U.S.N.										

B. M. S. College of Engineering, Bengaluru - 560019

Autonomous Institute Affiliated to VTU

October / November 2021 Supplementary Examinations

Programme: B.E. **Semester: I / II**
Branch: All Branches **Duration: 3 hrs.**
Course Code: 18CY1BSCHY / 18CY2BSCHY **Max Marks: 100**
Course: ENGINEERING CHEMISTRY **Date: 31.10.2021**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may suitably assumed.

UNIT - 1

1. a) What is desalination? Describe desalination of water by electro dialysis. 7
   b) What are boiler scales? Solve temporary and permanent hardness of water if water sample contains $Ca(HCO_3)_2$ = 19.2 mg/L, $Mg(HCO_3)_2$ =22.4 mg/L, $CaSO_4$ = 20.5 mg/L. Given: molecular weight of $Ca(HCO_3)_2$ = 162, $Mg(HCO_3)_2$ = 146 and $CaSO_4$ = 136. 7
   c) Explain secondary treatment of waste water using trickling filter. 6

UNIT - 2

2. a) What are reference electrodes? Describe the determination of pH of a solution using glass electrode. 7
   b) Consider two metal A and B having standard reduction potential value of +0.34 and -0.76 V respectively are connected for an application. Which among A or B will undergo corrosion and why? Interpret the type of corrosion with reactions. 7
   c) What are concentration cells? Find the value of X in the concentration cell $Cd|CdSO_4(0.0093M)\ ||CdSO_4(xM)\ |\ Cd$, EMF = 0.086 V at 25 $^{\circ}$C and write the cell reactions. 6

OR

3 a) Define corrosion? Explain electrochemical theory of corrosion taking iron as an example. 7
   b) Explain the effect of following factors on rate of corrosion. 6
      i) relative anodic and cathodic area
      ii) temperature
   c) Describe the construction and working of calomel electrode. Write the cell reactions. Justify that its potential is dependent on chloride ions. 7

UNIT - 3

4. a) What is reformation of petrol, write the reactions along with necessary conditions? Justify its need. 7
   b) Explain the construction and working of Nickel metal hydride (Ni-MH) battery. Mention its applications. 7
   c) Describe the construction and working of the device which is used to convert solar energy into electrical energy. Mention its advantages. 6

OR

5. a) Define calorific value of fuel. Calculate GCV & NCV of coal sample from the following data; Weight of coal sample = 0.98 g, wt. of water 6

taken in calorimeter = 2600g, water equivalent of calorimeter= 368 g. latent heat of steam = 2454 kJ/kg specific heat of water = 4.187KJ $Kg^{-1}K^{-1}$, Rise in temperature = 2.8 K Percentage of hydrogen in coal sample = 5.8

b) Write a note on (i) production of biodiesel and (ii) Advantages and shortcomings of Hydrogen as a fuel. 7

c) Explain the construction, working and applications of Methanol-O_2 fuel cell. 7

UNIT - 4

6. a) Explain the synthesis and properties of i) PMMA ii) Butyl rubber. Mention its applications. 7

b) Describe the synthesis and uses of polyglycolic acid. 7

c) A polydisperse sample of polystyrene is prepared by mixing three monodisperse samples in the following proportions. 10 molecules of molecular weight 10000, 15 molecules of molecular weight 15000, 20 molecules of molecular weight 18000. Calculate number average and weight average molecular weight of the polymer. 6

UNIT - 5

7. a) What are nano materials? Discuss their classifications. 7

b) Interpret the instrumental method of analysis to estimate the amount of sodium in water sample. 7

c) Justify the below statements; 6

(i) Bulk gold which is catalytically inactive becomes catalytically active at the nano scale.

(ii) Graphene have superior mechanical and electrical properties.

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