

Syllabus of UPCATET Entrance Exam

MST group

M.Tech.(Sugar Technology/ Industrial Fermentation and Alcohol Technology)

Mathematics

Vector differentiation and integration; Gradient, divergence and curl; Line and surface integrals. Rank of matrix, solution of linear equations, eigen values and eigen vectors. Limit, continuity, intermediate value theorem, differentiability; Rolle's and Mean Value theorems; Maxima and minima, partial differentiation. Riemann integral, fundamental theorem of calculus; Definite integrals, volume and surface of revolution; Double integration. Order and degree, first-order differential equations ($y' = f(x,y)$);

General & Physical Chemistry

Chemical Equilibrium – Reversible reactions, characteristics of equilibrium, homogeneous and heterogeneous systems, equilibrium constant; law of mass action, Le Chatelier's principle. Colloids – Preparation, properties and uses; Tyndall effect and Brownian movement; applications of colloids. Electrochemistry – Specific, equivalent and molar conductivities; ionic conductance and mobility. Chemical Kinetics – Rate of reaction, factors affecting rate, molecularity and order of reaction; half-life of reactions.

Organic Chemistry

Classification and nomenclature of organic compounds, Isomerism and stereochemistry. Fundamental concepts in organic reaction mechanism, Methods of purification; Qualitative and quantitative analysis of organic compounds; Bio-molecules:- Carbohydrates- Classification, structure of D-glucose and fructose (open and ring structure), Wohl's degradation, epimerization. Disaccharides-manufacture of sucrose, structure and their common reaction, Polysaccharides. Structure and function of nucleic acids, lipids and vitamins.

Inorganic Chemistry

Periodic properties including ionization potential, electron affinity, electronegativity, atomic and ionic radii, hybridization, polarization, effective nuclear charge, shielding (screening) effect, Slater's rules, ionization enthalpy and electron gain enthalpy. Oxidation states and oxidation numbers; redox reactions, oxidizing and reducing agents; electrode potential and electrochemical series. Coordination compounds including double salts and complex salts; definition of complex ions, coordination number and nomenclature. Effective atomic number, stability of complexes and stability constants, factors influencing stability; valence bond theory and crystal field theory of coordination compounds.

Physics

black body radiation, Planck's law, Laws of thermodynamics, isothermal & adiabatic processes; Carnot cycle, entropy; Joule-Thomson effect; equipartition theorem; Interference (biprism, thin films); diffraction (basic concepts); polarization, Nicol prism; lasers: principles and applications. Photoelectric effect, Compton effect; de Broglie waves. optical fibers: types, numerical aperture, losses. Crystal structure, Miller indices, NaCl & diamond;

Chemical Engineering

Material balance:- Law of conservation of mass and energy for chemical process. Ideal gas law, Dalton's Law, Amagat's Law, Average molecular weight of gaseous mixture, vapour pressure, Dalton's Law and

Pravin Karmar

Henry's Law. Fluid flow:- Fluid statistics, Newtonian and non-Newtonian fluids, Bernoulli's equation, flow meters, types of pumps. Heat transfer:- Conduction, convection and radiation. Distillation:- types of distillation.

Basic Biology and microbial technology

Basic structure and function of cell, cell cycle, Molecular basis of life: Structure and function of DNA and RNA; Basics of DNA replication, transcription and translation; Cell structure and function (prokaryotic & eukaryotic), Microbial classification (bacteria, fungi, yeast, viruses); The cell wall structure: Gram positive and gram-negative bacteria, Cytoplasmic membrane, Cytoplasmic inclusion and nuclear material

General Biochemistry

Carbohydrates: Structure and properties of monosaccharide, disaccharides, oligosaccharides and polysaccharides, Mutarotation, colour test with sugars. Metabolism of carbohydrates Fermentation pathways (alcoholic, lactic). Enzymes: Nature, occurrence, classification of enzymes, Vitamins and Minerals: Classification of Vitamins, deficiency diseases & their symptoms, dietary sources of vitamins



Pravin Kumar

The format of the question booklet

Sr. No.	Programme	Abbreviations of the Exam	Subject	No. of questions	Group of Questions
1	M.Tech.(Sugar Technology/ Industrial Fermentation and Alcohol Technology)	MST	General Knowledge	25	A
			Mathematics	20	B
			General and Physical Chemistry	20	
			Organic Chemistry	20	
			Inorganic Chemistry	20	
			Chemical Engineering	25	
			Physics	20	C
			Basic Biology and Microbial Technology	25	
			General Biochemistry	25	
			Total:	200	

RB

YB

AD

WJ

Pravin Kumar