

BT-203

Roll No. 12176

B. TECH (CSE, IT, MAE, FOOD TECH, S & AE)
& B. TECH (MAE) + M. TECH AUTOMOBILE
ENGINEERING (DD), B. TECH (CSE, MAE) +
MBA DUAL DEGREE

SECOND SEMESTER END TERM EXAMINATION

APRIL - 2013

APPLIED CHEMISTRY

Time : 3 Hrs.

Maximum Marks : 70

Note: Attempt questions from all sections as directed.

SECTION - I

(30 Marks)

Attempt any 5 questions.

Each question carries 6 marks.

- (a) What is standard hard water and what is its role in determination of hardness by EDTA method?

(b) 0.6 g of CaCO_3 was dissolved in HCl and the volume was made up to 1 l with distilled water. 100 ml of the above solution required 26 ml of EDTA. 75 ml sample water required 17 ml EDTA and on boiling and cooling, 50 ml boiled water required 6 ml EDTA. Calculate temporary hardness. (2,4)

P.T.O.

2. (a) Give a comparison between solid, liquid and gaseous fuels taking any three characteristics into consideration.
- (b) Define knocking. Explain how knocking is caused in a petrol engine. (3,3)
3. (a) Give any four functions of lubricants.
- (b) Define iodine value. 0.7 g of oil was taken in a iodine flask and 25 ml CCl_4 and 25 ml Wij solution was added to it. A similar flask was prepared without oil. Both were kept in the dark for 1 hr and later 20 ml of 10% KI was, added and titrated with N/10 $\text{Na}_2\text{S}_2\text{O}_3$. The flask with oil required 15 ml of hypo while the blank required 32 ml hypo solution. Calculate iodine value. (2,4)
4. (a) Differentiate between anodic and cathodic coating.
- (b) Explain "Pitting corrosion" with an example. (3,3)
5. Draw a block diagram of a UV-visible spectrophotometer describing each part used for Ultra-violet and visible studies.
6. (a) What are the disadvantages of alkaline water? 50 ml of sample water required 27 ml of N/10 HCl for complete neutralization with methyl orange while another 50 ml of sample required 10 ml of

N/10 HCl for phenolphthalein end point. Calculate alkalinity in terms of CaCO_3 equivalents.

- (b) Define 'Hypsochromic shift' and 'hypochromic shift' in VU-visible spectroscopy. (4,2)

SECTION - B (20 Marks)

Attempt any two questions.

Each question carries 10 marks.

7. (a) Under what conditions is the use of grease preferred over liquid lubricants. Give any three types of grease. State the function of soap in grease.
- (b) "Purification of mineral oils is essential before they can be used as lubricants". Justify this statement and how is this process carried out? (6,4)
8. (a) Explain the electrochemical process of corrosion emphasizing on the cathodic reaction in acidic and alkaline medium. What are the condition necessary for this type of corrosion?
- (b) "Aluminium oxide becomes reactive in a reducing environment". Explain giving the phenomenon observed in aluminum oxide and how are these kinds of metals protected against corrosion. (5,5)

9. (a) What is chemical shift? Why is TMS used as reference standard? Giving examples, explain how isomers can be differentiated using NMR.
- (b) State the types of vibrations observed in IR spectroscopy? How can you differentiate between *o*-nitro benzoic acid and *p*-nitro benzoic acid using IR. (5,5)

SECTION - C (20 Marks)
(Compulsory)

10. (a) How is continuous hot Lime-soda process used for the treatment of water? Explain. A sample of water contains the following impurities: $\text{Ca}^{2+} = 60 \text{ ppm}$, $\text{Mg}^{2+} = 48 \text{ ppm}$, $\text{CO}_2 = 66 \text{ ppm}$, $\text{HCO}_3^- = 122 \text{ ppm}$. Sodium aluminate (164 ppm) was added as a coagulant. Calculate the amount of lime and soda required if the lime used was 60% pure and soda was 90% pure. Also calculate permanent and temporary hardness.
- (b) Define 'Proximate analysis'? Explain the complete process by which this is carried out.
- (c) 2 kg of coal had the following composition: C = 50%, S = 5%, H = 3%, N = 8% and rest oxygen. Calculate the amount of air to be supplied by weight and by volume, if 30% excess air is supplied. Also calculate HCV and LCV of the coal sample. (10,5,5)