

**GUJARAT TECHNOLOGICAL UNIVERSITY****DIPLOMA ENGINEERING – SEMESTER –III • EXAMINATION – SUMMER 2016****Subject Code: 330503****Date: 24-11-2016****Subject Name: Industrial Stoichiometry****Time: 10:30 AM To 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Each question carry equal marks (14 marks)
5. Atomic Weight : C=12, N= 14, O=16 S= 32, H=1,

<b>Q.1</b>	(a)	(i) Define: work and force (4 marks) (ii) Explain STP and NTP ( 3 marks)	<b>07</b>
	(b)	Justify the importance of Stoichiometry in chemical Industry.	<b>07</b>
<b>Q.2</b>	(a)	Prove that mole% = Volume % = Pressure %	<b>07</b>
	(b)	580 grams of acetic acid is mixed with 2 liter of water. Find weight ratio and mole ratio of acetic acid.	<b>07</b>
		OR	
	(b)	For Ideal Gas Prove that $PV=nRT$	<b>07</b>
<b>Q.3</b>	(a)	Derive : $C_p - C_v = R$	<b>07</b>
	(b)	If 80 kg of Crystal containing 8.2% moisture is dried to 0.6 % moisture. Calculate the amount of water evaporated.	<b>07</b>
		OR	
<b>Q.3</b>	(a)	320 kg Nitrobenzene is prepared from benzene and nitric acid. Calculate amount of benzene and nitric acid required.	<b>07</b>
	(b)	Convert 392 grams per liter sulphuric acid in to Normality and Molarity	<b>07</b>
<b>Q.4</b>	(a)	A solution of ethyl alcohol ( $C_2H_5OH$ ) containing 30% alcohol is fed at the rate of 1600 kg/hr to a distillation column. The top contains 95% alcohol. The residue contains 4% alcohol. Calculate percentage loss of alcohol in residue.	<b>07</b>
	(b)	Calculate the standard heat of reaction : $4 NH_3(g) + 5 O_2(g) \rightarrow 4 NO(g) + 6 H_2O(g)$ Enthalpy of formation $\Delta H_f^\circ$ are $NH_3(g) = -46.2$ , $NO(g) = +90.3$ , $H_2O(g) = -241.6$ KJ/gmol	<b>07</b>
		OR	
<b>Q.4</b>	(a)	How much heat must be added in order to raise the temperature of 10 kmol water from 250 °K to 350 °K at 1 atm. Take average specific heat of water 1 Kcal/Kg ° C.	<b>07</b>
	(b)	Describe System of units like MKS, CGS, SI, FPS briefly	<b>07</b>
<b>Q.5</b>	(a)	A sample of groundnut seeds contains 45% oil, 40% solids and rest moisture. After extraction, cake composition is 80 % solids, 5% oil and rest moisture. Find % recovery of oil.	<b>06</b>
	(b)	Define (i) Recycle (ii) Bypass (iii) Conversion (iv) Yield	<b>08</b>
		OR	
<b>Q.5</b>	(a)	Find value of gas constant R, take number of moles in gm mole, pressure in atm, volume in cm <sup>3</sup> and temperature in °K. Assume that at STP 1 g mole gas occupies 22.4 liter.	<b>07</b>
	(b)	Derive equation for heat of reaction.	<b>07</b>