B.Tech. Degree III Semester Examination
November 2002

SE 304 CHEMICAL ENGINEERING-I
(1999 Admissions onwards)

Time: 3 Hours   Maximum Marks: 100

I.	(a)	State first law of thermodynamics. What is its limitations?	(5)
	(b)	Prove that $C_p - C_v = R$ for an ideal gas.	(7)
	(c)	Show that for an adiabatic process $PV^\gamma = $ constant .	(8)

OR

II.	(a)	Write short note on heat pump.	(5)
	(b)	Explain the effect of pressure and volume on heat capacities.	(15)

III.	(a)	Differentiate elementary and non-elementary reactions.	(5)
	(b)	Define molecularity and order of reaction.	(5)
	(c)	Explain the effect of pressure on equilibrium constant.	(10)

OR

IV.   The coefficient of expansion of $CCl_4(\ell)$ is $0.00124/^\circ K$ and its molar volume is 97.1cm³/gm mole at 25°C and 1 atm.

         (i)   By how much does the molar entropy of $CCl_4(\ell)$ change for an increase in pressure of 20 atm at 25°C?

         (ii)   If the entropy is 51.25 cal/gm mole °k at 25°C and 1 atm, what is the entropy at 25°C and 20 atm?

Assume that for $CCl_4(\ell)$ over the pressure range $\left(\frac{\partial V}{\partial T}\right)p$ is the independent of pressure.   (20)

V.	(a)	Explain the dynamic characteristics of measuring instruments.	(10)
	(b)	Explain the working of Mc Leod vacuum gauge.	(10)

OR

VI.	(a)	What are the functions of an instrument?	(5)
	(b)	Explain the method of temperature measurement using expansion concept in solids and liquids.	(15)

VII.	(a)	Write short note on transducers.	(5)
	(b)	With a neat sketch explain the working of a pneumatic PID controller.	(15)

OR

VIII.		What are the different types of control valves? Explain control valve characteristics.	(20)

IX.	(a)	Explain the analysis of solids by X-ray diffraction.	(10)
	(b)	Explain the working of an ultraviolet spectrometer with a neat sketch.	(10)

OR

X.	(a)	What are polymers? Give two examples of Natural and Synthetic polymers.	(5)
	(b)	Describe the nature of bonding of atoms in ceramic materials and discuss the main features of the ceramic crystal structures.	(15)

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