30/12/2011 Applied chemistry - I (Rev)

Con. 5907-11. MP-2482

(2 Hours) [Total Marks : 75

N. B. : (1) Question No. 1 is **compulsory.**
(2) From Q. No. 2 to Q. No. 7 answer any **four** questions,
(3) **Atomic Weights.** : C-12, O-16, H-1, N-14, S-32, Cl-35·5, Ca-40, Mg-24, Na-23, Al-27, K-39.
(4) Answer to questions should be **grouped** and written **together.**

Q.No.1 Answer any three from the following; 5x3=15

a) Classify the following impurities in to temporary, permanent and non-hardness causing impurities.
$Ca(HCO_3)_2$, $MgSO_4$, $CaCl_2$, CO_2, HCl, $Mg(HCO_3)_2$, $CaSO_4$ and NaCl.
How many grams of $CaCl_2$ dissolved per litre gives 150 ppm of hardness?

b) 1.3g of a gear box oil is taken for acid value determination. It required 0.8ml of 0.001N KOH for neutralization. Calculate the acid value and mention whether the oil is suitable to be used further or not.

c) Give the main physical changes that take place at the nano scale with its applications.

d) What is degree of polymerization? Give its significance. A homo polymer has mol.wt.= 56,000. Its monomer mol.wt is =28. Calculate its degree of polymerization.

e) Define COD and BOD. Give its significance.

f) What is reverse osmosis? Give its applications.

g) Distinguish between conventional and non-conventional energy sources.

Q.No.2 a) Outline the chemical reactions involved in the Lime-soda method of softening water. 6

b) A blended oil weighing 12.3 g was treated with 45ml of 0.5 N KOH and refluxed for 1.5 hrs. The blank titration reading was 45ml of 0.5 N HCl. The back titration reading was 20.2 ml of 0.5 N HCl. Calculate the saponification value.If the oil used for blending is castor oil having saponification value= 188, calculate the percentage blend. 4

c) With a neat diagram explain Solar photovoltaics. 5

Q.No.3 a) Distinguish between thermoplastics and thermosettings. 5

b) 15,000 litres of hard water was passed through a zeolite softener. The exhausted zeolite required 120 litres of NaCl having 30 g / litre of NaCl. Calculate the hardness of water. 5

c) What is glass transition temperature? What is its significance? 5

Q.No.4 a) Explain the application of phase rule to one component system. 5

b) 20 ml of standard hard water containing 1.2 g $CaCO_3$ per litre required 35 ml of EDTA. 50 ml of hard water sample required 30 ml of the same EDTA. 100 ml of hard water sample after boiling required 25 ml of the same EDTA. Calculate the various hardnesses. 5

c) With a neat diagram explain working of Lithium ion batteries.Give its applications. 5

Q.No.5 a) What are CNTs? What are its types? Give their applications. 5

b) What are plain carbon steels? How are they classified on the basis of the carbon content? Give their draw backs. 5

c) Calculate the quantity of lime(90% pure) and soda (95% pure) required for softening 50,000 litres of water containing the following impurities. $Ca(HCO_3)_2$-81 mg/l , $MgCl_2$-95 mg/l, $CaSO_4$-68 mg/l, SiO_2-50 mg/l,$Mg(HCO_3)_2$-146 mg/l, H_2SO_4-49 mg/l. 5

Q.No.6 a) What is fabrication? What are the various types? With a neat diagram explain any one of them. 6

b) List any five characteristics of a good lubricant with justification. 5

c) Advanced polymeric materials like, conducting polymers, liquid crystal polymers, supramolecules and polymer composites have gained increasing importance in the recent years. Explain what are these, what are their main structural features with one example each. 4

Q.No.7 a) What is vulcanization? How does it improve the properties of rubber? 5

b) What are shape memory alloys? How do they work? Give their applications. 5

c) With a neat flowchart explain the waste water treatment. 5