USN | | | | | | | | | | **BCHEM102/202**

First/Second Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Applied Chemistry for ME Stream

Time: 3 hrs.   Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. VTU Formula Hand Book is permitted.

		Module – 1	M	L	C
Q.1	a.	With a neat diagram, explain the construction working and application of photovoltaic cell.	7	L2	CO1
	b.	Calculate the GCV and NCV of a sample of coal 0.75g of which when burnt in a bomb calorimeter raised the temperature of water from 22.5ºC to 26ºC. The mass of water is 1000 g and water equivalent of calorimeter is 250g. The specific heat of water is 4.187 kJ/kg/K, latent heat of steam is 2454 kJ/kg. The coal sample contains 92% carbon , 7% H_2 and 1% ash.	7	L3	CO1
	c.	Explain the construction and working of Li-ion battery and mention its applications.	6	L2	CO1
		OR			
Q.2	a.	Explain the determination of calorific value of solid / liquid fuel using bomb calorimeter.	7	L1	CO1
	b.	Explain the construction and working of Methanol – Oxygen fuel cell.	7	L1	CO1
	c.	Interpret a suitable method for the synthesis of biodiesel and mention advantages and disadvantages of biodiesel.	6	L1	CO1
		Module – 2			
Q.3	a.	Explain the electrochemical theory of corrosion with suitable reactions by taking iron as example.	7	L2	CO2
	b.	Calculate the CPR in both mpy and mmpy for a thick steel sheet of area 100 inch^2 which experiences a weight loss of 400 g after one year. (Density of steel = 7.9 g/cm^3).	7	L3	CO2
	c.	What is metal finishing? Mention any five technological importance of metal finishing.	6	L1	CO2
		OR			
Q.4	a.	Describe anodization and mention any two applications.	7	L1	CO2
	b.	What is Electroless plating? Explain the electroless plating of Nickel.	7	L2	CO2
	c.	Explain the following with suitable example : i) Differential metal corrosion ii) Differential aeration corrosion.	6	L1	CO2

		Module – 3			
Q.5	**a.**	Explain the synthesis of CPVC and mention its properties and applications.	7	L1	CO3
	b.	In a sample of polymer , 25% molecules have molecular mass 15000g/mol , 40% molecules have molecular mass 25000 g/mol and remaining molecule have molecular mass 20000 g/mol. Calculate the number average and weight average molecular weight of the polymer.	7	L3	CO3
	c.	Explain the synthesis of Teflon and mention its applications.	6	L2	CO3
		OR			
Q.6	**a.**	Define and explain the condensation polymerization with suitable example.	7	L1	CO3
	b.	Explain the synthesis of Kevlar fibers and mention the properties and applications.	7	L2	CO3
	c.	Write any three properties and industrial applications of : i) metal matrix polymer composites ii) Lubricants.	6	L1	CO3
		Module – 4			
Q.7	**a.**	Explain the application of potentiometric sensor in the estimation of iron.	7	L1	CO4
	b.	Explain the principle and working of glass electrode with neat diagram.	7	L2	CO4
	c.	Define Phase , Components and Degree of freedom.	6	L1	CO4
		OR			
Q.8	**a.**	Explain the application of colorimetric sensor in the estimation of copper.	7	L1	CO4
	b.	Discuss the application of phase rule to lead – silver system.	7	L1	CO4
	c.	Explain the application of glass electrode in the determination of p^H of beverages.	6	L2	CO4
		Module – 5			
Q.9	**a.**	What are alloys? Mention the composition properties and application of stainless steel.	7	L1	CO5
	b.	Sol gel method is suitable for the preparation of nanomaterials. Justify with suitable example.	7	L1	CO5
	c.	Explain any two size dependent properties of nanomaterials.	6	L2	CO5
		OR			
Q.10	**a.**	Mention the composition , properties and application of brass.	7	L1	CO5
	b.	What are Ceramics? Mention the properties and applications of Perovskites.	7	L1	CO5
	c.	Write a brief note on : i) CNTs ii) Graphene.	6	L1	CO5

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