

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, selecting atleast two questions from each Unit.

x-x-x

UNIT – I

- I. a) Derive an expression for the irreversible adiabatic expansion of an ideal gas
b) Define entropy. What is its significance?
c) What is the zeroth law of thermodynamics and what is its significance? (5,2,3)
- II. a) How will you determine experimentally heat change during combustion of a solid or a liquid? Describe the method and instrumentation giving diagram.
b) Derive Gibb's Helmholtz equation. Discuss its significance. (5,5)
- III. a) What are the different types of electrochemical corrosion? Discuss the mechanism of any one type.
b) What are the factors affecting corrosion and how can it be prevented? (5,5)
- IV. a) Derive Michealis Menten equation for enzyme catalysis. When is the reaction rate first order?
b) Discuss the Wacker process. (5,5)

UNIT – II

- V. a) Discuss the mechanism of polymerization of styrene by free radical polymerization.
b) Give the preparation, properties and uses of polyamide.
c) What is the basis of atomic spectroscopy? (4,3,3)
- VI. a) How do electronic transitions occur? What are the selection rules for electronic spectroscopy?
b) State and derive Lambert Beer law. How can you use it for quantitative analysis?
c) Explain with the help of MO diagram of a conjugated system the effect of conjugation on π - π^* transitions. (3,4,3)

P.T.O.

(2)

- VII. a) Why do molecules absorb infrared radiations? What are the conditions for the same?
- b) How do bond strength and masses of atoms influence frequency of absorption in infrared spectroscopy?
- c) Give the frequency of absorption in IR spectra for C-H, C-N, C-O and C-C bonds.
(3,3,4)
- VIII. a) Discuss the principle and instrumentation of HPLC.
- b) Explain the following terms in relation to chromatography:-
- i) Elution
 - ii) Chromatogram
 - iii) Dead time
 - iv) Plate height
 - v) Peak Resolution
- (5,5)

x-x-x