

**INDIAN INSTITUTE OF INFORMATION  
TECHNOLOGY, BHOPAL**

**B.TECH. 1st YEAR PROGRAMME**

**SCHEME & SYLLABUS  
(1<sup>st</sup> & 2<sup>nd</sup> Semester)**

**For  
ECE/ CSE/ IT  
Department**

### First Semester (B.Tech. – ECE/CSE/IT)

Course No.	Subject	Scheme of Studies Periods per Week			Credits
		L	T	P	
MTH 101	Engineering Mathematics I	3	1	-	4
PHY 101	Engineering Physics I	2	1	2	4
CS 101	Fundamentals of Computing	2	1	2	4
EE 101	Fundamentals of Electrical & Electronic	2	1	2	4
HUM 101	Effective Communications	3	1	-	4
IT 101	Engineering literacy	-	-	4	2
Total L=12, T=5, P =10				Total Credit:	22

### Second Semester (B.Tech. – ECE/CSE/IT)

Course No.	Subject	Scheme of Studies Periods per week			Credits
		L	T	P	
MTH 102	Engineering Mathematics-II	3	1	-	4
PHY 102	Engineering Physics-II	3	1	-	4
EG 101	Engineering Graphics	2	1	2	4
CS 102	Data Structures and Algorithms	2	1	2	4
HUM 102	Culture & Human Values	2	1	2	4
IT 102	Workshop I	-	-	4	2
Total L=12, T=5, P =10				Total Credit:	22

## **B.Tech (ECE/CS/IT) First Year Syllabus**

### **SEMESTER-I**

#### **MTH 101 Engineering Mathematics I**

**Calculus of Functions of One Variable:** Real Numbers, Functions, Sequences, Limit and Continuity, Differentiation : Review, Successive differentiation, Chain rule and Leibnitz Theorem, Roll's and Mean Value Theorems, Maxima/Minima, Curve sketching, Linear and Quadratic approximations, Error estimates, Taylor's Theorem, Newton and Picard Methods, The Riemann Integral, Approximate Integration, Natural Logarithm, Exponential function, Relative growth rates, L-Hospital's rule, Geometric applications of Integrals, Infinite series, Tests of convergence, Absolute and Conditional convergence, Taylor and Maclaurin series.

**Calculus of Functions of Several Variables:** Scalar fields, Limit and Continuity, Partial derivatives, Chain rules, Implicit differentiation, Gradient, Directional derivatives, Total differential, Tangent planes and Normal's, Maxima, Minima and Saddle points, Constrained maxima and minima, Double Integrals, Applications to areas and volumes, Change of variables.

**Graph Theory:** Introduction, terminology, representation, isomorphism, connectivity, Wars hall's algorithm, Euler and Hamilton path, and shortest path tree.

#### **PHY 101 Engineering Physics I**

Relative velocity and accelerations; Newton's law and applications (to include friction, constraint equations, rough pulleys), line integrals, gradient, curl, conservative forces, potential, work-energy theorems, energy diagrams; Conservation of linear momentum and collisions, variable mass problem; Central forces, gravitation; motion in non-inertial frames, centrifugal and Coriolis forces; Conservation of angular momentum and elementary rigid body dynamics; Special theory of relativity. Fundamentals of optics.

#### **CS 101 Fundamentals of Computing**

Concept of Programming Languages, A quick overview of OS-Windows/Linux, Writing, compiling and running the program on Linux/Windows, The Compiler, Program Builder, Debugging: types of errors and debugging techniques, Problem solving aspects, Introduction to Algorithms and flow charts, C programming Data structures , Variables, Variables names, I/O, The standard Input/output file, Formatted inputs/Output, Expressions and Operators, connectors, control statements, Functions: Scope of Function variable, Modifying function arguments, Pointers, Array, String, Structures and Unions, file handling, File redirection, file pointers, advantages of using multi files, Organization of data in each file, compiling multi-file programs, The Preprocessor, Library Functions and Low level programming.

**Textbooks:**

1. Balgurusamy, Programming in ANSI C, Mc Graw Hill, 2015
2. Rajaraman V., COMPUTER PROGRAMMING IN C, Printice Hall of India, 2004.
3. The C Programming language, Kernigham & Ritchie
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 2004

**EE 101 Fundamentals of Electrical & Electronic****D.C. Circuits and AC Fundamentals**

Ohm's law, Kirchoff's laws, Nodal Analysis, Mesh Analysis, Superposition Theorem, Source Transformations, Thevenin's and Norton's Theorems, star/delta transformation, maximum power transfer theorem, transients.

**A.C. Fundamentals**

Single phase EMF generation, average and effective values of sinusoids, Solution of series and Parallel Circuits, power and power factor, Resonance in series and parallel circuits, steady state analysis for sinusoidal excitation: Sinusoids, Three phase connections: star and delta. **Magnetic Circuit**

Mmf, Magnetising force, Magnetic flux and flux density, permeability, Reluctance and permeance, B-H curve, Simple magnetic circuits, Hysteresis and eddy current loss. **Transformer:**

Single-phase transformer Construction, principle of operation, EMF equation, phasor diagram on no-load and full-load, losses and efficiency, open and short circuit test, auto transformer

**D. C. Machines****D. C. Generator**

Construction, EMF equation, various types and characteristics

**D. C. Motor**

Principle, torque and speed formula, types and their characteristics, Speed control **Semiconductor Diode and BJT**

Semiconductor Diode and its V-I characteristics, Rectifier circuit, Various types of diodes, Zener diode, PIN Diode, Light emitting diode, gun diode, Working principle, Transistors in CC, CE, and CB configurations, transistor biasing, V-I characteristics and load line concept with Quiescent point, Transistor H-parameter.

**Textbooks:**

1. Toro, Del V., Electrical Engineering Fundamentals, Printice Hall of India, 1994.
2. Millman, Jacob and Halkias, Christos C., Integrated Electronics: Analog and Digital Circuits and Systems, Mc Graw Hill, 2004
3. Boylestad, Robert L., and Nashelsky, Louis, Electronics Device and Circuit Theory, Ninth Edition, Printice Hall of India, 2005

**HUM 101 Effective Communications**

General Introduction: Why English?; The purpose of communication; Communication through body language, listening, speaking, reading and writing; Phonetics: Air speech mechanism; Classification of vowel sounds; Classification of consonant sounds; Accent, Pronunciation, Intonation; Problems of Tense; Use of Verbs; Proverbs and Idioms; Vocabulary, Technical Vocabulary; Punctuation; Comprehension; Expansion; Definition, Scope and Significance of technical writing; Features of technical style; Mechanics of technical writing: Equation, Abbreviation, Numerals, Figures, Charts, Tables, and Graphs etc. Report writing, Essentials of technical report writing; Non-formal reports and its format; Formal reports and its format; Different kinds of reports: Progress Report, Feasibility Report, and Trouble Report; Committee Report.; Annual Report; Business Correspondence - Introduction; Elements of a good letter; Format of a letter; Letter of Enquiry; Letter for placing orders; Letter of complaint and its Reply; New Trends in Business Communication; Job Application; Preparation of Curriculum Vitae/Resume; Preparation of Notices, Agenda, Minutes; Tender Notices; Interviews; Essentials of Group Discussions; Presentation.

### **IT 101 Engineering literacy**

- E1 Sound Equipments working principle
- E2 Incandescent Bulb / CFL / LED / energy meter calculation
- E3 Testing of Earthing, concept of breadboard, polarity etc
- E4 Fuse Specifications, Circuit Breakers, UPS, Surge Protector and Line Filter
- E5 Automobile Features 4 stroke Petrol / Diesel Engine
- E6 Automobile Transmission System
- E7 Study of Mechanical Measurement Tools
- E8 RC Aero-model Study
- E9 Computer Connectors and Peripherals
- E10 CPU, RAM, Motherboard and Motherboard connector
- E1 1SMPS, CD ROM, HDD
- E1 2Types of Batteries, specifications and applications

## **MTH 102 Engineering Mathematics-II**

**Linear Algebra:** Review of Matrices Algebra, Solution of Matrices Equation, Row reduced Echelon form, Determinant, Cramer's rule, Vector spaces, subspaces, basis, Orthogonal basis, Gram-Schmidt, orthogonalization, Linear Operators, Matrix representation, Rank, Solution of Linear equations using matrices (invertibility, null space etc.), Eigenvalues, eigenvectors, diagonalisability, Symmetric systems, Positive definite.

**Complex Analysis:** Review of complex numbers and operations, Functions of a Complex Variable, Analytical functions, Cauchy-Reimann equations, Elementary functions, Conformal mapping, Contour integrals, Cauchy's Theorem, Residue Theorem, Power series, Taylor and Laurent series, zeros, poles, essential singularities, evaluation of integrals.

**Vector Calculus:** Vector fields, Divergence and Curl, Line Integrals, Green's Theorem, Surface Integrals, Divergence Theorem, Stoke's Theorem and applications. Evaluation Schedules

## **PHY 102 Engineering Physics-II**

### **Part A:**

**Electrostatic:** Coulomb's Law, Electric field & electrostatic potential, Work and Energy in electrostatic field, Gauss law & its applications, Curl of E, Laplace's and Poisson's equations, Dipoles & multipoles, Force and torque on dipoles, Polarization, Bound charges & electric displacement.

**Magnetostatics:** Electric Current, Magnetic field & Current density, Ampere's law & its applications, Biot-Savart law, Curl and divergence of  $\mathbf{B}$ , Magnetic dipoles, Magnetization, Magnetic susceptibility, Ferro-, para- and dia-magnetism, Faraday's law, Energy in magnetic field.

**Electrodynamics:** Lorentz force, Maxwell's equations. Poynting theorem, Electromagnetic potentials, Electromagnetic (EM) waves & their propagation in different media.

### **Part B:**

Introduction to quantum mechanics, Planck's theory, Thermal radiation (Black bodies, Stefan Boltzmann etc), Photoelectric effect, Compton effect, Dual nature of EM radiation, matter waves, de Broglie waves, wave-particle duality, Uncertainty principle, Heisenberg microscope, Properties of matter (phase and group velocity). Schrodinger equation, probabilistic interpretation of wave function, admissibility conditions for wave function. One dimensional problems: particle in a box, potential well, potential barrier and quantum tunneling. Periodic potential in one dimension.

### **Text Books:**

1. INTRODUCTION TO ELECTRODYNAMICS: D.J. GRIFFITHS
2. QUANTUM PHYSICS: EISBERG & RESNICK

### 3. CONCEPT OF MODERN PHYSICS: BEISER

#### **EG 101 Engineering Graphics**

Lines, Lettering, Sketching, Principle of Dimensioning, Orthographic Projection: Projection of Points, Lines, Planes, Auxiliary Views, Projection of Solids, Sections of Solids, Intersections of solids and development of lateral surfaces of simple solids, Isometric Projections, Oblique and Perspective Projection.

#### **CS 102 Data Structures and Algorithms**

Notion of Algorithm, Space and Time Complexity, Analyzing algorithms Static & Dynamic Memory Management, Arrays, Stacks, Queues, Linked Lists Trees, Binary Trees, Tree Traversals, Applications of Binary Trees Graphs and their representations, Graph Traversal Algorithms, Minimum Spanning Tree, Shortest Paths **Searching Algorithms:** Sequential Search, Binary Search

**Sorting Algorithms:** Quick sort, Merge sort, insertion sort, Selection sort, Heap & Heap sort Binary Search Tree, Balanced Tree, AVL Tree Files

**Indexing:** Hashing,

**Tree Indexing:** B-tree

**Basic Algorithm Design Paradigms:** Divide & Conquer, Greedy method, Dynamic Programming, Back tracking, Branch and Bound [Discussion with the help of some example which are already discussed].

#### **Text/ References Book:**

1. Horowitz, Sahni, Fundamentals of Data Structures, Computer Science Press-2013.
2. Cormen et al., Introduction to Algorithms, Second Edition, Printice Hall of India 2014.
3. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sartaj Sahni, Rajasekaran-Universities Press-2008.
4. Data Structures Using C And C++, 2 Edition, Augenstein Moshe j., Tenenbaum Aaron M., Langsam Yedidyah, Publisher: Prentice-Hall India-2009

#### **HUM 102 Culture & Human Values**

The syllabus comprises of excerpts from the writings of great masters like Swami Vivekananda, Mahatma Gandhi, Chanakya, Rabindranath Tagore, Dr. S. Radhakrishnan, H.E. Dr. APJ Kalam, Carl Sagan, Gurunanak Dev, Wordsworth, O. Henry, Maupassant and many others. The wisdom of the philosophical texts would be brought to them through the Reading Material prepared specifically for the students. It is expected that their English communication and general awareness would improve through this discursive and interactive method.

## **IT 102 Workshop I**

### **AutoCAD:**

Introduction to 3D Wireframe/Solid Modeling, Modeling of Primitive 3D Solids, Modeling of unique 3D Solids by Extrusion, Revolution, Sweeping and Lofting, 3D Operations and Solid Editing

### **Matlab:**

Basics: Mathematics, Data Analysis, Programming, Graphics, Creating GUI  
Toolboxes - Curve Fitting: Data fitting, Preprocessing data, post processing data, Using library functions for Data fitting, Symbolic Math: Calculus, Linear Algebra, Simplifications, Solutions of Equations, Matlab Compiler: Programs involving control statements, data structure etc., User defined functions, Simulink: building a model, run