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BCHEM102/202

## First/Second Semester B.E./B.Tech. Degree Examination, June/July 2023 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.	Organize the determination of calorific value of a solid fuel using Bomb Calorimeter.	7	L2	CO1
	b.	Sketch and explain the construction and working of photovoltaic cells and define solar cell.	6	L2	CO1
	c.	0.75 g of coal sample (carbon 90%, H <sub>2</sub> 5% and 5% ash) was subjected to combustion in bomb calorimeter. Mass of water taken in calorimeter was 2.5 kg and the water equivalent of calorimeter is 0.65 kg. The rise in temperature was found to be 3.2°C. Calculate higher and lower calorific values of the sample. Latent heat of steam = 2457 kJ/kg and specific heat of water = 4.187 kJ/kg/°C.	7	L3	CO1
<b>OR</b>					
Q.2	a.	Describe the construction and working of methanol oxygen fuel cell and its applications.	7	L2	CO1
	b.	Write notes on: (i) Power alcohol (ii) Bio-diesel	6	L2	CO1
	c.	Illustrate the production of hydrogen by electrolysis of water.	7	L2	CO1
<b>Module – 2</b>					
Q.3	a.	Define corrosion. Describe the electrochemical theory of corrosion taking rusting of iron as an example.	7	L2	CO2
	b.	Explain: (i) Water line corrosion (ii) Pitting corrosion	6	L2	CO2
	c.	What is electroless plating? Explain electroless of Nickel.	7	L2	CO2
<b>OR</b>					
Q.4	a.	What is meant by metal finishing? Mention (any five) technological importance of metal finishing.	6	L2	CO2
	b.	Explain the process of (i) Galvanizing (ii) Anodizing of Al.	7	L2	CO2
	c.	What is electroplating? Explain electroplating of chromium. Mention why chromium cannot be used as anode.	7	L2	CO2
<b>Module – 3</b>					
Q.5	a.	Illustrate about the number average and weight average molecular weight.	6	L3	CO3
	b.	Organize the properties and applications of lubricants.	7	L2	CO3
	c.	Organize the synthesis, properties and applications of polystyrene.	7	L2	CO3
<b>OR</b>					
Q.6	a.	Organize the synthesis, properties and applications of Kevlar.	6	L2	CO3
	b.	Illustrate the synthesis, properties and applications of polyester.	7	L2	CO3
	c.	Organize the synthesis, properties and applications of PMMA.	7	L2	CO3
<b>Module – 4</b>					
Q.7	a.	Sketch and explain the optical sensor (colorimetry) and write its applications.	7	L2	CO4
	b.	Organize the instrumentation of potentiometric sensor and its application in the estimation of iron.	6	L2	CO4
	c.	Explain the concept of phase, components, degree of freedom, phase rule equation.	7	L2	CO4

OR					
Q.8	a.	Explain along with diagram Lead-Silver two component system.	7	L2	CO4
	b.	Explain the principle, instrumentation and working of pH sensor (Glass electrode).	7	L2	CO4
	c.	Organize the pH sensors applications in the determination of pH of beverages.	6	L2	CO4
Module – 5					
Q.9	a.	Explain the properties and applications of carbon nanotubes and graphene.	6	L2	CO5
	b.	Define alloys. Explain the composition along with properties of AlNiCo.	7	L2	CO5
	c.	Explain the chemical composition, properties and applications of perovskites.	7	L2	CO5
OR					
Q.10	a.	Explain the synthesis of nanomaterials by sol-gel method.	7	L2	CO5
	b.	Explain size dependant properties of nanomaterials with respect to surface area, catalytical and thermal.	6	L2	CO5
	c.	Define Alloys. Explain the composition along with properties of Brass.	7	L2	CO5

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