

F.E. sem I (Rev.)  
All branches

Applied chemistry - I

12/6/08

Con. 3504-08.

CO-5149

(REVISED COURSE)

(2 Hours)

[Total Marks : 75

- N.B.** (1) Question No. 1 is **compulsory**.  
(2) From remaining **six** questions attempt any **four**.  
(3) **All** questions carry **equal** marks.  
(4) **Figures** to the **right** indicate **full** marks.

1. Attempt any **five** of the following :—

- (a) What is polymerisation ? What are the conditions for polymerisation ?  
(b) A water sample contains :  
(i)  $\text{Ca (HCO}_3)_2 = 32.4 \text{ mg/l}$   
(ii)  $\text{Mg (HCO}_3)_2 = 29.2 \text{ mg/l}$   
(iii)  $\text{CaSO}_4 = 13.5 \text{ mg/l}$

Calculate temporary, permanent and total hardness.

(At. wt. C = 40 Mg = 24 H = 1 C = 12 O = 16 S = 32 )

- (c) What are carbon-nanotubes ? Explain different types of carbon-nanotubes.  
(d) What are lubricants ? List different functions of lubricants.  
(e) What are fuel cells ? List the advantage of fuel cells over conventional power plants.  
(f) What is triple point in phase diagram ? Explain it with reference to one component water system phase diagram.  
(g) Distinguish between thermoplastics and thermosetting resins.

2. (a) What do you mean by fabrication of plastics ? Explain transfer moulding with the help of a neat diagram. 6  
(b) Explain any **two** of the following terms :— 6  
(i) Phases  
(ii) Components  
(iii) Degrees of freedom.  
(c) 1.55 gram of an oil is saponified with 20 ml of  $\frac{N}{2}$  alcoholic potassium hydroxide solution. 3  
After refluxing the mixture, it requires 15 ml of  $\frac{N}{2}$  HCl solution. Find saponification value of oil.  
3. (a) Explain theory, procedure and limitations of Zeolite process with the help of a neat diagram. 6  
(b) Explain the following terms :— 6  
(i) Glass transition temperature  
(ii) Liquid crystal properties of polymers  
(iii) Supramolecules  
(c) State and explain condensed phase rule. 3

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4. (a) Calculate the amount of limes (85% pure) and soda (90% pure) required for softening of 10,000 litres of boiler-feed water containing following impurities :— 6
- (i)  $\text{Ca(HCO}_3)_2$  → 16.2 ppm.
  - (ii)  $\text{CaSO}_4$  → 6.8 ppm.
  - (iii)  $\text{CaCl}_2$  → 11.1 ppm.
  - (iv)  $\text{MgSO}_4$  → 6.00 ppm.
  - (v)  $\text{Mg(HCO}_3)_2$  → 8.4 ppm.
  - (vi)  $\text{SiO}_2$  → 8.00 ppm.
- (At. Wt. Ca = 40 Mg = 24, S = 32 O = 16 Cl = 35.5 C = 12 H = 1 Si = 28)
- (b) What is solar energy ? Explain the working of solar heating system using flat plate collectors. 6
- (c) What are plain carbon steels ? How can they be classified on the basis of carbon contents ? 3
5. (a) Explain the use of nano materials in the field of any **two** of the following : 6
- (i) Medicine
  - (ii) Electronics
  - (iii) Catalysis
- (b) What are carbonate and non-carbonate hardness ? 6  
A standard hardwater contains 15 gm/l calcium carbonate. 20 ml of this water required 25 ml of EDTA solution. 100 ml of sample water required 18 ml of EDTA solution. The same sample after boiling required 12 ml of EDTA solution. Calculate temporary hardness of water.
- (c) Explain the term 'vulcanization' with the help of a suitable example. 3
6. (a) Write the preparation, properties and uses of urea formaldehyde. 6
- (b) Explain any **two** of the following properties of lubricants :— 6
- (i) Oiliness
  - (ii) Acid value
  - (iii) Cloud point and pour point temperature.
- (c) Give brief account of reverse osmosis. 3
7. Write short notes on any **three** of the following :— 15
- (a) Solid lubricants
  - (b) Conducting polymers
  - (c) Activated sludge method to control water pollution
  - (d) Photovoltaic cell.