



Indian Engineering Olympiad

SYLLABUS FOR THIRD YEAR STUDENTS (Common to all Streams)

General Aptitude:- (Common to all Streams)

Verbal Ability:-

English grammar, Synonyms, Antonyms, sentence completion, verbal analogies, word groups, instructions, critical reasoning and verbal deduction.

Numerical Ability:-

Number Systems; Linear Equations; Percentages, Profit and loss; Simple interest and Compound Interest; Ratio, Proportion and variation; Averages and Mixtures; Time and Work; Time, speed and Distance; Numerical Series and Sequences; Permutations and combinations; Probability; Data Sufficiency; Data Interpretation.

Mathematics-I:- (Common to all Streams)

Linear Algebra:-

Matrix algebra, Systems of linear equations, Eigenvalues and Eigenvectors.

Calculus-I:-

Functions of single variable, Limits, continuity and differentiability; Mean value theorems, Indeterminate forms; Evaluation of definite and improper integrals; Double and Triple integrals; Partial derivatives, Total derivative, Taylor series (in one and two variables), Maxima and Minima,

Probability and Statistics:-

Definitions of probability, Sampling theorems, Conditional probability; Mean, Median, Mode and Standard deviation; Random variables, Binomial, Poisson and Normal distributions.

Mathematics-II:- (Common to all Streams except Computer Science Eng.)

Calculus-II:-

Fourier series; Gradient, Divergence and Curl, Vector identities, Directional derivatives, Line, Surface and Volume integrals, Applications of Gauss, Stokes and Green's theorems.

Differential equations:-

First order equations (linear and nonlinear); Higher order linear differential equations with constant coefficients; Euler - Cauchy equation; Initial and boundary value problems; Laplace transforms; Solutions of heat, wave and Laplace's equations.

Complex variables:-

Analytic functions; Cauchy -Riemann equations; Cauchy's integral theorem and integral formula; Taylor and Laurent series.

Numerical Methods:-

Numerical solutions of linear and non - linear algebraic equations; Integration by Trapezoidal and Simpson's rules; Single and Multi – step methods for differential equations.



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SYLLABUS FOR THIRD YEAR STUDENTS CHEMICAL ENGINEERING

Thermodynamics:-

First and Second laws of thermodynamics. Applications of first law to close and open systems. Second law and Entropy. Thermodynamic properties of pure substances: Equation of State and residual properties, properties of mixtures: partial molar properties, fugacity, excess properties and activity coefficients; phase equilibria: predicting VLE of systems; chemical reaction equilibrium.

Fluid Mechanics:-

Fluid statics, Newtonian and non-Newtonian fluids, shell-balances including differential form of Bernoulli equation and energy balance, Macroscopic friction factors, dimensional analysis and similitude, flow through pipeline systems, flow meters, pumps and compressors, elementary boundary layer theory, flow past immersed bodies including packed and fluidized beds, Turbulent flow: fluctuating velocity, universal velocity profile and pressure drop.

Heat Transfer:-

Steady and unsteady heat conduction, convection and radiation, thermal boundary layer and heat transfer coefficients, boiling, condensation and evaporation; types of heat exchangers and evaporators and their process calculations. Design of double pipe, shell and tube heat exchangers, and single and multiple effect evaporators.

Mass Transfer:-

Fick's laws, molecular diffusion in fluids, mass transfer coefficients, film, penetration and surface renewal theories; momentum, heat and mass transfer analogies.

Process Calculations:-

Steady and unsteady state mass and energy balances including multiphase, multi- component, reacting and non-reacting systems. Use of tie components; recycle, bypass and purge calculations; Gibb's phase rule and degree of freedom analysis.

Mechanical Operations:-

Particle size and shape, particle size distribution, size reduction and classification of solid particles; free and hindered settling; centrifuge and cyclones; thickening and classification, filtration, agitation and mixing; conveying of solids.