		D.L.	Group-B-111 : Applied Chemistry		
P. Pages : 2 Time : Three Hours			GUG/W/16/ * 3 9 3 5 * Max. Mar		
	Note	es: 1. 2. 3. 4. 5.	All questions carry equal marks. Assume suitable data wherever necessary. Diagrams and Chemical equation should be given where Illustrate your answers wherever necessary with the help Use of calculator is allowed.	ver necessary. of neat sketches.	
1.	a)	A turbic followin $C_a(HCC)$	hard water using $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ as coagulant at the rate ng analysis. $\text{O}_3)_2 = 162 \text{ ppm}, \text{ M}_g(\text{HCO}_3)_2 = 146 \text{ppm},$	of 278 ppm, gave 13	
		MgSO ₄ Calculat (86% pt	$_{4} = 120$ ppm, CaSO ₄ = 136 ppm CaCl ₂ = 111 ppm & M te temporary, permanent and Total Hardness of water. Als ure) and soda (90% pure) needed for softening 10 million	$lgCl_2 = 95$ ppm to calculate Lime litres of the water.	
	b)	Give chemical reactions involved in lime-soda process of softening hard water containing $C_a(HCO_3)_2$, MgCl ₂ .			
			OR		
2.	a)	The Har through regenera concent	rdness of 20,000 litres of a water sample was completel a zeolite softener. The zeolite softener required 220 lit ation. If the water has a hardness equivalent to 171 ppm of ration of the Nacl solution used.	by removed by passing it 5 tres of Nacl solution for of C_aCO_3 , Calculate the	
	b)	Write th i) Ca	ne causes, prevention and effects of; ustic embrittlement ii) Priming and Foam	ing 8	
	c)	What ar	e scales? What are the disadvantages of scales?	3	
3.	a)	Explain	in brief the differential aeration theory of corrosion.	4	
	b)	Explain	working of Ni-Cd batteries its advantages, limitations and	d applications. 6	
	c)	Write no i) Pit	otes on: ting corrosion ii) Stress corrosion OR	6	
4.	a)	What is example	Cathodic Protection ? How it is done by using Sacrifies.	icial anode with suitable 6	
	b)	Explain	working of Alkaline fuel cell with chemical equations inv	volved. 5	
	c)	Describ	e in detail the various factors which influence corrosion.	5	
5.	a)	State pri	inciples of Green chemistry and explain any six of them.	6	
	b)	Write no i) He ii) Us	otes on: at of Hydration. e of fly Ash as cementing material.	6	

ii) Ready Mix concrete.

	c) What are the important process parameters for manufacturing of good cement				
6.	a)	Draw a neat and well-labeled diagram of rotary kiln and mention the various thermo chemical reactions taking place during cement manufacturing process.			
	b)	 Explain:- i) Concept of carbon Credits. ii) High Alumina cement. iii) Characteristics of the constitutional compounds in cement. 			
7.	a)	Give experimental details for determining calorific value of a gaseous fuel by Boy's calorimeter.			
	b)	The following data were obtained in a Boy's calorimeter experiment;	4		
		 i) Volume of gaseous fuel burnt = 0.1m³ ii) Weight of water used for cooling the combustion products = 25 Kg iii) Weight of steam condensed = 0.025 Kg iv) Temperature of Inlet water = 20°C v) Temperature of outlet water = 33°C Determine HCV and LCV of the gaseous fuel. 			
	c)	Write note on: i) Bio-diesel and ii) Doping Agents for petrol	6		
8.	a)	Explain refining of petroleum by fractional distillation method.			
	b)	Explain synthetic petrol from coal by Fischer-Tropsch process.			
	c)	A boiler is fired with coal having $C = 80\%$, $H = 4.5\%$, $S = 1.8\%$, $O = 4\%$, $N = 1.5$ and remaining ash. Calculate gross and net calorific value of 1Kg of coal using Dulong's formula.			
9.	a)	Lubricating oil has SUS 58 seconds at 210 °F and 600 seconds at 100 °F. The high viscosity standard Pennsylvanian oil has SUS 58 second at 210 °F and 400 seconds at 100 °F. The low viscosity index standard Gulf oil has SUS 58 seconds at 210 °F and 800 seconds at 100 °F. Calculate viscosity Index of oil.			
	b)	Explain structure and properties of graphite as a lubricant.			
	c)	Name the different mechanisms of Lubrication ? Explain Extreme Pressure Lubrication. With suitable examples.			
		OR			
10.	a)	Define flash and fire point.	2		
	b)	A producer gas has the following percentage composition by volume: $CO = 25\%$, $H_2 = 10\%$, $CO_2 = 10.3\%$ $CH_4 = 3.5\%$ and $N_2 = 50.7\%$. Calculate:			
		 i) Theoretical quantity weight and volume of air required per m³ of the gaseous fuel. ii) IF 25% excess air is used, find the % composition of dry products of combustion. 			

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