B.Tech. / B.E. (Model Curriculum) Semester-I & II

# BSC102 - Chemistry-I

P. Pages : 2 **GUG/S/25/13170**

Time : Three Hours * 1 4 8 2 * Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Assume suitable data wherever necessary.
3. Diagrams and Chemical equation should be given wherever necessary.
4. all questions are compulsory.

**1.** a) Calculate amount of lime and soda required for 500000 litres of water containing **8**
$Ca(HCO_3)_2 = 81ppm$, $Mg(HCO_3)_2 = 73ppm$, $CaCl_2 = 111ppm$,
$MgSO_4 = 90ppm$, $SiO_2 = 3.9$ ppm, $NaCl = 3.1$, using sodium aluminate @ 69.5ppm
also purity of lime and soda is 85 and 90% respectively.

b) Calculate total, carbonate and non carbonate hardness. **4**

c) Hardness of 25000 litres water was completely removed by passing it through zeolite softener. It required 300 litres of NaCl solution for complete regeneration ,if water has hardness of 400 ppm of CaCo3 Calculate concentration of NaCl used ? **4**

**OR**

**2.** a) Explain ion exchange process with principle, advantage and limitation? **6**

b) Explain scale and sludge formation with its prevention? **4**

c) Explain phosphate conditioning with respect to principle, advantage and limitation? **6**

**3.** a) Explain the corrosion prevention with respect to design and material Selection? **6**

b) Explain in detail polymer electrode membrane ? **4**

c) Explain alkaline fuel cell and phosphoric acid fuel ? **6**

**OR**

**4.** a) Explain pilling bedworth rule ? **4**

b) Explain anodic prevention with diagram ? **6**

c) Explain electrochemical corrosion mechanism ? **6**

**5.** Coal sample C =87%. H =2%. N= 1.4%, O-1. Sulphur 1 % rest ash is burnt
Calculate -
a) Total fuel : air required ratio **3**

b) percentage composition of product of combustion including water vapour formed. **3**

c) weight and volume of air used for complete combustion of 1 kg of coal sample if 25% excess air is used. **6**

d) Explain octane and cetane number? **4**

**OR**

**6.** a) Describe Bomby calorimeter ? **8**

b) Calculate gcv and ncv of coal sample having C=82%, $H_2$=8%, $O_2$=5%, S=2.5% $N_2$=1.4% and ash =2%. **4**

c) Explain Fischer tropsch process ? **4**

**7.** a) Explain principle of green chemistry? **10**

b) Explain principle and concept of carbon credit and goal of green chemistry? **6**

**OR**

**8.** a) Explain traditional and green pathways of -

a) Adipic acid. **4**

b) Polycarbonate. **4**

c) Indigo dye **4**

b) Explain efficiency parameters and need of green chemistry? **4**

**9.** a) Explain free radical and step growth polymerization reaction and mechanism? **8**

b) Explain average molecular weight concept ? **4**

c) Differentiate Tm and Tg ? **4**

**OR**

**10.** Write short note on :

a) Polycarbonate **4**

b) Polyhydroxyburate. **4**

c) Polyhydroxyvalante **4**

d) Vulcanization by sulphur. **4**

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