**INDIAN ENGINEERING OLYMPIAD**

# 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
## COMPUTER SCIENCE AND ENGINEERING

### Programming and Data Structures:-

Programming in C, Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

### Discrete Structures And Graph Theory:-

Propositional and first order logic. Sets, relations, functions, partial orders and lattices. Groups. Graphs: connectivity, matching, coloring. Combinatorics: counting, recurrence relations, generating functions

### Operating System:-

Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling; Memory management and virtual memory; File systems.

### Database Management Systems:-

ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

### Design and Analysis of Algorithms:-

Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.