

U.S.N

P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

I/II Semester, B.E. - Semester End Examination; August - 2023

Engineering Chemistry

(Common to All Branches)

Time: 3 hrs

Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Aware and Recognize the importance of Chemical fuels and Alternate fuels.

CO2: Describe the construction, working and applications of electrodes, cells, and batteries.

CO3: Apply the knowledge of Chemistry to understand the mechanism and prevention of corrosion.

Engineering applications of electro-plating and electro-less plating

CO4: Synthesis of various polymers and study their applications. Use of cement and lubricants in the field of engineering. Acquiring the knowledge of liquid crystals, nano science, water technology and Water pollution.

Note: I) PART - A is compulsory. Two marks for each question.

II) PART - B: Answer any **Two** sub questions (from a, b, c) for a Maximum of **18** marks from each unit.

Q. No.	Questions	Marks	BLs	COs	POs
I : PART - A		10			
1 a.	Define Calorific value.	2	L1	CO1	PO1
b.	Name any four components of battery.	2	L1	CO2	PO1
c.	Write any two applications of electro - less plating of Nickel	2	L1	CO3	PO1
d.	Name the monomers used in the synthesis of Kevlar.	2	L1	CO4	PO1
e.	What are liquid crystals? Give an example.	2	L1	CO5	PO1
II : PART - B		90			
UNIT - I		18			
2 a.	What are Chemical Fuels? Explain the construction and working of calorific value of solid fuel using bomb calorimeter.	9	L2	CO1	PO1
b.	Define PV cell. Illustrate the principal, working and applications of PV cell.	9	L2	CO1	PO1
c.	A sample of coal contains C = 94%, H = 5% and ash = 1%.The following data were obtained when the above coal was tested in bomb calorimeter. Weight of coal = 0.95g, weight of water taken = 700g, weight of water equivalent of calorimeter = 2000 g, increase in temperature = 2.48°C, Fuse wire correction = 10.0 cal. Acid correction=60.0 cal, Cooling correction=0.02°C. Calculate the GCV and NCV of coal (latent heat of condensation of steam=587cal/g) S = 4.187 J/kg/°C.	9	L3	CO1	PO2
UNIT - II		18			
3 a.	Summarize the construction, working and applications of Calomel electrode.	9	L2	CO2	PO2

- b. Explain the construction, working and applications of Methanol-Oxygen fuel cell. 9 L2 CO2 PO1
- c. Discuss the following battery characteristics:
- i) EMF ii) Capacity iii) % of Energy efficiency 9 L2 CO2 PO2
- iv) Shelf life v) Cycle life

UNIT - III**18**

- 4 a. Describe the differential metal corrosion and differential aeration corrosion with example. 9 L2 CO3 PO2
- b. Outline the following factors affecting the rate of corrosion:
- i) Nature of Metal 9 L2 CO3 PO2
- ii) Nature of corrosion product
- iii) Anodic and cathodic areas
- c. Define electro-less plating. Describe the electro-less plating of Cu on PCB 9 L1 CO3 PO1

UNIT - IV**18**

- 5 a. Illustrate the synthesis and applications of the following polymers:
- i) PMMA ii) Polycarbonates iii) Epoxy Resin 9 L2 CO4 PO2
- b. What are the constituents of cement? Explain the following properties of cement:
- i) Quality ii) Shrinkage 9 L1 CO4 PO1
- iii) Soundness iv) Color
- c. Define conducting polymer. Describe the synthesis, mechanism (n-type) and applications of poly-acetylene. 9 L1 CO4 PO2

UNIT - V**18**

- 6 a. Define Nano chemistry. Explain the following size dependent properties of nanomaterial:
- i) Surface area ii) Electrical properties 9 L1 CO5 PO2
- iii) Optical properties iv) Catalytic properties
- b. Discuss the purification of water for Municipal supply. 9 L2 CO5 PO1
- c. Define BOD and COD. Calculate the COD of effluent sample when 25 ml of effluent is mixed and refluxed with 25ml of $K_2Cr_2O_7$ required 9.8 ml of 0.05N FAS. The blank titration consumed 19.8ml of 0.05 N FAS. 9 L3 CO5 PO2

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