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BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)

January 2017 Semester End Make Up Examinations

Course: Engineering Chemistry
Course Code: 14CY11CCHY

Duration: **3 hrs**
Max Marks: **100**
Date: 12.01.2017

Instructions: **1.Answer any five full questions choosing one from each unit.**

UNIT 1

1	a)	Calculate temporary and permanent hardness of a sample of water containing $Mg(HCO_3)_2$=72.54mg/L, $Ca(HCO_3)_2$=161.98mg/L, $MgCl_2$=95.65mg/L and $CaSO_4$=136.73mg/L (Given molecular weight of $Mg(HCO_3)_2$=146, $Ca(HCO_3)_2$=162, $MgCl_2$=95 and $CaSO_4$=136)	4
	b)	What is saline water? With a neat diagram explain desalination by electrodialysis	6
	c)	Describe experimental determination of alkali metals in water by flame photometric method	6
	d)	Justify the following: (i) COD values are usually higher than BOD values (ii) Nanocrystalline TiO_2 is more effective and efficient than bulk TiO_2 in waste water treatment	4

UNIT 2

2	a)	What are secondary reference electrodes? Explain the construction and working Ag-AgCl electrode	6
	b)	Explain the following battery characteristics: (i) EMF and (ii) cycle life	4
	c)	Discuss the construction and working of Li-MnO_2 battery. Justify the need of using non-aqueous electrolytes in this battery	5
	d)	Explain the construction and working of acid catalyzed $CH_3OH–O_2$ fuel cell with the cell reactions involved	5

UNIT 3

3	a)	Describe with a neat diagram, the determination of calorific value of a solid fuel using bomb calorimeter	6
	b)	What is biodiesel? With the help of chemical reactions show how transesterification can be used to produce biodiesel?	5
	c)	What is meant by reforming of petrol? By taking suitable examples, narrate four chemical reactions involved in reformation process	5

	d)	Describe Czochralski's crystal pulling technique	4

OR

4	a)	When 0.95 g of benzoic acid (C_6H_5COOH) was subjected to complete combustion in bomb calorimeter, the temperature of surrounding water increased from 25.2^0C to 27.7^0C. The weight of water taken and water equivalent of bomb calorimeter were 1.9 kg and 0.450 kg respectively. Calculate GCV and NCV of benzoic acid. (Given: Specific heat of water is 4.186 kJ/kg/^{0}C and Latent heat of steam is 2457.18 kJ/kg)	4
	b)	What is the significance of petroleum cracking? Explain fluidized bed catalytic cracking with a neat diagram	6
	c)	Define knocking in petrol engines. Explain the probable mechanism of knocking in chemical terms with reactions.	6
	d)	List any two physical and two chemical properties of silicon relevant to photovoltaic application	4

UNIT 4

5	a)	Define corrosion. Explain corrosion of iron based on electrochemical theory of corrosion	6
	b)	What is meant by cathodic protection? Explain sacrificial anode method of corrosion control	5
	c)	Discuss the significance of decomposition potential and polarization in electroplating	4
	d)	Explain electroless plating of copper on PCB with relevant reactions	5

OR

6	a)	With a neat diagram indicating anodic and cathodic regions and respective reactions, explain differential aeration corrosion,	6
	b)	Discuss the effect of (i) relative anodic & cathodic areas and (ii) pH on the rate of corrosion	4
	c)	Account for the following : (i) Aluminium stops corroding whereas iron continues to corrode in air (ii) During chromium plating, chromium anodes are not used	4
	d)	Explain electroplating of gold with reactions involved	6

UNIT 5

7	a)	Write the structure of Ziegler-Natta catalyst and explain the mechanism of co-ordination polymerization of ethylene to polyethylene	6
	b)	Differentiate solution polymerization from emulsion polymerization technique	4
	c)	What are polymer composites? How are they produced? How do you account for their extraordinary properties?	5
	d)	What are conducting polymers? Write the structure and any two applications of conducting polyaniline	5

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