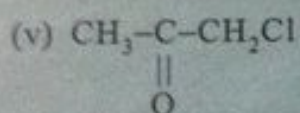
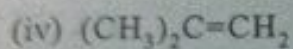
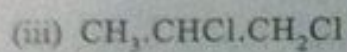
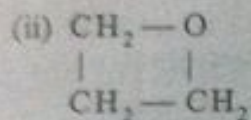
- (a) Solvent refining is better than acid refining  
(b) Long chain polymers can be used as viscosity index improvers  
(c) Drying oils are used in paints            (2+2+2)

4. (a) What is oxidation corrosion and how does it take place? Describe the mechanism of oxidation corrosion?

- (b) How much rust ( $\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$ ) will be formed when 100 Kg of iron have completely rusted away?            (4,2)

5. How many NMR signals are possible in the observed spectrum of?





6. (a) Water sample on analysis gave the following data

$$\text{Ca}^{2+} = 30 \text{ mg/l} \quad \text{K}^+ = 10 \text{ mg/l} \quad \text{HCl} = 50 \text{ mg/l}$$

$$\text{Mg}^{2+} = 24 \text{ mg/l} \quad \text{CO}_2 = 24 \text{ mg/l}$$

Calculate the quantity of lime (90 percent pure) and soda (94 percent pure) required to soften 50,000 lit of water. ( $\text{Ca}^{2+} = 40 \text{ g}$ ;  $\text{Mg}^{2+} = 24 \text{ g}$ ;  $\text{Cl} = 35.5 \text{ g}$ ;  $\text{C} = 12$ ,  $\text{O} = 16$ )

(b) Why is hot lime soda process better than the cold process? (4,2)

## SECTION - B (20 Marks)

*Attempt any two questions.*

*Each question carries 10 marks.*

7. (a) A sample of coal was found to have the following percentage composition :

C = 75% H = 5.2% O = 12.1% N = 3.2% and ash = 4.5%

(i) Calculate the minimum air required for complete combustion of 1 Kg of coal.

(ii) Also calculate the higher calorific value and lower calorific value of coal sample.

- (b) Why a good quality of coal sample should not have high percentage of nitrogen and explain the method of determining amount of nitrogen present in sample ?

1.0 gm of a coal sample was Kjeldahlized and  $\text{NH}_3$  gas thus evolved was absorbed in 50 ml of N/10  $\text{H}_2\text{SO}_4$ . After absorption, the excess acid required 10 ml N/10 NaOH for extract neutralization. Determine the percentage of nitrogen in the coal sample. (5,5)

8. (a) Discuss Electrochemical Theory of Corrosion. Define pitting corrosion. Why is it the most dangerous form of corrosion ? Give its mechanism.

- (b) Differentiate between anodic sacrificial protection and impressed current protection. (5,5)
9. (a) What is viscosity index? Name the two standard oils used for calculating viscosity index. Calculate the viscosity index of the oil sample under test from the following data:

	Viscosity (210 F)	Viscosity (100 F)
High VI oil	50	530
Low VI oil	50	850
Unknown oil	50	710

(5)

- (b) State and explain Lambert's and Beer's Law? Explain:

- (i) If the path length of a beam of light through the sample is doubled and the concentration is made half, will the value of absorbance change?
- (ii) C-C double and triple bonds of  $\text{CH}_2=\text{CH}_2$  and  $\text{CH}\equiv\text{CH}$  do not absorb IR energy. Why?
- (iii) Which of  $\text{CH}_3\text{COCH}_3$  and  $\text{CH}_2=\text{CHCOCH}_3$  exhibits higher value of  $\lambda_{\text{max}}$  in the visible - UV spectra? (2,3)

BT-206

100ml stand. h/w  
containing 0.6 mg/ml  $\text{CaCl}_2$   
6 req. 29 ml EDTA

SECTION - C (20 Marks)  
(Compulsory)

10. (a) What is the principle of EDTA method? 100 ml of water sample required 15 ml of 0.01 M EDTA for titration using Eriochrome black - T indicator. In another experiment, 100 ml of the sample was boiled to remove the temporary hardness. 100 ml of this sample required 8 ml of 0.01 M EDTA for titration. Calculate temporary, permanent and total hardness of water.
- (b) Define and draw break point chlorination curve? Why during chlorination process the pH is maintained less than 7? Explain.
- (c) Give the functions of lubricants. Describe the mechanism of hydrodynamic lubrication. How is grease prepared and under what operating conditions it is preferred over lubricating oil.

(5,5,10)