17CY110

8. a) What are the salts responsible for temporary hardness? Explain the causes of scale formation.
   b) Discuss the hot-lime soda process of softening of hard water.
   c) Write a note on activated sludge process.
   d) Explain the classification of nanomaterials based on their number of dimension.

Unit – V

9. a) Define gross calorific value of a fuel. A 0.7 gm coal sample with 94% C, 5% H_2 and 1% ash, caused a rise in the temperature of 2000 gm of water by 3.3^0C in a bomb calorimeter experiment. Calculate the gross and net calorific value of coal, given water equivalent = 200g; Specific heat of water = 4.2 kJ/kg/^{0}C; Latent heat of steam = 2436 kJ/kg.
   b) Give an account of petrol knocking in IC engine.
   c) Explain the molecular ordering in the following liquid crystal phases:
   (i) Chiral-nematic phase; (ii) Smectic phase

10. a) How is calorific value of a fuel determined using bomb calorimeter.
   b) Explain the reformation of petrol.
   c) Write a note on Lyotropic liquid crystals.
   d) Explain the electro-optic effect of liquid crystals.

BT* Bloom's Taxonomy, L* Level

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

First Semester B.E. (Credit System) Degree Examinations

April – May 2018

17CY110 – ENGINEERING CHEMISTRY

Duration: 3 Hours | Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

			Marks	BT*
		Unit – I		
1.	a)	Discuss the mechanism involved in free radical polymerization taking styrene as a monomer.	6	L*2
	b)	What is glass transition temperature? Explain the factors affecting the Tg.	7	L2
	c)	Mention any four advantages of synthetic rubber. Write the synthesis of (i) epoxy resin and (ii) polyurethane	7	L1
2.	a)	Explain bulk and emulsion polymerization.	8	L2
	b)	What are polymer composites? Give the synthesis, properties and applications of Kevlar.	6	L3
	c)	Explain the mechanism of electrical conduction in polyacetylene.	6	L4
		Unit – II		
3.	a)	Explain the origin of single electrode potential based on Helmholtz electrical double layer.	6	L4
	b)	The E^0 values of Zn and Cu are -0.76V and +0.34V and are in contact with 0.1M and 1.75M $ZnSO_4$ and $CuSO_4$ solutions respectively. Represent the cell, write cell reactions and calculate the EMF of the cell at 298K.	6	L6
	c)	Give the construction of glass electrode. Explain the experimental method of determination of PH of unknown solution using a glass electrode.	8	L4
4.	a)	Define a battery. Explain the following battery characteristics (i) Capacity; (ii) Cycle life and (iii) Energy density	7	L2
	b)	Discuss the construction and working of Li-ion battery.	6	L3
	c)	Distinguish between fuel cell and a battery. Explain the construction and working of hydrogen-oxygen fuel cell.	7	L4
		Unit – III		
5.	a)	What is wet corrosion? Explain the electrochemical theory of corrosion for rusting of iron.	8	L2
	b)	Give reason: (i) Iron corrodes faster when in contact with copper than that with tin. (ii) Cathodic metal coating provides protection only when it is non-porous.	4	L5
	c)	Write notes on (i) Tinning and (ii) Anodizing of aluminium	8	L2
6.	a)	Illustrate decomposition potential with suitable example.	6	L2
	b)	Discuss the electroplating of Chromium	6	L3
	c)	Give any four advantages of electroless plating. Explain the electroplating of copper on printed circuit boards.	8	L4
		Unit – IV		
7.	a)	Describe the determination of dissolved oxygen by Winkler's method.	7	L5
	b)	Write a note on boiler corrosion.	7	L2
	c)	Describe Sol-gel method for preparation of nano-materials.	6	L5

P.T.O.

8. a) Explain the hot lime soda process for softening of hard water. 7
   b) Explain Sol-gel method of synthesis of nanoparticles. 7
   c) Write a note on boiler corrosion. 6

Unit – V

9. a) What is cracking of Petroleum? Explain fluidized catalytic cracking process with a diagram. 6
   b) What is power alcohol? Write any 2 advantages and disadvantages of power alcohol. 6
   c) Explain the electro-optic effect of liquid crystals. 8

10. a) Write a note on classification of Liquid crystals. 6
    b) What is reformation reaction? Give the reaction involved in reforming. 6
    c) Define G.C.V. & N.C.V. 0.85g of coal sample containing 90% Carbon, 5% ash & 5% hydrogen was subjected to combustion. The raise in temperature of 2000g of water was 3.5 K & water equivalent to calorimeter is 600g. Latent heat of water is 4.2 J/g/K. Calculate the gross & net calorific values. 8

BT* Bloom's Taxonomy, L* Level

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

First/Second Semester B.E. (Credit System) Degree Examinations

Make up/Supplementary Examinations – July 2018

17CY110 – ENGINEERING CHEMISTRY

Duration: 3 Hours | Max. Marks: 100

*Note: Answer **Five full** questions choosing **One full** question from **each Unit.***

		Mraks	BT*
	Unit – I		
a)	Explain the following methods of polymerization. i) Suspension polymerization ii) Emulsion polymerization	6	L*2
b)	Discuss the synthesis and properties of i) Polyurethanes ii) Poly carbonates	6	L6
c)	Define glass transition temperature. Explain any 3 factors affecting glass transaction temperature.	8	L2
a)	Define Polymerization. Explain free radical mechanism of polymerization with an example.	7	L2
b)	What are adhesives? Discuss the synthesis and application of Epoxy resin.	6	L6
c)	What are conducting polymers? Discuss the mechanism of conduction in polyacetylene.	7	L6
	Unit – II		
a)	Define electrode potential. Derive the Nernst equation for a single electrode.	6	L2
b)	Explain the construction and working of Calomel electrode with a neat labelled diagram.	6	L2
c)	How is pH of a solution determined using glass electrode?	3	L1
d)	For the cell, $\underset{(0.01M)}{Fe/FeSO_4}\,//\,\underset{(0.1M)}{AgNO_3/Ag}$, write the cell reaction and calculate the emf of the cell at 298 K. E° of Fe and Ag electrodes are -0.44V and 0.8V respectively.	5	L6
a)	Write a note on construction, working and application of Lead acid battery.	6	L2
b)	Write a note on methanol - oxygen fuel cells with a neat diagram.	6	L5
c)	How are batteries classified? Give example.	3	L2
d)	Discuss the construction, working & application of Nickel-metal hydride battery.	5	L5
	Unit – III		
a)	Define Corrosion. Explain electro chemical theory of corrosion taking iron as an example.	8	L2
b)	Write short notes on i) Water line Corrosion ii) Petting Corrosion	6	L2
c)	What is Cathodic protection? Explain any two methods of Cathodic protection. Protection.	6	L5
a)	Write a note on technological importance of metal finishing.	4	L2
b)	Explain electroplating of chromium with reactions.	6	L2
c)	Differentiate electroplating and electroless plating process.	4	L4
d)	Explain electro less plating of copper in PCB.	6	L5
	Unit – IV		
a)	Write a note a causes and preventive methods of Scale and sludge formation in boilers.	8	L2
b)	Define desalination of water. Explain reverse osmosis process of desalination process.	6	L2
c)	What are nanoparticles? Write a note on classification of nanoparticles.	6	L2

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