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P.E.S. College of Engineering, Mandya - 571 401
(An Autonomous Institution affiliated to VTU, Belagavi)
First Semester, B.E. - Semester End Examination; May - 2022
Engineering Chemistry
(Common to All Branches)

Time: 3 hrs   Max. Marks: 100

Course Outcomes

The Students will be able to:

CO1: Recollect the fundamental Definitions or Laws of Chemistry relevant to Engineering field.

CO2: Discuss the various Properties and Applications by understanding the course topics pertaining to Engineering field.

CO3: Explain various Concepts and Principles used in the topics to understand the theory related to Engineering field.

CO4: Describe the Synthesis and applications of materials in the engineering field.

CO5: Solve the numerical problems by applying proper solutions to verify the theoretical concepts related to engineering.

<u>*Note:*</u> *I) PART - A is compulsory. **Two** marks for each question.*

*II) PART - B: Answer any <u>**Two**</u> 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**			
I a.	Define the terms; EMF of Cell and Free energy.	2	L1	CO1	PO1
b.	Give any two technological importance of metal finishing.	2	L2	CO2	PO2
c.	Mention the applications of araldite.	2	L2	CO2	PO2
d.	Write any two principles of green chemistry.	2	L2	CO3	PO2
e.	Define COD and BOD of sewage.	2	L1	CO1	PO1
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	What is knocking? Explain the mechanism of knocking of petrol engine. Mention its ill effect.	9	L2	CO3	PO2
b.	What are reference electrodes? Discuss the construction, working and applications of calomel electrode.	9	L2	CO2	PO2
c.	What are fuel cells? With neat diagram, describe the construction, working and applications of methanol-oxygen fuel cell.	9	L2	CO4	PO2
	UNIT - II	**18**			
2 a.	What is corrosion? Discuss the electrochemical theory of corrosion with reactions taking corrosion of iron as an example.	9	L2	CO2	PO2
b.	Explain the following factors affecting the rate of corrosion: i) Nature of Metal ii) Ratio of anodic to cathodic area iii) Nature of corrosion product iv) p^H	9	L2	CO3	PO2

c.	What is electroplating? Explain the electroplating of chromium. Outline its applications.	9	L2 CO4 PO2	

UNIT - III 18

3 a.	What are the types and constituents of cement? Explain the analytical procedure for determination of percentage of CaO on cement.	9	L2 CO3 PO2
b.	Explain the synthesis and applications of, i) Polycarbonates ii) Kevlar iii) Thiokol	9	L2 CO4 PO1
c.	What are conducting polymer? Discuss the synthesis and *n*-type mechanism of poly-acetylene.	9	L2 CO4 PO1

UNIT - IV 18

4 a.	Explain the synthesis of following organic compounds by conventional and green routes: i) Adapic acid ii) Paracetamol	9	L2 CO4 PO1
b.	What is meant by atom economy? Explain the synthesis of ethylene oxide and methyl methacrylate.	9	L2 CO4 PO1
c.	Discuss the synthesis of nano-material's by, i) Sol-gel process ii) Precipitation method	9	L2 CO3 PO1

UNIT - V 18

5 a.	i) Outline the analytical procedure for estimation of COD in industrial waste water.	5	L2 CO3 PO2
	ii) 20 ml of sewage sample for COD is reacted with 25 ml of $K_2Cr_2O_7$ solution and un-reacted $K_2Cr_2O_7$ required 9.0 ml of 0.25 N FAS solution. Under similar conditions in black titration 15.0 ml of FAS is used up. Calculate the COD of the sample.	4	L3 CO5 PO2
b.	State Beer-Lambert's Law. Explain the instrumentation and application of colorimetry.	9	L2 CO3 PO2
c.	Explain the purification of water for town supply.	9	L2 CO4 PO1

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