

First/Second Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 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. VTU Formula Hand Book is permitted.
3. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Explain the determination of calorific value of solid fuel using bomb calorimeter.	07	L2	CO1
	b.	Write note on Power Alcohol and Biodiesel.	06	L1	CO1
	c.	Describe the production of hydrogen by electrolysis of water. Mention its advantages.	07	L2 L1	CO1
OR					
Q.2	a.	0.98 g of fuel on complete combustion in excess of oxygen increases the temperature of water in a calorimeter from 13.25 to 19.2°C. The mass of water in a calorimeter is found to be 1450 g. Calculate the GCV and NCV of the fuel, if the water equivalent of calorimeter is 450 g and percentage of hydrogen is 8.	06	L3	CO1
	b.	Explain the construction and working of photovoltaic cell and list its advantages.	07	L2 L1	CO1
	c.	Describe the construction and working of methanol-oxygen fuel cell with acid electrolyte.	07	L2	CO1
Module – 2					
Q.3	a.	Define Metallic Corrosion. Describe the electrochemical theory of corrosion taking rusting of iron as an example.	07	L1 L2	CO2
	b.	Write the principle and explanation for differential metal and stress corrosion.	07	L1 L2	CO2
	c.	What is Cathodic Protection? Describe sacrificial anode technique and mention its advantages and disadvantages.	06	L1 L2	CO2
OR					
Q.4	a.	What is Metal Finishing? Write the bath composition and reactions involved in electroplating of decorative chromium.	07	L1	CO2
	b.	A steel sheet of area 100 inch ² is exposed to air near ocean. After 1 year period it was found to experience a weight loss of 485 g due to corrosion. If density of steel sheet is 7.9 g/cm ³ . Calculate CPR in mpy and in mm/year.	06	L3	CO2
	c.	Define Galvanization. Describe galvanizing of iron and mention its application.	07	L1 L2	CO2

Module – 3

Q.5	a.	What are Polymers? Explain the preparation, properties and industrial applications of polystyrene.	07	L1 L2	CO3
	b.	In a sample of polymer, 100 molecules have molecular mass 103 g/mol, 250 molecules have molecular mass 104 g/mol and 300 molecules have molecular mass 105 g/mol. Calculate number average and weight average molecular weight of the sample polymer.	06	L3	CO3
	c.	Define Polymer Composite. Explain the synthesis, properties and applications of Kevlar.	07	L1 L2	CO3

OR

Q.6	a.	Write the properties and applications of lubricants.	07	L1	CO3
	b.	Discuss the synthesis of PMMA. Mention its properties and industrial applications.	06	L1 L2	CO3
	c.	Define Polymer Composite. List out the properties and industrial applications of carbon based reinforced composites.	07	L1	CO3

Module – 4

Q.7	a.	Define the term Phase, Component and Degree of Freedom in phase rule equation.	06	L1	CO4
	b.	Discuss the application of phase rule to two component lead-silver system.	07	L2	CO4
	c.	Explain the principle and instrumentation of potentiometric sensors.	07	L2	CO4

OR

Q.8	a.	Explain the principle and instrumentation of optical sensors in colorimetry.	07	L2	CO4
	b.	Explain the principle and instrumentation of pH sensors in determination of pH of beverages.	07	L2	CO4
	c.	Explain the process of estimation of iron from a sample solution by using potentiometric sensors.	06	L2	CO4

Module – 5

Q.9	a.	Write the composition of any one of the stainless steel alloy. Mention its properties and applications.	07	L1	CO5
	b.	Explain chemical composition, properties and applications of perovskites.	07	L2	CO5
	c.	Discuss the catalytic and thermal properties of nanomaterials.	06	L2	CO5

OR

Q.10	a.	Explain the synthesis of nano materials by sol-gel method.	07	L2	CO5
	b.	Define Alloys. Explain the properties and applications of brass alloy.	07	L1 L2	CO5
	c.	Discuss the properties and engineering applications of carbon nanotubes.	06	L2	CO5
