

Reg.No. _____

**Karunya UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Code : 14BT2003
Sub. Name : Principles of Chemical Engineering

Semester : 2016-17 ODD
Duration : 3hrs
Max. Marks: 100

Q. No	Questions	Course outcome	Marks
PART-A (40X1=40 MULTIPLE CHOICE QUESTIONS)			
1.	The process where there is no addition of input through out the processing time is called		
	a. Continuous Process b. Batch Process c. Semi Batch d. Fed-Batch Process	2	(1)
2.	How many grams of O ₂ are required to produce 0.3 mole of H ₂ O CH ₄ + 2O ₂ → CO ₂ + 2H ₂ O		
	a. 0.1 b. 0.3 c. 0.6 d. 0.5	1	(1)
3.	Calculate the no of moles in a reaction where 90 grams of HCl are given.		
	a. 1.34 b. 2.47 c. 5.35 d. 6.22	1	(1)
4.	4NH ₃ + 5O ₂ → 6H ₂ O + 4 NO How many NO is produced if 2.5 moles of O ₂ are used.		
	a. 6 mole b. 3 mole c. 5 mole d. 8 mole	1	(1)
5.	N ₂ + 3H ₂ = 2NH ₃ , if in the feed mixture 20 moles of N ₂ is going to react with 80 moles of H ₂ , then which is the limiting reactant.		
	a. 6 mole b. 3 mole c. 5 mole d. 8 mole	1	(1)
6.	A Process where production is continues with time is called as		
	a. Batch Process b. Continuous process c. Semi Batch d. Fed-Batch Process	1	(1)
7.	Suppose in a flow reactor water is flowing at 100 kg/min at the inlet to a tank and leaves at the flow rate of 90kg/min. What will be the accumulation after 15 min of operation.		
	a. 100 b. 150 c. 200 d. 250	2	(1)
8.	Choose the correct equation for the % Recovery		
	a. $I - O / I * 100$ b. $I + O / I * 100$ c. $I - O / O * 100$ d. $O - I / O * 100$	2	(1)
9. process is often used as a final production step before selling or packaging products		
	a. Evaporation b. Drying c. Filtration d. None of the above	2	(1)
10.	How many moles of H ₂ O are produced if 0.17 moles of O ₂ are used. CH ₄ + 2O ₂ → CO ₂ + 2H ₂ O		
	a. 0.22 b. 0.17 c. 0.33 d. 0.65	2	(1)

11.	When reactants are present in least stoichiometries properties, they are called					
	a. Excess reactant	b. Limiting reactant	c. Minor reactant	d. None of them	1	(1)
12.	When reactants are present in excess of their stoichiometry coefficients, they are called					
	a. Limiting reactant	b. Excess reactant	c. Major reactant	d. None of them	1	(1)
13.	$3 \text{FeS}_2 + 11 \text{O}_2 = 2\text{Fe}_2\text{O}_3 + 8 \text{SO}_2$, the coefficients of the equation is					
	a. Absolute coefficients	b. Stoichiometric Coefficients	c. Heat coefficients	d. Mass transfer coefficients	1	(1)
14.	Any chemical equation provides the information about					
	a. Reactants	b. Reactants with their quantity	c. Only about quantity	d. None of them	1	(1)
15.	A condition of fluid flow in which the volumetric flow rates changes with temperature, pressure, or composition is called as					
	a. Steady state flow	b. Unsteady state flow	c. Continuous flow	d. Laminar flow	2	(1)
16.	The process where there is no addition of input throughout the processing time is called					
	a. Fed-Batch Process	b. Batch Process	c. Semi Batch	d. Continuous Process	2	(1)
17.	Example of tie element is					
	a. Activated carbon	b. Ash	c. Charcoal	d. Coal	2	(1)
18.	Major Material Balance is classified into two types					
	a. With chemical reactions	b. With and Without chemical reactions	c. Without chemical reactions	d. None of them	2	(1)
19.	The general equation for material balance is					
	a. Input - generation - output - consumption = accumulation	b. Input + generation - output - consumption = accumulation	c. Input + generation + output - consumption = accumulation	d. Input + generation - output + consumption = accumulation	2	(1)
20.	Molecular Weight of CH_3OH is _____					
	a. 28	b. 32	c. 42	d. 40	2	(1)
21.	SI unit for mass is _____					
	a. kg	b. pound	c. gram	d. sec	1	(1)
22.	fps unit for length is _____					
	a. foot	b. cm	c. m	d. gm	1	(1)
23.	Calculate the pressure (Nm^{-2}) when the cross sectional area of pipe is 2 m^2 and force is 25 N?					
	a. 12.5	b. 10.5	c. 13.5	d. 8.5	1	(1)
24.	Convert 35 m to feet					
	a. 114.82	b. 120.34	c. 145.25	d. 172.33	1	(1)
25.	Convert 4 inch to cm					
	a. 10.16 cm	b. 12.42 cm	c. 13.24 cm	d. 16.23 cm	1	(1)
26.	14 is the molecular weight of _____					
	a. N	b. O	c. C	d. K	1	(1)

27.	Molecular weight for sulphur					
	a. 32	b. 42	c. 52	d. 62	2	(1)
28.	Calculate the partial pressure of H ₂ at 20 degree centigrade when the vapour pressure of water is 17.5 torr. The total pressure of the gas is 750 torr.					
	a. 732	b. 823	c. 923	d. 574	2	(1)
29.	Three ideal gases are mixed together in 500 lit containers. Ar has pressure 255 torr, N ₂ has a pressure of 228 torr and H ₂ has 752 torr. What is the total pressure in the container?					
	a. 1235	b. 1566	c. 1788	d. 1134	2	(1)
30.	The molecular weight of a compound is 52 and its valency is 5, what will be the equivalent weight?					
	a. 10.4	b. 48.3	c. 98.2	d. 12.3	2	(1)
31.	Binary mixture contains 15 kg of A and 16 kg of B, the mass % of 'A' component is _____					
	a. 48.3	b. 5.45	c. 60.54	d. 54.54	1	(1)
32.	The molecular weight of a compound is 67 and its valency is 2, what will be the equivalent weight?					
	a. 33.5	b. 48.3	c. 29.2	d. 12.3	1	(1)
33.	Molecular weight of glucose (C ₁₂ H ₂₂ O ₁₁) is _____					
	a. 342.29	b. 280.36	c. 803.44	d. 380.22	1	(1)
34.	An object is moving at a speed of 20 m/s and KE of 10,000 J. What is the mass of the object.					
	a. 50 kg	b. 40 kg	c. 20 kg	d. 30 kg	1	(1)
35.	How many grams of NH ₄ Cl are there in 5 mole ?					
	a. 267.5 gm	b. 300.5 gm	c. 468.66 gm	d. 789.55 gm	1	(1)
36.	How many atoms are present in 349.7 gm of NaCl.					
	a. 36.017×10^{23}	b. 26.017×10^{23}	c. 46.017×10^{23}	d. 56.017×10^{23}	2	(1)
37.	How many grams of KCl would you need to add to 2 lit of water to make 0.5m solution.					
	a. 74.55	b. 54.55	c. 74.55	d. 84.55	2	(1)
38.	10 moles of HCl dissolved in 1000 g of H ₂ O. Find the molality of solution?					
	a. 10	b. 0.01	c. 0.001	d. 100	2	(1)
39.	1 inch to cm is					
	a. 2.54	b. 3.54	c. 5.54	d. 4.54	2	(1)
40.	Convert 15 miles to km					
	a. 24.140	b. 34.140	c. 44.140	d. 54.140	2	(1)

PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)

41.	In textile mill, double effect evaporator systems concentrate weak liquor containing 4% caustic soda to produce lye containing 25% solids. Calculate the evaporation of water per 100 kg feed in the evaporator.	2	(5)
42.	Write short note on Rotary drum drier and Spray drier	2	(5)
43.	Explain the concept of single effect and multi effect evaporator with diagram and mass balance equations	2	(5)
44.	Explain the concept of filtration process with scientific diagram and with proper equations	2	(5)
45.	Explain the mechanism of Drying Process with its application and diagram	2	(5)
46.	In a double effect evaporator plant the second effect is maintained under vacuum of 475 Torr. Find the absolute pressure in kPa, bar and psi.	1	(5)
47.	Calculate the mass flow rate of a given fluid whose density is 785 kg/m ³ , velocity and	1	(5)

	area of cross section are 10 m/s and 15 cm ² respectively.		
48.	A sample of gas having volume of 0.5 m ³ is compressed in such a manner so that pressure is increased by 60%. The operation is done for final mass of gas at constant temperature. Calculate the volume of gas.	1	(5)
49.	Determine the molality and molarity of solution prepared by dissolving 75 gm Ba(NO ₃) ₂ into 374 gm of H ₂ O at 25 C. (water density = 0.99707 g/ml ³)	2	(5)
50.	How many grams of NO are produced if 20 gm NH ₃ is burned in 30 gm O ₂ ? 4NH ₃ +5O ₂ -----> 6H ₂ O +4NO	2	(5)
PART C(2 X 10 = 20 MARKS) (ANSWER ANY TWO)			
51.	A triple effect evaporator is used to concentrate 1000 kg of aqueous solution from a concentration of 20% solute to 80% solute. Assuming an equal amount of vaporization in each effect. Calculate the composition, the weight of the solution entering the second and third effect evaporator.	2	(10)
52.	A gas mixture contains 0.274 k mol of HCl, 0.337 k mol of N ₂ and 0.089 k mol of O ₂ . Calculate a) Average molecular weight of gas b) Volume occupied by the mixture at 405.3 k pa and 30 C. c) Partial pressure of each compound.	1	(10)
53.	An aqueous solution of NaCl is prepared by dissolving 25 kg of NaCl in 100 kg of H ₂ O. Determine a) Weight percent b) Mole percent composition of solution	1	(10)

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