Course Curriculum
(Preparatory Programs)

Course curriculum for preparatory students at IIT Bhilai

Semester-I

Course Code	Course Title	Lecture (Credit)	Tutorial	Lab	Type	Credit
CYL010	Chemistry-I	3	1	0	Theory	4
CYP011	Chemistry Lab-I	0	0	3	Practical	1.5
PHL010	Physics-I	3	1	0	Theory	4
PHP011	Physics Lab-I	0	0	3	Practical	1.5
MAL010	Mathematics-I	3	1	0	Theory	4
LAL010	English-I	2	1	0	Theory	3
					Total	**18**

Semester-II

Course Code	Course Title	Lecture	Tutorial	Lab	Type	Credit
CYL020	Chemistry-II	3	1	0	Theory	4
CYP021	Chemistry Lab-II	0	0	3	Practical	1.5
PHL020	Physics-II	3	1	0	Theory	4
PHP021	Physics Lab-II	0	0	3	Practical	1.5
MAL020	Mathematics-II	3	1	0	Theory	4
LAL020	English-II	2	1	0	Theory	3
					Total	**18**

Course Contents

CYL010 Chemistry-I

4 Credits (3-1-0)
Prerequisite(s): None
Overlap with: NA

Fundamentals of Organic Chemistry, Alkanes, Alkyl Halides, Alkenes and Alkynes, Benzene, Phenols, Biomolecules, Concept of atoms and molecules; Dalton's atomic theory; Mole concept; Chemical formulae; Balanced chemical equations; Calculations (based on mole concept and stoichiometry) involving common oxidation-reduction, neutralization, and displacement reactions; Concentration in terms of mole fraction, molarity, molality and normality, States of Matter: Gases and Liquids, Atomic Structure, Chemical Bonding and Molecular Structure, Chemical Thermodynamics, Chemical and Ionic Equilibrium.

CYL020 Chemistry-II

4 Credits (3-1-0)
Prerequisite(s): None
Overlap with: NA

Electrochemistry, Chemical Kinetics, Solid State, Solutions, Surface Chemistry, Classification of Elements and Periodicity in Properties, Hydrogen, s-Block Elements, p-Block, Coordination compounds, Isolation of Metals, Polymers, Alcohols, Ethers, Aldehydes and Ketones, Carboxylic Acids, Amines.

CYP011 Chemistry Lab - I

1.5 Credits (0-0-3)
Prerequisite(s): None
Overlap with: NA

Safety and General information.
Detection of elements (N, S, halogens); Detection and identification of the following functional groups: hydroxyl (alcoholic and phenolic), carbonyl (aldehyde and ketone), carboxyl, amino and nitre.
Standardization of acids, Determination of hardness of water, Optical rotation of carbohydrates, Kinetics study of reaction.

CYP021 Chemistry Lab – II

1.5 Credits (0-0-3)
Prerequisite(s): None
Overlap with: NA

Safety and General information
Separation and detection of metal ions in group I, Principles of Qualitative Analysis Flame test of known basic radicals, Borax bead test: Groups I to V detection (Ag^+, Hg^{2+}, Cu^{2+}, Pb^{2+}, Fe^{3+}, Cr^{3+}, Al^{3+}, Ca^{2+}, Ba^{2+}, Zn^{2+}, Mn^{2+} and Mg^{2+}); Nitrate, halides (excluding fluoride), carbonate and bicarbonate, sulphate and sulphide. Test for alcohol, aldehyde, ketone, carboxylic acid, phenol, and amine

LAL010 Preparatory English I

3 Credits (2-1-0)
Prerequisite(s): None
Overlap with: NA

Introduction to communication: Basics of speaking - phonetics – everyday communication situations - common phrases (5 lectures 2 tutorials)
Vocalics and Body language: Intonations - Rhetorics - Knowing Audience – Stress management (5 lectures 3 tutorials)
Speech Analysis: Conversations - Extempore - Group Discussion (6 lectures 3 tutorials)
Reading Strategies: Essays - Op-eds - Short stories - Skimming - Scanning (6 lectures 3 tutorials)
Writing Skills: Paragraphs - Transition phrases - Coherent writing - MEAL Plan – Short Essays {6 lectures 3 tutorials)

LAL020 Preparatory English II

3 Credits (2-1-0)
Prerequisite(s): None
Overlap with: NA

Introduction Oral Communication: Public speaking - Speech analysis - Self introduction for interviews.
Writing process: Prewriting - Brainstorming - Mind mapping - Argument structure.
Academic writing: Cohesive writing - Structure - phrases and vocabulary.
Writing essays: Thesis statement - Topic sentence - Outlining – Drafting.
Writing techniques: Summarising - Paraphrasing - Note making – Abstracts.
Genres: Long Essay- Emails - Resume – Reports.

MAL010 Mathematics - I

4 Credits (3-1-0)
Prerequisite(s): None
Overlap with: NA

Sets and their representations, different kinds of sets (empty, finite and infinite), algebra of sets, intersection, complement, difference and symmetric difference of sets and their algebraic properties, De-Morgan’s laws on union, intersection, difference (for finite number of sets. Cartesian product of finite sets ordered pair, relations, domain and codomain of relations, equivalence relation. Function as a special case of relation, functions as mappings, domain, codomain, range of functions, invertible functions, even and odd functions, into, onto and one-to-one functions.

Limit and continuity of a function, limit and continuity of the sum, difference, product and quotient of two functions, Derivative of a function, derivative of the sum, difference, product and quotient of two functions, chain rule, derivatives of polynomial, rational, trigonometric, inverse trigonometric, exponential and logarithmic functions, Tangents and normal, increasing and decreasing functions, Higher order derivatives, maximum and minimum values of a function.

Integration, indefinite integrals of standard functions, definite integrals as the limit of sums, definite integral and their properties, Integration by parts, integration by the methods of substitution and partial fractions, application of definite integrals to the determination of areas bounded by simple curves.

Formation of differential equations, Solution of equations of first order and first degree: Variable separable method, homogeneous differential equations and reducible to homogeneous form, exact differential equations. Integrating factor, Linear differential equation, Bernoulli Differential Equations.

MAL020 Mathematics - II

4 Credits (3-1-0)
Prerequisite(s): None
Overlap with: NA

Matrices as a rectangular array of real numbers, equality of matrices, addition, multiplication by a scalar and product of matrices, transpose of a matrix, elementary row and column operation, determinant of a square matrix and its properties, adjoint of a matrix, inverse of a square matrix, properties of these matrix operations, diagonal, symmetric and skew symmetric matrices and their properties, solutions of simultaneous linear equations in two or three variables.
Random experiment, sample space, different types of events (impossible, simple, compound), addition and multiplication rules of probability, conditional probability, independence of events, total probability, Bayes Theorem, computation of probability of events using permutations and combinations. Measure of central tendency and dispersion, mean, median, mode, mean deviation, standard deviation and variance.
Algebra of complex numbers, addition, multiplication, conjugation, polar representation, properties of modulus and principal argument, triangle inequality, cube roots of unity, geometric interpretations. Roots of complex numbers. Application of De Moiver’s theorem.
Addition of vectors, scalar multiplication, dot and cross products, scalar and vector triple products, and their geometrical interpretations. Vector equations of line and plane, Geometrical applications of vectors, Product of two, three and four vectors. (8 lectures).

PHL010 Physics - I

4 Credits (3-1-0)
Prerequisite(s): None
Overlap with: NA

Mechanics and Properties of Matter, Waves & Oscillations, Kinetic Theory of Gases and Thermodynamics, Atomic & Nuclear Physics, Dual Nature of Radiation and Matter.

PHL020 Physics - II

4 Credits (3-1-0)
Prerequisite(s): None
Overlap with: NA

Electrostatics & Current Electricity, Magnetostatics & Magnetism, Electromagnetic Induction & Alternating current, Electronic Devices, Geometrical optics, Wave Optics, Electromagnetic Waves.

PHP011 Physics Lab - I

1.5 Credits (0-0-3)
Prerequisite(s): None
Overlap with: NA

Learning Vernier Callipers, screw gauge, spherometer; understanding parallelogram law of vectors, simple pendulum, friction and coefficient of friction, angle dependent component of gravitational pull, Boyle's law, Young's modulus, specific heat capacity of solid, latent heat. Spring constant, viscosity - terminal velocity of a given spherical body, hot body and time -cooling curve, Sonometer, resonating air columns.

Activities/demonstration experiments: making a paper scale of given least count, determining mass of a given body -principle of moments, plotting, the force of limiting friction, range of a projectile vs angle of projection, conservation of energy, dissipation of energy, Foucault pendulum.

PHP021 Physics Lab - II

1.5 Credits (0-0-3)
Prerequisite(s): None
Overlap with: NA

Deflection magnetometer, magnetic lines, resonating air columns, convex and concave lens, prism, i-d curve, tangent galvanometer, Ohm's law, meter bridge, copper voltameter ece, Joule calorimeter, diode characteristics, surface tension. Nuclear detector/ Counters.

Activities/demonstration experiments: cooling curve for molten wax, bi-metallic strip, thermal expansion of liquids, surface tension and capillary effect, rate of loss of heat of a liquid, to observe the decrease in pressure with increase in velocity of a fluid.