	b)	Explain the effect of the following on the nature of electro deposit. i) Current density ii) Throwing power	7	L2	3
	c)	Explain electroplating of chromium. Indicate the reasons for not employing chromium as anode.	8	L3	3

Unit – IV

7.	a)	What is desalination? Write a note on electrodialysis.	6	L2	4
	b)	Define BOD and COD. 20ml of sample of COD analysis was reacted with 10ml of 0.25 N $K_2Cr_2O_7$ and the unreacted dichromate required 6.5ml of 0.10N FAS. 10ml of the same $K_2Cr_2O_7$ and 20ml of distilled water under the same conditions as the sample required 26ml of 0.10 N FAS. What is the COD of the sample?	8	L3	4
	c)	Explain the synthesis of nano material by sol-gel method.	6	L2	4
8.	a)	Describe the reasons and disadvantages of scale formation.	8	L2	4
	b)	Write a note on secondary and tertiary sewage treatment.	7	L2	4
	c)	What are nano materials? Mention any four applications of nanomaterials.	5	L2	4

Unit – V

9.	a)	Define GCV and NCV. On burning 0.76 $X10^{-3}$ kg of a solid fuel in a bomb calorimeter, the temperature of 2.5kg of water is increased from 25° C to 28° C. The water equivalent of calorimeter and latent heat of steam are 0.486 kg and 2454 kJ/kg respectively. Calculate its GCV and NCV. Given specific heat = 4.187kJ/kg/°C and % of H_2 is 2.5.	7	L3	5
	b)	What is knocking in IC engines? Explain its mechanism with chemical reactions. How can it be prevented?	7	L2	5
	c)	Explain the molecular ordering in Nematic and smectic liquid crystals	6	L2	5
10.	a)	Explain the determination of calorific value of solid fuel.	7	L2	5
	b)	Define cracking and reformation. Discuss the reactions involved in reformation process.	7	L2	5
	c)	What are liquid crystals? Explain the classification of liquid crystals with examples.	6	L2	5

BT* Bloom's Taxonomy, L* Level; CO* Course Outcome; PO* Program Outcome

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belagavi)

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

Make up Examinations - July - August 2021

20CY110 – ENGINEERING CHEMISTRY

ation: 3 Hours

Max. Marks: 100

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

		Marks	BT*	CO*	PO*
	Unit – I				
a)	Explain the free radical mechanism of addition polymerization by taking propylene as a monomer.	6	L2	1	1
b)	Give the synthesis, properties and applications of i) PMMA ii) Polyurethane	8	L3	1	1
c)	What are adhesives? Explain the synthesis and applications of epoxy resin.	6	L2	1	1
a)	Explain emulsion polymerization. Mention any two advantages.	6	L2	1	1
b)	Give the synthesis and applications of i) Butyl rubber ii) Silicon rubber	6	L3	1	1
c)	What are conducting polymers? Explain the mechanism of conduction in polyacetylene.	8	L2	1	1
	Unit – II				
a)	What is single electrode potential. Derive Nernst equation for single electrode potential.	7	L2	2	1
b)	Define reference electrode. Explain the construction and working of Calomel.	7	L2	2	1
c)	An electrode chemical cell consists of magnesium electrode in 0.042M $Mg(NO_3)_2$ solution and silver electrode in 0.35M $AgNO_3$ solution. The SRP of Mg and Ag are -2.363V and +0.80V respectively. Represent the cell, write the cell reaction and calculate the emf of the cell.	6	L3	2	2
a)	What are secondary batteries? Discuss the construction and working of Ni-mH battery.	7	L2	2	1
b)	Explain the following Battery characteristics. i) Cycle life ii) Voltage iii) Shelf life	6	L2	2	1
c)	What are fuel cells? Describe the construction and working of Methanol- oxygen fuel cell.	7	L2	2	1
	Unit – III				
a)	Define the term corrosion. Describe electrochemical theory of corrosion by taking iron as an example.	8	L2	3	1
b)	Explain the following factors affecting rate of corrosion. i) Nature of corrosion product ii) Anodic and catholic area	6 6	L2 L2	3 3	1
c)	Describe Galvanization and Tinning .				
a)	What is electroless plating? Differentiate between electroplating and electroless plating.	5	L4	3	

P.T.O.

7.	a)	Differentiate between scales and sludges. Explain the causes of scale formation.	7
	b)	Describe primary, secondary and tertiary sewage treatment process.	8
	c)	Explain Sol-gel method of synthesis of nanomaterial.	5
8.	a)	Explain the softening of water by ion exchange method.	8
	b)	What is desalination? Explain the desalination of water by electro dialysis method.	6
	c)	Describe the size dependent property of nanomaterials.	6
9.	a)	Explain bomb calorimetric method of determining calorific value of a solid fuel.	7
	b)	What is meant by cracking of petroleum? Explain fluidized bed catalytic cracking.	7
	c)	Explain the molecular ordering in the following liquid crystal phases. (i) Nematic (ii) Chiral Nematic	6
10.	a)	On burning 0.83×10^{-3} kg of a solid fuel in a bomb calorimeter, the temperature of 3.5 kg of water increased from 26.5°C to 29.2°C. The water equivalent of calorimeter and latent heat of steam are 0.385 kg and 4.2x587kJ/kg respectively. If the fuel contains 0.7% hydrogen, calculate its gross and net calorific values.	6
	b)	What is octane number? Explain with equations how reformation of gasoline enhances its octane rating.	8
	c)	Explain the classification of liquid crystal with examples.	6

BT* Bloom's Taxonomy, L* Level; CO* Course Outcome; PO* Program Outcome

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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 – September 2021

20CY110 – ENGINEERING CHEMISTRY

Duration: 3 Hours | Max. Marks: 100

*Note: 1) Answer any **Five full** questions.*
2) Draw the neat diagram wherever necessary.

		Marks	BT*
1. a)	What is glass transition temperature? Discuss the following factors influencing the glass transition temperature (i) Flexibility (ii) Crystallinity (iii) Branching	7	L*3
b)	Explain the manufacture and applications of (i) Polyurethane (ii) Polymethyl methacrylate.	7	L2
c)	What are adhesives? Explain the synthesis and applications of epoxy resin.	6	L3
2. a)	What are conducting polymers? Discuss the mechanism of conduction in polyacetylene.	7	L2
b)	Explain the free radical mechanism of addition polymerization with suitable example.	7	L3
c)	Explain the synthesis and applications of (i) Butyl rubber (ii) Silicone rubber	6	L2
3. a)	What is standard electrode potential? Derive Nernst equation for single electrode potential.	7	L3
b)	Explain the construction and working of Calomel electrode. Mention its advantages.	7	L2
c)	What are concentration cell? Derive an expression for EMF of a concentration cell.	6	L3
4. a)	What are fuel cells? Explain the construction and working of methanol oxygen fuel cell.	7	L2
b)	Explain the construction and working of Nickel-Metal hydride battery. Give the reaction involved during discharge and recharge modes.	7	L2
c)	Explain the classification of batteries with examples.	6	L2
5. a)	Define metallic corrosion. Discuss the following factors which affect the rate of corrosion (i) Nature of corrosion product (ii) Anodic and Cathodic area	7	L4
b)	Explain the following types of corrosion (i) Galvanic corrosion (ii) Differential aeration corrosion.	7	L2
c)	Explain the following. (i) Anodizing (ii) Galvanization	6	L2
6. a)	What is electroplating? Explain the electroplating of chromium for engineering applications.	7	L2
b)	Explain the effect of following factors on the nature of deposit (i) Current density (ii) pH (iii) Temperature	7	L4
c)	Explain the process of electroless plating of copper for the manufacture of PCB.	6	L2

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