## FIRST YEAR B.TECH. Curriculum 2018 (Common for all branches)

(Applicable to students admitted during 2018 and later)

### First Year: Course Structure (Physics Group)

**Total:** 44 Credits

<table>
<thead>
<tr>
<th>Year</th>
<th>FIRST SEMESTER</th>
<th>SECOND SEMESTER</th>
<th>Total Contact Hours (L + T + P)</th>
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<tr>
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<tr>
<td>Sub. Code</td>
<td>Subject Name</td>
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<td>T</td>
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<tr>
<td>MAT 1151</td>
<td>Engineering Mathematics - I</td>
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<tr>
<td>PHY 1051</td>
<td>Engineering Physics</td>
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<td>1</td>
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<tr>
<td>CIE 1051</td>
<td>Mechanics of Solids</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>ECE 1051</td>
<td>Basic Electronics</td>
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<td>MME 1051</td>
<td>Basic Mechanical Engineering</td>
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<td>HUM 1051</td>
<td>Communication skills in English</td>
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<td>PHY 1061</td>
<td>Engineering Physics Lab</td>
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<td>Workshop Practice</td>
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<td>Engineering Graphics - I</td>
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### First Year: Course Structure (Chemistry Group)

**Total:** 44 Credits

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<td>CHM 1051</td>
<td>Engineering Chemistry</td>
<td>2</td>
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<td>BIO 1051</td>
<td>Biology for Engineers</td>
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<td>ELE 1051</td>
<td>Basic Electrical Technology</td>
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<td>CSE 1051</td>
<td>Problem Solving Using Computers</td>
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<td>CIE 1052</td>
<td>Environmental Studies</td>
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<td>CHM 1061</td>
<td>Engineering Chemistry Lab</td>
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### Notes
- **Sub. Code:** Subject Code
- **L:** Lecture Hours
- **T:** Tutorial Hours
- **P:** Practical Hours
- **C:** Contact Hours
- **Total Contact Hours (L + T + P):** Total contact hours for each semester.
**MAT 1151: ENGINEERING MATHEMATICS – I [3 1 0 4]**

**Reference Books:**

**ECE 1051: BASIC ELECTRONICS [3 0 0 3]**
Diode Characteristics, Breakdown phenomenon in diodes, Zener diode, Diode rectifier, Zener regulator, Regulated Power supplies, Special purpose diodes, BJT characteristics, CB, CE and CC configurations, Transistor biasing, RC coupled Amplifier, Transistor as a Switch, Block diagram and characteristics of Operational Amplifier, Inverting and non-inverting amplifier, Difference amplifier, Op-amp based adder, subtractor, integrator, differentiator, comparator and square wave generator, Number systems and codes, Boolean algebraic theorems, simplification of Boolean expressions, Logic gates, concept of Universal Logic, Flip flops, Fundamentals of analog communication, Introduction to digital communication and communication networks, Introduction to mobile communication.

**References:**

**MME 1051: BASIC MECHANICAL ENGINEERING [3 0 0 3]**
Properties of Steam and Boilers: Steam properties, Zener diode, Diode rectifier, Zener regulator, Regulated Power supplies, Special purpose diodes, BJT characteristics, CB, CE and CC configurations, Transistor biasing, RC coupled Amplifier, Transistor as a Switch, Block diagram and characteristics of Operational Amplifier, Inverting and non-inverting amplifier, Difference amplifier, Op-amp based adder, subtractor, integrator, differentiator, comparator and square wave generator, Number systems and codes, Boolean algebraic theorems, simplification of Boolean expressions, Logic gates, concept of Universal Logic, Flip flops, Fundamentals of analog communication, Introduction to digital communication and communication networks, Introduction to mobile communication.

**References:**

**PHY 1051: ENGINEERING PHYSICS [2 1 0 3]**

**References:**
1. Jewett & Serway; PHYSICS for Scientists and Engineers with Modern Physics (7e), Cengage Learning 2008.

**CIE 1051: MECHANICS OF SOLIDS [2 1 0 3]**
Introduction to mechanics of rigid bodies, Resolution of forces, Composition of forces, Moment of a force, Varignon's theorem, couple, Conditions of Equilibrium, Space and free body diagrams, Lamé's theorem, Types of beams, Support reactions, Types of loading, Friction, Centroid and moment of inertia of simple and composite areas, Introduction to rigid bodies, Normal stress and strain, Mechanical properties of materials, Hooke's law, Modulus of elasticity, Stress – Strain behaviour of ductile and brittle materials, Factor of safety,
Allowable stress, Stresses and deformations in tapered bars, Stepped bars, Poisson's ratio, Shear stress and shear strain, Modulus of rigidity, Relationship between modulus of elasticity, modulus of rigidity and bulk modulus, Compound bars, stresses due to temperature, Stresses in thin cylinders, Concepts of bending moment & shear force diagrams.

References:

MME 1161: ENGINEERING GRAPHICS – I [1 0 3 2]
Introduction - Geometrical constructions, Dimensioning and conventions of lines. Projection of points in first Quadrant only. Projection of straight lines inclined to both horizontal and vertical planes, Traces of lines, Application problems on lines. Projection of regular plane when the surface is inclined to both HP and VP. Projection of regular solids like prisms, pyramids cone and cylinder when the axis is inclined to both HP and VP.

References:

PHY 1061: ENGINEERING PHYSICS LAB [0 0 3 1]

References:

MME 1061: WORKSHOP PRACTICE [0 0 3 1]

References:

MME 1161: ENGINEERING GRAPHICS – II [3 1 0 4]
Introduction – Geometrical constructions, Dimensioning and conventions of lines. Projection of points in first Quadrant only. Projection of straight lines inclined to both horizontal and vertical planes, Traces of lines, Application problems on lines. Projection of regular plane when the surface is inclined to both HP and VP. Projection of regular solids like prisms, pyramids cone and cylinder when the axis is inclined to both HP and VP.

References:

MAT 1251: ENGINEERING MATHEMATICS – II [3 1 0 4]

Reference Books:

ELE 1051: BASIC ELECTRICAL TECHNOLOGY [2 1 0 3]
DC circuits, Independent sources, Resistance, Network reduction techniques, Mesh and Node voltage analysis, Superposition, Thevenin’s and Maximum power transfer theorems, Transient behaviour of inductance and capacitance, Series and Parallel magnetic circuits, Self and Mutual inductances, Coupled coils, Dot rule, Average and RMS values of sinusoidal waves, Series and Parallel AC circuits, Power factor improvement, Series and Parallel resonance, Three phase star and delta connected loads, Measurement of power in three phase circuits, Electrical power system, Transformers, DC motors, BLDC, Induction motors, Synchronous motors, Stepper motors, Measurement of energy.

References:
4. http://www.nptel.ac.in/courses/108108076/
5. http://www.nptel.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Basic%20Electrical%20Technology/New_index1.htm

BIO 1051: BIOLOGY FOR ENGINEERS [2 1 0 3]
Chemistry of life: Elements of life and their bonding ability, importance of carbon, elemental replacement, different types of bonds and interactions in biological systems, water and phospholipids as well as their importance in the survival of life, Biomolecules such as carbohydrates and proteins, their structures, enzymes, effect of pH and Bioenergetics. Inheritance of life: Mendelian model and its testing, Location of factors and its mode of inheritance, Morgan concept on location of factors, pedigree analysis. Molecular basis of inheritance: Discovery of DNA, Experimental evidence for the existing theories of molecular biology, structure of DNA, DNA copying mechanism and its proof reading as well as editing, RNA synthesis and processing, Protein synthesis and Genetic code. Case studies: Mechanism of viral replication, Lac operon as an example of biological control system, Concepts of cloning, Recombinant DNA technology, vaccination and asent of sap. Evolution and origin of life: Darwin's theory, Mechanisms of Evolution, Evidence of evolution, Constraints on evolution.

References:

CHM 1051: ENGINEERING CHEMISTRY [2 1 0 3]

References:

CIE 1052: ENVIRONMENTAL STUDIES [1 0 3 2]
Meaning, multidisciplinary nature of environmental science, applications in engineering disciplines, environmental ethics, sustainable development. Renewable and non-renewable resources, Resource consumption & conservation methods, different types of energy, Conventional sources & Non-Conventional sources of energy. Types & Structure of Ecosystem, Environmental Pollution and control, Disaster Management meaning, natural disasters especially earthquakes & Man-made disasters, Environmental crisis & legislations, Environmental acts, Laws and Policies, EIA, Case studies of the past related to environmental issues, crisis, disasters, hazard, pollution, climate change & its effects, Practical activity related to environmental problems and its impacts on environment.

References:

CSE 1051: PROBLEM SOLVING USING COMPUTERS [2 1 0 3]
Introduction to computing, Importance of Problem solving using computers, Algorithms and Flow charts, Introduction to C language, Simple C programs, Syntax and Logical Errors in compilation, Object and executable code, Variable names and declaration, Data types, Sizes and Constants, Various operators, Type conversion and expressions, Precedence and order of evaluation, Statements and blocks, Control flow, Break and continue, 1-D and 2-D Arrays and Strings, Searching and Sorting, Multidimensional Arrays and Matrices, Modular programming and Recursive functions, Structure and Pointers, Defining Structures and Array of Structures, Pointer arithmetic, Pointer to Structures, File Management and Cyber Security.

References:

CHM 1061: ENGINEERING CHEMISTRY LABORATORY [0 0 3 1]
Alkalimetric titration; Estimation - Total hardness of water, percentage of copper in brass, weight of iron in haematite, percentage of manganese dioxide in pyrolusite, percentage of ammonia nitrogen in a fertilizer; pK value of a weak acid by potentiometric titration; Conductometric acid-base titrations; Determination of concentration of copper using colorimeter; Determination of coefficient of viscosity of liquid; Chloride content of water; Analysis of lead pigment

References:
2. Laboratory Manual for Engineering Chemistry Laboratory, M.I.T., 2014

MME 1261: ENGINEERING GRAPHICS – II [1 0 3 2]

References:

CSE 1061: PROBLEM SOLVING USING COMPUTERS LAB [0 0 3 1]
Introduction to Computing, Simple C programming, Branching Control Structures, Looping Control Structures, 1D and 2D Array programming, String programming, Modular and Recursive Function Programming – Programs using Pointers, Structures and File manipulation – MATLAB Programming with Simulink.

References: