MAKE-UP EXAM

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BCHEC102/202

First/Second Semester B.E./B.Tech. Degree Examination, Nov./Dec. 2023
Applied Chemistry for Civil Engg 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 properties and applications of iron alloys.	07	L1, L2	CO1
	b.	Explain the testing of cement by EDTA method.	07	L2	CO1
	c.	What are refractories? Mention the properties and applications of refractories.	06	L2	CO1
		OR			
Q.2	a.	Explain the properties and applications of aluminium alloys.	07	L1	CO1
	b.	Describe the setting and hardening process in cement.	07	L3	CO1
	c.	Describe the classification of glass based on chemical composition.	06	L1, L2	CO1
		Module – 2			
Q.3	a.	Explain the construction and working of photovoltaic cell.	07	L2	CO2
	b.	Explain electrochemical theory of corrosion of steel in concrete.	06	L2	CO2
	c.	Explain the construction and working of Li-ion battery.	07	L2	CO2
		OR			
Q.4	a.	Define and explain the following types of corrosion: i) Differential aeration corrosion ii) Stress corrosion	07	L2	CO2
	b.	Explain the following methods of controlling of corrosion : i) Sacrificial anode method ii) Galvanization	06	L2	CO2
	c.	Explain the construction, working and applications of Methanol – Oxygen fuel cell.	07	L2	CO2
		Module – 3			
Q.5	a.	Define nanomaterials. Explain the synthesis of nanomaterials by sol-gel method.	07	L1, L2	CO3
	b.	25 ml of sewage water was acidified and refluxed with 10ml of $K_2Cr_2O_7$. The unreacted $K_2Cr_2O_7$ consumed 15ml of 0.2 N FAS. In a blank titration 10ml of $K_2Cr_2O_7$ consumed 20ml of 0.2 N FAS. Calculate COD of sewage.	07	L2	CO3
	c.	Explain softening of water by ion exchange method.	06	L2	CO3
		OR			
Q.6	a.	Explain the size dependent properties of nanomaterials with example. i) Surface area ii) Catalytic property.	07	L2	CO3
	b.	Describe the properties and engineering applications of i) Carbon nanotubes ii) Graphene	06	L2	CO3
	c.	The standard hard water contains 15g of $CaCO_3$ per liter. 20ml of this required 25 ml of EDTA solution. (i) 100 ml of sample of water required 18ml of solution (ii) The same sample after boiling required 12ml of EDTA solution. Calculate the temporary hardness of the given sample of water in terms of ppm.	07	L2	CO3

Module – 4					
Q.7	**a.**	What are polymers? Explain condensation polymerization and addition polymerization with examples.	**07**	**L2**	**CO4**
	b.	What are polymer composites? Explain properties and applications of Fiber Reinforced Polymer Composites (FRPC).	**06**	**L2**	**CO4**
	c.	Explain the synthesis, properties and applications of polyethylene.	**07**	**L2**	**CO4**
OR					
Q.8	**a.**	Explain the synthesis of polypropylene and Nylon fiber.	**06**	**L1, L2**	**CO4**
	b.	What are biodegradable polymers? Explain the synthesis and applications of polylactic acid.	**07**	**L2**	**CO4**
	c.	In a polymer sample, 20% molecules have molecular mass 15000 g/mol, 35% molecules have molecular mass 25000 g/mol and remaining molecular mass 20000 g/mol. Calculate the number average and weight average molecular mass of polymer.	**07**	**L2**	**CO4**
Module – 5					
Q.9	**a.**	Explain the terms involved in phase rule with examples.	**07**	**L2**	**CO5**
	b.	Explain the estimation iron using potentiometric sensors.	**07**	**L2, L3**	**CO5**
	c.	Explain the determination of pH of soil sample using pH (meter) sensors.	**06**	**L2**	**CO5**
OR					
Q.10	**a.**	With neat diagram describe two component lead-silver system.	**07**	**L1, L2**	**CO5**
	b.	Explain the instrumentation and applications of conductometric sensors (conductometric titration)	**07**	**L2**	**CO5**
	c.	What is phase rule? Explain phase, component and degree of freedom.	**06**	**L2**	**CO5**

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