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BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)
December 2016 Semester End Main Examinations

Course: Engineering Chemistry   Duration: **3 hrs**
Course Code: 14CY11CCHY   Max Marks: **100**
       Date: 14.12.2016

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

UNIT 1

1	a)	(i)	What is the role of $HgSO_4$ and Ag_2SO_4 in COD determination	5
		(ii)	100 ml of hard water sample required 33 ml of 0.1M EDTA solution. Calculate total hardness	
	b)		Define the term COD. Explain determination of COD of the given industrial water sample	5
	c)		What is the principle involved in reverse osmosis? Explain desalination of water by reverse osmosis process	5
	d)		Discuss the usage of nano-technology in water puification	5

UNIT 2

2	a)	Justify the statements: (i) Why SHE is not preferable in the determination of pH of an unknown solution	5
		(i) Zn-air battery has high energy density	
		(ii) Fuel cell are energy conversion devices	
	b)	What are ion selective electrodes? Explain determination of pH of an unknown solution using glass electrode	5
	c)	Mention any five differences between a battery and fuel cell.	5
	d)	A galvanic cell is constructed by dipping zinc rod in 5×10^{-2} M zinc nitrate solution and silver rod in 1.2×10^{-1} M silver sulphate solution. Write half cell reactions and calculate the e.m.f of the cell. Given: Standard reduction potentials of zinc and silver metals are -0.76 V and +0.80 V respectively	5

UNIT 3

3	a)	(i) How octane value of a gasoline sample is enhanced?	5
		(ii) For a given bomb calorimeter, how water equivalent of calorimeter is determined?	
		(iii)How petrol engine is different from diesel engine?	

	b)	Explain the construction and working of a silicon based photovoltaic cell	5
	c)	Define HCV. In bomb calorimetric method, 0.95 g of coal sample was burnt completely in bomb calorimeter, containing 2000 g water. The initial and final temperature of the water was 28.5 ^oC and 32.7 ^oC. Water equivalent of calorimeter is equal to 200 g. specific heat of water is 4.2 kJ/kg/^oC. latent heat of steam = 2454 kJ/kg. Calculate GCV and NCV of coal. Given the composition of coal is C= 92 %, H = 5.5 % and remaining ash	5
	d)	Explain synthesis of synthetic petrol by Fischer-Tropsch's method	5

OR

4	a)	Answer the following: (i) Write explosive combustion reactions which occur during knocking process (ii) How spent catalyst is regenerated in fludised bed cracking process?	5
	b)	Explain the terms : octane number and cetane number.	5
	c)	Explain the production of solar grade silicon from silica	5
	d)	What is the effect of hydrogen content in a solid fuel on calorific value? How much water produced if 0.080 g of a coal sample burnt in a bomb calorimeter. Coal sample contains 1.5 % hydrogen, 96 % of carbon and 2.5 % of ash	5

UNIT 4

5	a)	(i) Write the cathodic reactions which occur during corrosion process, when the corrosive medium is acidic and when the medium is aerated and neutral (ii) Justify: phosphating is a conversion coating (iii) Why anodic inhibitors to be always added in excess quantities?	5
	b)	Discuss stress corrosion with suitable example. Why stressed part act as anode?	5
	c)	Justify electroless plating is superior to electroplating	5
	d)	What is over voltage? Mention its significance in electroplating	5

OR

6	a)	(i) What kind of corrosion is induced when a metal is exposed to different oxygen concentrations? (ii) As hydrogen over voltage increases the rate of corrosion decreases, Why? (iii) Justify, Galvanized articles are not used for preparing and storing food stuffs	5
	b)	What is colorimetry? Explain estimation of copper (in ppm) present in an effluent from a copper coating industry	5
	c)	What are metallic coatings? Explain different steps involved in tinning process	5
	d)	Suggest and explain a suitable method for corrosion protection of buried steel pipes	5

UNIT 5

7	a)	Justify: (i) All simple organic molecules are not monomers (ii) glass transition temperature increases as molecular weight increases	5
	b)	What are plastics? Give the synthesis and applications of PMMA	5
	c)	What are elastomers? Explain the synthesis and applications of epoxy resin	5
	d)	What are conducting polymers? Explain the conduction mechanism in polyaniline	5

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