B.TECH. I Semester-1	L	T	P	C
CS 101: Fundamentals of Computers and Programming	3	0	2	4

Basic Structure of Computers	4 Hours
Computer Types, Functional Units: Input Unit, Memory Unit, Arithmetic and Logic Unit, Output Unit, Control Unit Basic Operational Concept, Number Representation and Arithmetic Operations: Integers, Floating-Point Numbers Character Representation, Performance: Technology, Parallelism, Historical Perspective: The First Generation, The Second Generation, The Third Generation, The Fourth Generation Concluding Remarks	
Variables, Operators and Expressions **Control Flow, Functions and Program Structure**	**12 Hours**
Variables constants and declarations. Arithmetic, relational and logical operators: Precedence order. Control flow statements: For loop, While loop, If, If-else, Switch. Arrays: One dimensional and two dimensional arrays. Characters and strings. Functions: Pass by value, pass by reference, Recursive functions, Scope of variables. Sorting algorithms: Selection sort, Insertion sort	
Pointers and Arrays, Structures, Input and Output	**18 Hours**
Introduction to pointers: Basic pointers, Pointers to arrays and two dimensional arrays, Pointer arithmetic , Malloc, stack vs heap, Structures: Basic introduction, Pointers to structures, Basic linked lists File processing (IO processing): Opening, closing and reading files, Structured and Unstructured file reading	
Introduction to Python	**8 Hours**
General Information Core Python: Variables, Strings, Tuples, Lists, Arithmetic Operators, Comparison Operators, Conditionals, Loops, Type Conversion, Mathematical Functions, Reading Input, Printing Output, Error Control Functions and Modules: Functions, Modules. Mathematics Modules: math Module, cmath Module numarray Module: General Information, Creating an Array, Accessing and Changing Array Elements, Operations on Arrays, Array Functions, Copying Arrays. Scoping of Variables. Writing and Running Programs	
Total Contact Time: 42 Hours	

Recommended Books

1. "Computer Organization and Embedded Systems", Carl Hamacher, 6th Edition, TMH.
2. “Programming with C Schaum’s outline Series”, Gottfried B.S., Outline Series, 2/E, Tata McGraw-Hill, 2006.
3. “The C Programming language”, Brian W. Kernighan, Dennis M. Ritchie, 2/E, Prentice Hall PTR publication, 1988.
4. “Programming in ANSI C”, E. Balagurusamy, 6/E, Tata Mc-Graw Hill, 2012.
5. “Programming in C”, Pradip Dey, 2/E, Oxford University Press, 2012.
6. "Numerical Methods in Engineering with Python", J. Klusalaas, Cambridge University Press.
7. “Introduction to Computer Science”, ITL Education Solutions Limited, Pearson Education, Fourth Impression, 2009.

B.TECH. I Semester-1	L	T	P	C
EL 102: English & Communication Skills	3	0	2	4

Spoken English	14 Hours
Individual and group speaking activities - on topics like Introductions, making request, suggestions, invitations, acceptance, refusal, seeking permission, giving a description, stating likes and dislikes, agreeing and disagreeing, conversing on telephones, inquires, complains, compliments, expressing thanks and apologies etc. (Audio Visual aids could be used for the above). Mock interview objectives, preparation and practice for interview as student and as job applicant. Group discussion strategy of speaking in a GD, types of GD and evaluation components.	
Written English	**14 Hours**
Business letters- structures of business letters, essential of good business letters, letters of enquiries, complaints, request etc. Résumé writing- structure and types, Report writing – types and format of technical reports, Writing formal speeches - welcome address, introduction of guest speakers, farewell, vote of thanks etc. Common errors - grammar, spellings and choice of words, Editing.	
Presentation Skill	**7 Hours**
Technical Presentation- content organization, different tools for presentation, summarization, preparing individual and group presentations, nuances of delivery.	
Communication Skill	**7 Hours**
Nonverbal communication- body language, appearance and space. Technical discussion- technical article reading and narrating. JAM (Just a minute) sessions. Team based activities.	
Total Contact Time: 42 Hours	

Recommended Books

1. Raman, Meenakshi & Sharma Sangeeta, Technical Communication Principles and Practice, 2nd Edition, OUP, New Delhi, 2011.
2. Sharma R.C. & Mohan Krishna, Business Correspondence and Report Writing, 3rd Edition, Tata McGraw Hill, New Delhi, 2007.
3. Raymond V. Lesikar and Marie E Flatley, Basic Business Communication skills for Empowering the Internet generation, Tata McGraw Hill publishing company limited. New Delhi 2005.
4. Farahthullah, T.M, Communication Skills for Technical Students, 5th Edition, Orient Blackswan, Kolkata, 2009.
5. Saumya Sharma, Common Errors in Everyday English, OUP, New Delhi, 2017.
6. Krishna Mohan and Meera Banerji, Developing Communication Skills, McMillan Co., 1990.
7. N. Krishnaswami and T. Shariram, Creative English Communication, McMillan Co., 1992.
8. King and Cree, Modern Business Letters, Orient Longman, 1990.
9. M. I. Joshi, Let's Talk English, Gujjar Prakashan, Ahmedabad, 1995.

B.TECH. I Semester-1	L	T	P	C
AS 103: Engineering Physics	3	0	2	4

Electromagnetism	8 Hours
Ampere's law, Biot-Savart's law, Lorentz force, Electromagnetic waves: Maxwell's equations in vacuum and medium. Types of matter magnetism: Ferromagnetism, Paramagnetism and Diamagnetism, Nuclear magnetism, Three magnetic vectors, Magnetic susceptibility, Curie's law.	
Quantum Physics	**8 Hours**
Black body radiation, Dual nature of matter and radiation, Compton effect, Pair production, de Broglie waves, Uncertainty principle. Wave equation: Probability and wave function, Time dependent and time independent Schrödinger equations, Particle in a box	
Solid State Physics	**10 Hours**
Basics of crystal structure, Bravais lattice, Unit cell, Packing fraction, Miller indices. X-Ray properties, diffraction and Bragg's law. Bonding in solids: Ionic, Covalent, Metallic, Vander Waals' and Hydrogen. Free-electron theory of metals, Band theory of solids, Semiconductors: Intrinsic and extrinsic, Hall effect, Superconductivity: Type I and type II, Meissner effect.	
Laser Physics & Fibre Optics	**8 Hours**
Introduction to Laser, Characteristics of Lasers, Spontaneous and stimulated emissions, Einstein's coefficients, Population inversion and lasing action. Laser systems: Ruby laser, He-Ne Laser, Semiconductor Laser, Advanced lasers, Holography. Fermat's principle and Snell's law-optical fibre, Principle and construction, Acceptance cone, Numerical aperture, V-Number, Types of fibres, Fabrication: Double Crucible Technique, Vapour phase Oxidation Process, Fibre optic communication principle, Fibre optic sensors, Other applications of optical fibres.	
Nuclear & Particle Physics	**8 Hours**
Nuclear structure, Atomic mass, Stable nuclei, Binding energy, Nuclear fission and fusion with examples. Classifications of Fundamental particles and Standard model.	
Total Contact Time: 42 Hours	

Recommended Books

1. David J. Griffith , "Introduction to Electrodynamics", Addison-Wesley, 2012.
2. Resnick and Haliday, Physics, Part I and II, Wiley Eastern, 2008. A. Beiser, Concept of the Modern Physics, McGraw-Hill, 2008
3. A. Ghatak, Introduction to Modern Optics, McGraw-Hill, 2012.
4. W. T. Silfvast , Laser Fundamentals, Cambridge, 2004.

B.TECH. I Semester-1	L	T	P	C
EE 104: Electrical Networks	3	0	2	4

Prerequisite
Units and Scales, Charge, Current, Voltage, and Power, Voltage and Current Sources, Ohm's Law The Capacitor, The Inductor, Inductance and Capacitance Combinations, Consequences of Linearity, Duality

Voltage and Current Laws, Basic Nodal and Mesh Analysis, Handy Circuit Analysis Techniques	**14 Hours**
Nodes, Paths, Loops, and Branches, Kirchhoff's Current Law, Kirchhoff's Voltage Law, The Single-Loop Circuit, The Single-Node-Pair Circuit, Series and Parallel Connected Sources, Resistors in Series and Parallel, Voltage and Current Division Nodal Analysis, The Supernode, Mesh Analysis, The Supermesh, Nodal vs. Mesh Analysis: A Comparison Linearity and Superposition, Source Transformations, Thévenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion, Selecting an Approach: A Summary of Various Techniques	
Basic RL and RC Circuits, The RLC Circuit, Sinusoidal Steady-State Analysis, AC Circuit Power Analysis	**14Hours**
The Source-Free RL Circuit, Properties of the Exponential Response, The Source-Free RC Circuit, A More General Perspective, The Unit-Step Function, Driven RL Circuits, Natural and Forced Response, Driven RC Circuits, Predicting the Response of Sequentially Switched Circuits The Source-Free Parallel Circuit, The Overdamped Parallel RLC Circuit, Critical Damping, The Underdamped Parallel RLC Circuit, The Source-Free Series RLC Circuit, The Complete Response of the RLC Circuit, The Lossless LC Circuit Characteristics of Sinusoids, Forced Response to Sinusoidal Functions, The Complex Forcing Function, The Phasor, Impedance and Admittance, Nodal and Mesh Analysis, Superposition, Source Transformations and Thévenin's Theorem, Phasor Diagrams Instantaneous Power, Average Power, Effective Values of Current and Voltage, Apparent Power and Power Factor, Complex Power	
Magnetically Coupled Circuits, Complex Frequency and the Laplace Transform, Circuit Analysis in the s-Domain, Frequency Response, Two-Port Networks	**14 Hours**
Mutual Inductance, Energy Considerations, The Linear Transformer, The Ideal Transformer Complex Frequency, The Damped Sinusoidal Forcing Function, Definition of the Laplace Transform, Laplace Transforms of Simple Time Functions, Inverse Transform Techniques, Basic Theorems for the Laplace Transform, The Initial-Value and Final-Value Theorems Z(s) and Y(s), Nodal and Mesh Analysis in the s-Domain, Additional Circuit Analysis Techniques, Poles, Zeros, and Transfer Functions, Convolution, The Complex-Frequency Plane, Natural Response and the s Plane, A Technique for Synthesizing the Voltage Ratio H(s) = Vout/Vin Parallel Resonance, Bandwidth and High-Q Circuits, Series Resonance, Other Resonant Forms, Scaling, Bode Diagrams One-Port Networks, Admittance Parameters, Some Equivalent Networks, Impedance Parameters, Hybrid Parameters, Transmission Parameters	
Total Contact Time: 42 Hours	

Recommended Books
1. “Engineering Circuit Analysis”, W. H. Hyat, J. E. Kimmerly, S. M. Durbin, 8thEdition, TMH. 2. “Electric Circuits”, Joseph A Edminister, SI (metric) edition, Schaum’s outline series, McGraw hill, 2nd edition 1983. 3. “Network Analysis”, Van Valkenburg M E, 3rd Edition, PHI, 2002. 4. “Basic electrical engineering”, Kothari and Nagrath, 2nd edition, 2007, Tata McGraw-Hill Education

B.TECH. I Semester-1	L	T	P	C
AS 105: Engineering Mathematics	3	1	0	4

Calculus	8 Hours
Reorientation of calculus. Differentiation of Hyperbolic and Inverse Hyperbolic functions. Successive Differentiation, standard forms, Leibnitz's theorem and applications, Power series, Expansion of functions, Taylor's and Maclaurin's series, Differential Calculus.	
Differential Equation	**8 Hours**
Reorientation of differential equation, Exact differential equation and Integrating factors, First order and higher degree odes, solvable for p, y and x. Modeling of Real world problems particularly Engineering System, Application of first order differential equation including RC and RL network. Cartesian, polar and parametric form of standard curves.	
Introduction to Complex Variables	**6 Hours**
Analytic function, its applications, Linear transformation of complex domain, bilinear transformations, conformal mapping and its application, complex integration over closed contour.	
Basic Concepts of Integral and Vector Calculus	**8 Hours**
Multiple integrals, line integrals, scalar and vector point function, differential operator, gradient, directional derivative, physical meanings of gradient, divergence, curl and Laplacian with their properties.	
Linear Algebra	**12 Hours**
Elementary row and column transformation rank of matrix, Linear dependence, consistency of linear system of equations, Characteristic equation, Caley–Hemilton theorem, Eigen value, Eigen vector, Vector, Subspace, Matrix arithmetic, Singular Value Decomposition, Pseudoinverse, Linear Transformations, Positive Definite Matrix, Hessian Matrix, Group, Ring, Field	
Total Contact Time: (42 + 14) Hours	

Recommended Books

1. E. Kreyszig, , Advanced Engineering Mathematics, 8th Ed, John Wiley & Sons., New York.
2. Jain and Iyenger, Advanced Engineering Mathematics, Narosa Publications, New Delhi.
3. O'Neil Peter, Advanced Engg. Mathematics, Thompson, Singapore, Ind. Ed. 2002.
4. J. N. Kapur, Mathematical Models in Biology and Medicine, East west Press, New Delhi 1985.
5. F. B. Hilderband, Methods of Applied mathematics, PHI, New Delhi, 1968.
6. Wiley C. R., Advanced Engineering Mathematics, MGH Int. Student Ed, 1993.

B.TECH. I Semester-1	L	T	P	C
EC 106: ICT Workshop - I	0	0	4	2

Component Identification & Testing **Bread-Board Connections**	**6 Hours**
Resistors, Capacitors, Diodes, Transistors etc.	
Introduction to Various Instruments	**8 Hours**
Digital Multimeter, DC Power Supply, Function Generator, CRO/DSO etc.	
Ports and Connectors	**2 Hours**
Banana Plugs, Alligator clips, Test Clips, Binding Posts, BNC Connector, Power Connectors, Audio Connectors, RJ-type Modulo Connectors, USB Connector etc. Parallel Port, Serial Port, USB Port, Ethernet Port, Audio Port, Video Port	
Introduction to Soldering and Desoldering	**6 Hours**
Introduction to PCB Design	**6 Hours**
Introduction, PCB Design Overview, PCB Design Glossary, Prototyping and the PCB Design Flow, How to Prototype PCB Designs	
Introduction to Arduino	**16 Hours**
Basics of Arduino Interfacing of various components with Arduino	
Project	**12 Hours**
Total Contact Time: 56 Hours	

Recommended Books
1. Electronic Principles, Albert Malvino and David J Bates, McGraw Hill(7th Edition) 2. https://www.arduino.cc/ 3. http://www.ni.com/en-in/innovations/white-papers/10/pcb-design-fundamentals---main-page.html