Exam.Code:0905
Sub. Code: 6650

1078
B.E. (Mechanical), First Semester
CH-101: Applied Chemistry
(Common with ECE and EEE)

Time allowed: 3 Hours   Max. Marks: 50

NOTE: *Attempt <u>five</u> questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.*

x-x-x

1a) Derive an expression for work during a reversible isothermal expansion of gas.   2

b) Give various reactions & catalyst used in the Wacker process.   2

c) Differentiate fuel cell from a conventional cell. Give the chemical reactions of H_2-O_2 fuel cell.   2

d) Explain the selection rule for IR spectroscopy taking one example.   2

e) Give various properties of silicon polymers.   1

f) Explain the purple colour of $[Ti(H_2O)_6]^{3+}$ on the basis of CFT.   1

SECTION-A

2 a) What are cyclic processes? Derive an expression for efficiency of a carnot cycle. A carnot cycle takes 500 cal of heat from its source at 127°C and rejects 400 cal to sink during a cycle. Calculate the efficiency of the process.

4

b) Calculate the entropy change for I_2 (s, 1atm, 273 K) to I_2 (v, 1 atm, 453K)

Given ΔH_{fus} = + 15.68 kJ/mol at m. p. 113.6 °C, ΔH vap = 25.52 kJ/mol at b. p. 180 °C

Cp (I_2,s) = 54.68 J/K mol Cp (I_2,l) = 81.59 J/K mol   3

c) Derive Gibb's Helmholtz equation.   3

3 a) Write note on following

(i) Caustic embrittlement   (ii) galvanic series   4

b) Discuss corrosion control using potentiostatic anodic control & inhibitors.   6

4 a) Derive an expression for rate of enzyme catalyzed reaction. Explain when order of the reaction will be two.

4

b) Discuss various features of homogeneous catalysis. Give the catalytic cycle of Hydroformylation reaction.   4

c) Give the characteristics of a catalytic reaction.   2

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SECTION-B

5 a) Explain splitting of d orbitals when a metal ion is placed in (a) tetrahedral field (b) distorted octahedron field of ligands?   5

b) Give various applications of crystal field theory.   3

c) Calculate CFSE of $[CoCl_4]^{2-}$ & $[Co(H_2O)_6]^{3+}$ 2

6 a) Explain Beer Lambert law. Why electronic spectra results in absorptions bands than sharp peaks? Discuss the change in electronic spectra of acetone if its solution is made in methanol instead of chloroform.

5

b) Discuss the various factors affecting the position of I.R. absorption. How will you distinguish o-hydroxy benzoic acid from para isomer on the basis of I. R. spectrum?   5

7 a) Discuss the classification of polymers.   4

b) Write note on following

(i) Uses of epoxy resins (ii) Molecular weight of polymers (ii) Mechanism of anionic addition polymerization

6

x-x-x