Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN | | | | | | | | | | |

Fourth Semester B.E. Degree Examination

Stoichiometry

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module -1	*Bloom's Taxonomy Level	Marks
Q.01	a	The density of the liquid is 1500 kg/m^3. What is its specific gravity. What volume does 140 pounds of this material will occupy?	L1,L2	06
	b	$AgNO_3$ reacts with $BaCl_2$ to form AgCl & $Ba(NO_3)_2$ i. Write the balanced chemical equation ii. If 39.02 g of $BaCl_2$ reacted in an excess of $AgNO_3$, how many representative particles of AgCl are produced. iii. If 40g of $Ba(NO_3)_2$ are produced how many grams of $AgNO_3$ were reacted	L2,L3	14
		OR		
Q.02	a	A product gas from a reaction has the composition by weight. Cl_2—67%, Br_2—28%, O_2—5%, using the ideal gas law calculate i. the composition of gas by volume ii. the density of the mixture in g/L at 25^oC iii. Specific gravity of the mixture. iv. Average molecular weight of the mixture.	L2,L3	08
	b	A compound whose molecular weight is 103, analyses C—81.5%, H2—4.9% and N2—13.6%. What is its molecular formula?	L2,L3	08
	c	What is the molarity of a solution containing 8g of EDTA in 300 cm^3 of it?	L2,L3	04
		Module-2		
Q. 03	a	Feed containing 50% of benzene and 50% of toluene is fed to the distillation column at a rate of 5,000 kg/hr. Distillate contains 95% benzene and bottom product contains 92% toluene. All percentages are by weight percentage. I. Calculate the mass flow rate of distillate and bottom product % Recovery of Benzene	L2,L3	10
	b	2000kg of wet solids by weight containing 70% solid by weight are fed to a tray drier and is dried by hot air.The product finally obtained is found to contain 1% moisture and 99% solids by weight. Calculate i) kg of water removed from wet solids ii) kg of product obtained	L2,L3	10
OR				
Q.04	a	A liquid adhesive, which is used to make laminated boards, consists of a polymerdissolved in a solvent. The amount of polymer in the solution has to be carefully controlled for this application. When the supplier of the adhesive receives an order for 3000 kg of an adhesivesolution containing 13 wt % polymer, all it has on hand is (1) 500 kg of a 10 wt % solution, (2) avery large quantity of a 20 wt % solution, and (3) pure solvent. Calculate the weight of each of the three stocks that must be blended together to fill the order.	L2,L3	12

	b	A single effect evaporator is fed with 10000 kg / h of weak liquor containing 15 % caustic by weight and is concentrated to get thick liquor containing 40 % by weight caustic. Calculate: (a) kg / h of water evaporated and (b) kg / h of thick liquor	L2,L3	08
		Module-3		
Q. 05	a	Explain the importance of recycle and bypass using block diagram.	L1,L2	08
	b	Fresh juice contains 12% solids & the rest water. It is concentrated to contain 42% solids. The evaporator is bypassed with a fraction of fresh juice. Juice that enters the evaporator is concentrated to 58% solids and is mixed with bypassed juice to achieve the desired concentration. Calculate the amount of concentrated juice per kg of fresh juice.	L2,L3	12
		OR		
Q. 06	a	The gross heating value of gaseous propane (C_3H_8 at 298 K is 2219.5 kJ/mol. Calculate its net heating value considering latent heat of water vapour at 298K is 2442.5 kJ/kg obtain the amount of water from reduction.	L1,L2,L3	08
	b	Write a note on types and characteristics of fuels and biofuels	L1,L2	12
		Module-4		
Q. 07	a	Define the following i) Heat of reaction ii) Heat of formation iii) Heat of combustion	L1,L2	03
	b	The temperature of O_2 is raised from 350 K to 1500K. Calculate the amount of heat that must be supplied for raising the temperature of 1 kmol of O_2 using C_p data given. $Cp = 26.0257 + 11.7551 \times 10^{-3} T - 2.3426 \times 10^{-6} T^2 - 0.5623 \times 10^{-9} T^3$ kJ/mol K.	L2,L3	10
	c	Calculate the heat of formation of methane gas from the following heat of combustion data. $CH_4(g) + 2O_2(g) \longrightarrow CO_2(g) + 2H_2O(l)$ $\Delta H_{298} = -890.94$ kJ $C(g) + O_2(g) \longrightarrow CO_2(g)$ $\Delta H_{298} = -393.78$ kJ $H_2(g) + 1/2O_2(g) \longrightarrow H_2O(l)$ $\Delta H_{298} = -286.03$ kJ	L2,L3	07
		OR		
Q. 08	a	A stream flowing at a rate of 15000 mol/hr containing 25 mol% N_2 and 75 mol%H_2 is to be heated from 298 K to 473 K. Calculate the that must be transferred using Cp data given below ,$Cp = a + bT + cT^2 + dT^3$ kJ/mol K Gas | a | b x 10^{-3} | C x10^{-6} | d x 10^{-9} N_2 | 29.5909 | -5.41 | 13.1829 | -4.968 H_2 | 28.6105 | 1.0194 | -0.1476 | 0.769	L2,L3	10
	b	Calculate the standard heat of formation of n-propanol liquid using the following data: Standard heat of formation of $CO_2(g) = -393.51$ kJ/mol Standard heat of formation of $H_2O = -285.83$ kJ/mol Standard heat of Combustion of n-propanol[C_3H_7OH] (l) = -2028.19 kJ/mol	L2,L3	10
		Module-5		
Q. 09	a	Explain the different downstream process involved in production of Ethanol.	L1,L2	10
	b	Write a note on development of bioprocess technology.	L1,L2	10
		OR		
Q. 10	a	Explain with an example, the process flow sheet and unit operations involved in bioprocess industry.	L1,L2	10
	b	Explain the different downstream process involved in production of Pencillin.	L1,L2	10

*Bloom's Taxonomy Level: Indicate as L1, L2, L3, L4, etc. It is also desirable to indicate the COs and POs to be attained by every bit of questions.