USN | | | | | | | | | Course Code | 2 | 2 | C | H | E | C | 12 | / | 22

First / Second Semester B.E. Degree Summer Semester Examinations, September/October 2025
CHEMISTRY FOR CIVIL ENGINEERING STREAM

Duration: 3 hrs   **Max. Marks: 100**

*Note: 1. Answer any **FIVE** full questions, choosing **ONE** full question from each module.*
2. Use of Chemistry Formula Handbook is permitted.
3. Missing data, if any, may be suitably assumed.

Q. No		Question	Marks	(RBTL:CO:PI)
		Module-1		
1.	a.	With neat figure describe production of hydrogen by electrolysis of water.	06	(2 :1 : 1.2.1)
	b.	Describe manufacturing of cement by wet process.	06	(2 :1 : 1.2.1)
	c.	On burning a coal sample of 0.75 g in a bomb calorimeter, The temperature of 4500 g of water in the calorimeter raises from $25.5^{\circ}C$ to $30.5^{\circ}C$. If water equivalent of stirrer, bomb etc., = 450 g, Calculate GCV & NCV of the coal, Given that, % of hydrogen in the fuel = 5 %, Specific heat of water= 4.187 KJ/Kg/$^{\circ}C$, latent heat of steam = 2454 KJ/Kg. Calculate GCV & NCV of the fuel.	08	(3 :1 : 1.2.1)
		(OR)		
2.	a.	Discuss synthesis of bio-diesel. List the advantages of biodiesel.	06	(2 :1 : 1.2.1)
	b.	Explain properties and application of aluminium.	06	(2 :1 : 1.2.1)
	c.	Calculate HCV & LCV from the following data obtained from Bomb calorimeter experiment: Weight of the fuel taken = 1.50 g, Water equivalent of stirrer, bomb etc., = 550 g, Weight of the water in the calorimeter = 5000 g, initial temperature of water in calorimeter = 24.5 ^{0}C, maximum temperature water in calorimeter= 29.5 ^{0}C, % of hydrogen = 5 %, Specific heat of water= 4.187 KJ/Kg/$^{\circ}C$ and latent heat of steam = 2454 KJ/Kg.	08	(3 :1 : 1.2.1)
		Module-2		
3.	a.	Define metal finishing. Mention technological importance of metal finishing.	06	(2 :2 : 1.2.1)
	b.	What are fuel cells? With neat figure describe construction working and application of methanol-oxygen fuel cell.	06	(2 :2 : 1.2.1)
	c.	Define corrosion. Explain electrochemical theory of corrosion with reference to rusting of iron.	08	(3 :2 : 1.2.1)
		(OR)		
4.	a.	Define galvanisation. Discuss steps involved in galvanisation with neat figure.	06	(2 :2 : 1.2.1)
	b.	With neat figure describe construction, working and application of lithium-ion battery.	06	(2 :2 : 1.2.1)

Note: (**RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI - Performance Indicator**)

	c.	Distinguish between electro plating and electro less plating.	**08**	**(3 :2 : 1.2.1)**

Module-3

5.	**a.**	Explain softening of water by ion exchange process.	**06**	**(2 :3 : 1.2.1)**
	b.	Describe synthesis of nano materials by sol-gel process.	**06**	**(2 :3 : 1.2.1)**
	c.	Define COD. In COD determination 50 ml waste water titrated with 0.05N FAS solution. Blank and main titrations readings were found to be 35.5 ml and 22.0 ml respectively. Calculate COD of the waste water.	**08**	**(3 :3 : 1.2.1)**

(OR)

6.	**a.**	Explain the process of reverse osmosis.	**06**	**(2 :3 : 1.2.1)**
	b.	Explain properties and industrial applications of Graphene's.	**06**	**(2 :3 : 1.2.1)**
	c.	A sample hard water was found to contain fallowing dissolved salts in mg/L $Mg(HCO_3)_2=252$, $Ca(HCO_3)_2=162$, $MgSO_4=240$, and $MgCl_2=95$ calculate Temporary, Permanent and Total Hardness of water. Given that, molecular weight of $Mg(HCO_3)_2=146$, , $Ca(HCO_3)_2=162$, $MgSO_4=120$, and $MgCl_2=95$	**08**	**(3 :3 : 1.2.1)**

Module-4

7.	**a.**	Explain synthesis, properties and applications of Poly-vinyl chloride.	**06**	**(2 :4 : 1.2.1)**
	b.	Explain synthesis, properties and applications of Kevlar.	**06**	**(2 :4 : 1.2.1)**
	c.	Define adhesives. Explain synthesis, properties and applications of epoxy resin.	**08**	**(3 :4 : 1.2.1)**

(OR)

8.	**a.**	Explain synthesis, properties and applications of Teflon.	**06**	**(2 :4 : 1.2.1)**
	b.	Explain synthesis, properties and applications of polyester.	**06**	**(2 :4 : 1.2.1)**
	c.	Define lubricant. Explain classification, properties and application of lubricants.	**08**	**(3 :4 : 1.2.1)**

Module-5

9.	**a.**	Explain advantages and disadvantages of instrumental methods.	**06**	**(2 :5 : 1.2.1)**
	b.	Describe theory and instrumentation of Conductometry.	**06**	**(2 :5 : 1.2.1)**
	c.	State phase rule equation. Explain terms involved in phase rule equation.	**08**	**(3 :5 : 1.2.1)**

(OR)

10.	**a.**	Describe theory and instrumentation of potentiometry.	**06**	**(2 :5 : 1.2.1)**
	b.	Describe colorimetric instrumentation with neat figure and its application in the estimation of beverages.	**06**	**(2 :5 : 1.2.1)**
	c.	Draw phase diagram for lead-silver system. Explain degree of freedom in the areas, along the curves and points.	**08**	**(3 :5 : 1.2.1)**

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