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 : 15CH3007 **Semester : 2016-17 ODD**
Sub. Name : Chemical Thermodynamics and Electrochemistry **Duration : 3hrs**
Max. marks : 100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	What is Joule-Thomson effect? Derive its coefficient.	CO1	10
	b.	Prove that $C_P-C_V = [P + (\delta E/\delta V)_T] (\delta V/\delta T)_P$	CO1	10
		(OR)		
2.	a.	What is the work done on the system, if one mole of an ideal gas at 300 K is compressed isothermally and reversibly to one fifth of its initial volume? Calculate the change in entropy of this process.	CO1	4
	b.	Prove that $C_P-C_V = [V- (\delta H/\delta P)_T] (\delta P/\delta T)_V$	CO1	8
	c.	Show that $(\delta E/\delta V)_T = [T(\delta P/\delta T)_V – P]$	CO1	8
3.	a.	Derive the Gibbs-Helmholtz equation	CO1	7
	b.	Derive the expression for chemical potential in a system of ideal gases	CO1	10
	c.	Show that $(\delta V/\delta S)_P = (\delta T/\delta P)_S$	CO1	3
		(OR)		
4.	a.	Explain the four strokes of Carnot cycle with a neat sketch	CO1	12
	b.	Derive the equation for the entropy of mixture of ideal gases	CO1	8
5.	a.	Derive the Maxwell-Boltzmann (M-B) statistics for a system consists of "N" particles.	CO1	10
	b.	Find out the value of β for M-B statistics.	CO1	10
		(OR)		
6.	a.	Derive the Bose-Einstein statistics for a system consists of "N" particles.	CO1	10
	b.	Describe the following thermodynamic parameters in terms of molecular partition functions. i) Internal Energy (U), ii) Entropy (S) and iii) Pressure (P)	CO1	10
7.	a.	Derive the Sackur-Tetrode equation	CO1	10
	b.	Derive the translation partition function for a system consists of "N" particles	CO1	10
		(OR)		
8.	a.	Derive the Debye theory of heat capacity of solids	CO1	15
	b.	Describe the following thermodynamic parameters in terms of molecular partition functions. i) Helmholtz function (A) and ii) Enthalpy (H)	CO1	5
		Compulsory:		
9.	a.	Verify the Onsager reciprocal relationship.	CO1	12

	b.	Explain Stern theory of double layer in detail.	CO1	8

ALL THE BEST