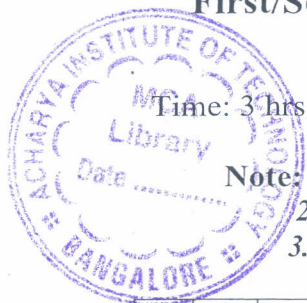BCHEM102/202

First/Second Semester B.E/B.Tech. Degree Examination, June/July 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 Handbook is permitted.

		Module – 1	M	L	C
1	a.	Define calorific value. Explain the determination of calorific value using Bomb calorimeter.	8	L2	CO1
	b.	What is Biodiesel? Outline the synthesis of Biodiesel and mention any two applications.	6	L2	CO1
	c.	Explain the construction, working and applications of PV cells.	6	L2	CO1
		OR			
2	a.	Calculate the HCV and LCV of the sample of 1.3g of coal (C 90%, H_2 5% and ash 5%) was subjected to combustion in a bomb calorimeter. The mass of water taken was 2500g and the water equivalent of the calorimeter was 550 g. The rise in temperature was found to be 4.2°C. [Latent heat of steam = 2457 kJ/kg and specific heat of water = 4.187 kJ/kg/°C]	6	L3	CO1
	b.	Explain the production of Hydrogen by electrolysis of water.	6	L2	CO1
	c.	What are fuel cells? Outline the construction, working and applications of Methanol – Oxygen fuel cell.	8	L2	CO1
		Module – 2			
3	a.	Illustrate the electrochemical theory of corrosion by taking Fe as example.	8	L2	CO2
	b.	Explain the following : i) Galvanization ii) Sacrificial anode method.	6	L2	CO2
	c.	Explain the electroplating of chromium by hard and decorative method.	6	L2	CO2
		OR			
4	a.	Explain : i) Differential metal corrosion ii) Water line corrosion.	8	L2	CO2
	b.	What is CPR? A thick steel sheet of area 400 cm^2 is exposed to air near the ocean. After a one year period it was found to experience a weight loss of 375 g due to corrosion. If the density of the brass is 7.9 g/cm^2, calculate the corrosion penetration rate in mpy and mm/g [Given K = 534 in mpy, and 87.6 in mm/g].	8	L3	CO2
	c.	List any four technical importance of metal finishing.	4	L2	CO2
		Module – 3			
5	a.	A polymer contains 250 molecules of molecular mass 2500, 200 molecules with 2,000 molecular mass and 150 molecules with molecular mass 1000, calculate the number average and weight average molecular mass.	6	L3	CO3
	b.	Explain the synthesis, properties and application of Kevlar fiber.	7	L2	CO3
	c.	Explain the synthesis, properties and applications of PMMA.	7	L2	CO3

		OR			
6	a.	Explain the synthesis, properties of polystyrene.	6	L2	CO3
	b.	Explain the synthesis, properties and applications of polyester.	7	L2	CO3
	c.	Explain the synthesis, properties and applications of Teflon.	7	L2	CO3
		Module – 4			
7	a.	Explain the lead-silver two component system with neat labeled diagram.	6	L2	CO4
	b.	Explain the principle, instrumentation and working of potentiometric sensor.	8	L2	CO4
	c.	Explain the determination of pH of beverage.	6	L2	CO4
		OR			
8	a.	Define the following terms : i) Phase ii) Components iii) Degree of freedom.	6	L2	CO4
	b.	Explain the principle, instrumentation and working of optical sensor (colorimetry).	8	L3	CO4
	c.	Explain the instrumentation and working of Glass electrode.	6	L2	CO4
		Module – 5			
9	a.	Define alloys. Explain the composition along with properties of brass.	6	L2	CO5
	b.	Explain the synthesis of co-precipitation method by suitable example.	6	L2	CO5
	c.	List the properties and engineering applications of carbon nanotubes.	8	L2	CO5
		OR			
10	a.	Explain the composition along with properties of Alnico.	6	L2	CO5
	b.	Explain the properties and application of Perovskite $(CaTio_3)$	6	L2	CO5
	c.	Explain the synthesis of nanoparticles by Sol-Gel method.	8	L2	CO5

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