

B.TECH 1ST YEAR

ENGINEERING CHEMISTRY

CH-101F

L	T	P
3	1	0

Sessional	50 Marks
Exam	100 Marks
Total	150 Marks

Duration of exam:3 Hrs

Note: Examiner will set 9 questions in total, with two questions from each section and one question covering all sections which will be Q.1. This Q.1 is compulsory and of short answer type. Each question carries equal mark (20 marks). Students have to attempt 5 questions in total.

SECTION A

Phase Rule:-Terminology, One component system (H_2O system and CO_2 - system), two components system, Simple eutectic system (Pb-Ag), system with congruent melting point (Zn - Mg), system with incongruent melting point ($Na_2SO_4 - H_2O$), Cooling curves.

Catalysis: Characteristics of catalytic Reactions, Types of catalysis: Homogeneous catalysis, Heterogeneous catalysis, Autocatalysis and Induced catalysis. Mechanism of Catalytic action (Intermediate compound formation theory & Adsorption theory). Concept of promoters, inhibitors and poisoners. Enzymatic catalysis: its characteristics, factors affecting, Mechanism (lock and key hypothesis and Induced fit hypothesis)

SECTION B

Water and its Treatment: Part-I: Sources of water, impurities in water, hardness of water and its determination(EDTA method), Units of hardness, alkalinity of water and its determination, related numerical problems, scale and sludge formation (composition properties and methods of prevention) Boiler corrosion and caustic embrittlement.Priming and foaming

Water and its Treatment: PART II: Treatment of water for domestic use, coagulation, sedimentation, filtration and disinfection. water softening : Lime-Soda treatment, Zeolite, Ion - exchange process, mixed bed demineralization, Desalination (Reverse Osmosis , electro dialysis) & related numericals.

SECTION C

Corrosion and its prevention: Mechanism of Dry and wet corrosion (rusting of iron), types of corrosion, galvanic corrosion, differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, Electroplating, tinning, galvanization.), Soil Corrosion, Microbiological Corrosion.

Lubrication and Lubricants: Introduction, mechanism of lubrication, classification of lubricants, (Liquid, Grease (semi - solid) and solid (MoS_2 , Graphite). Additives for lubricants. Properties of lubricants (Flash & Fire point, Saponification number, Iodine value, Acid value, Viscosity and Viscosity index Aniline point, Cloud point and pour point) Numerical problems based of viscosity Index. Biodegradable lubricants.

SECTION D

Polymers and polymerization: Introduction & Classification of polymers mechanism of polymerization (Addition, condensation and co- ordination) effect of structure on properties of polymers, Bio polymerization, Bio degradable polymerization, preparation properties and technical application of thermo - plastics (PVC, PVA, Teflon)& thermosetting(PF,UF), Natural elastomers and synthetic rubber (SBR,GR -N) . Silicones, Introduction to polymeric composites.

Instrumental Methods of Analysis: Principle and application of Thermal methods of Analysis. (TGA, DTA, DSC), Basic concepts of spectroscopy, Lambert and Beers law, Absorption and Emission spectroscopy Different spectroscopic Techniques (UV- Visible and IR spectroscopy) elementary discussion on Flame photometry.

Text Books:-

1. Engineering Chemistry , P.C. Jain Monica Jain (Dhanpat Rai & Co)
2. Chemistry in Engineering & Tech , Vol. I & II, Kuriacose (TMH)
3. Chemistry for Engineers, Dr. B.K. Ambasta, (University Science Press)

Reference Bankbooks:-

1. Instrumental methods of Chemical analysis,
MERITT & WILLARD (EAST - WEST press)
2. Physical Chemistry, P.W Atkin (ELBS, OXFORD Press)
3. Physical Chemistry W.J.Moore (Orient Longman)