B. Tech. First Year, Semester- I
(All Branches except Agriculture Engineering and Biotechnology)

<table>
<tr><td colspan="15">3- WEEKS STUDENT INDUCTION PROGRAMME
in the beginning of the session</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td colspan="3"></td><td colspan="2"></td><td colspan="4">Evaluation Scheme</td><td></td></tr>
<tr><td rowspan="2">SN</td><td rowspan="2">Subject Code</td><td rowspan="2">Subject Name</td><td rowspan="2">Type</td><td rowspan="2">Category</td><td colspan="3">Period</td><td colspan="2">Sessional Component</td><td rowspan="2">Sessional (SW) (TS/PS)</td><td rowspan="2">End Semester Examination (ESE)</td><td rowspan="2">Total</td><td rowspan="2">Credit</td></tr>
<tr><td>L</td><td>T</td><td>P</td><td>CT</td><td>TA</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>L</td><td>T</td><td>P</td><td>CT</td><td>TA</td><td>CT+TA</td><td>TE/PE</td><td>SW+ESE</td><td>Cr</td></tr>
<tr><td>1.</td><td>BAS102</td><td>Engineering Chemistry</td><td>T</td><td>BS</td><td>3</td><td>1</td><td>0</td><td>20</td><td>10</td><td>30</td><td>70</td><td>100</td><td>4</td></tr>
<tr><td>2.</td><td>BAS103</td><td>Engineering Mathematics-I</td><td>T</td><td>BS</td><td>3</td><td>1</td><td>0</td><td>20</td><td>10</td><td>30</td><td>70</td><td>100</td><td>4</td></tr>
<tr><td>3.</td><td>BEC101</td><td>Fundamentals of Electronics Engineering</td><td>T</td><td>ES</td><td>2</td><td>1</td><td>0</td><td>20</td><td>10</td><td>30</td><td>70</td><td>100</td><td>3</td></tr>
<tr><td>4.</td><td>BME101</td><td>Fundamentals of Mechanical Engineering</td><td>T</td><td>ES</td><td>2</td><td>1</td><td>0</td><td>20</td><td>10</td><td>30</td><td>70</td><td>100</td><td>3</td></tr>
<tr><td>5.</td><td>BAS105</td><td>Soft Skills</td><td>T</td><td>BS/ HS</td><td>3</td><td>0</td><td>0</td><td>20</td><td>10</td><td>30</td><td>70</td><td>100</td><td>3</td></tr>
<tr><td>6.</td><td>BAS152</td><td>Engineering Chemistry Lab</td><td>P</td><td>BS</td><td>0</td><td>0</td><td>3</td><td>-</td><td>50</td><td>50</td><td>50</td><td>100</td><td>1</td></tr>
<tr><td>7.</td><td>BEE151/ BEC151</td><td>Basic Electronics Engineering Lab</td><td>P</td><td>ES</td><td>0</td><td>0</td><td>3</td><td>-</td><td>50</td><td>50</td><td>50</td><td>100</td><td>1</td></tr>
<tr><td>8.</td><td>BAS155</td><td>English Language Lab</td><td>P</td><td>ES/ HS</td><td>0</td><td>0</td><td>3</td><td>-</td><td>50</td><td>50</td><td>50</td><td>100</td><td>1</td></tr>
<tr><td>9.</td><td>BWS151</td><td>Workshop Practice Lab</td><td>P</td><td>ES</td><td>0</td><td>1</td><td>3</td><td>-</td><td>50</td><td>50</td><td>50</td><td>100</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>13</td><td>5</td><td>12</td><td></td><td></td><td>350</td><td>550</td><td>900</td><td>22</td></tr>
</table>

Abbreviation Used:
BS: Basic Science Course
ES: Engineering Science Course
HS: Humanities and Social Science Course
VA: Value Added Course

B. Tech. First Year, Semester- II
(All Branches except Agriculture Engineering and Biotechnology)

SN	Subject Code	Subject Name	Type	Category	Period L	Period T	Period P	Sessional Component CT	Sessional Component TA	Sessional (SW) (TS/PS) CT+TA	End Semester Examination (ESE) TE/PE	Total SW+ESE	Credit Cr
1.	BAS202/ BAS201	Engineering Chemistry / Engineering Physics	T	BS	3	1	0	20	10	**30**	**70**	**100**	**4**
2.	BAS203	Engineering Mathematics-II	T	BS	3	1	0	20	10	**30**	**70**	**100**	**4**
3.	BEC201/ BEE201	Fundamentals of Electronics Engineering / Fundamentals of Electrical Engineering	T	ES	2	1	0	20	10	**30**	**70**	**100**	**3**
4.	BME201/ BCS201	Fundamentals of Mechanical Engineering/ Programming for Problem Solving	T	ES	2	1	0	20	10	**30**	**70**	**100**	**3**
5.	BAS205/ BAS204	Soft Skills / Environment and Ecology	T	HS/ BS	3	0	0	20	10	**30**	**70**	**100**	**3**
6.	BAS252/ BAS251	Engineering Chemistry Lab / Engineering Physics Lab	P	BS	0	0	3	-	50	**50**	**50**	**100**	**1**
7.	BEC251/ BEE251	Basic Electronics Engineering Lab/ Basic Electrical Engineering Lab	P	ES	0	0	3	-	50	**50**	**50**	**100**	**1**
8.	BAS255/ BCS251	English Language Lab / Programming for Problem Solving Lab	P	HS/ ES	0	0	3	-	50	**50**	**50**	**100**	**1**
9.	BWS251/ BCE251	Workshop Practice Lab / Engineering Graphics & Design Lab	P	ES	0	1	3	-	50	**50**	**50**	**100**	**2**
10.	BVA251/ BVA252	Sports and Yoga / NSS	P	VA	0	0	3		100	***100**		***100**	**0**
					13	**5**	**12+ 3***			**350+ *100**	**550**	**900+ *100**	**22**

*Compulsory Qualifying Audit Course

Abbreviation Used:
    BS: Basic Science Course
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> *Summer Internship (4-week) / NPTEL Course (4-week) during summer break after Semester-II and same will be assessed/evaluated in the Semester-III*

BAS101 / BAS201: ENGINEERING PHYSICS

Content	Contact Hours
Unit-1: Quantum Mechanics	**9**
Inadequacy of classical mechanics, Planck's theory of black body radiation(qualitative), Compton effect, de-Broglie concept of matter waves, Davisson and Germer Experiment, Phase velocity and group velocity, Time-dependent and time-independent Schrodinger wave equations, Physical interpretation of wave function, Particle in a one-Dimensional box.	
Unit-2: Electromagnetic Field Theory	**8**
Basic concept of Stoke's theorem and Divergence theorem, Basic laws of electricity and magnetism, Continuity equation for current density, Displacement current, Maxwell equations in integral and differential form, Maxwell equations in vacuum and in conducting medium, Poynting vector and Poynting theorem, Plane electromagnetic waves in vacuum and their transverse nature. Relation between electric and magnetic fields of an electromagnetic wave, Plane electromagnetic waves in conducting medium, Skin depth.	
Unit-3: Wave Optics	**10**
Coherent sources, Interference in uniform and wedge shaped thin films, Necessity of extended sources, Newton's Rings and its applications, Introduction to diffraction, Fraunhoffer diffraction at single slit and double slit, Absent spectra, Diffraction grating, Spectra with grating, Dispersive power, Resolving power, Rayleigh's criterion of resolution, Resolving power of grating.	
Unit-4: Fiber Optics & Laser	**9**
Fibre Optics: Principle and construction of optical fiber, Acceptance angle, Numerical aperture, Acceptance cone, Step index and graded index fibers, Fiber optic communication principle, Attenuation, Dispersion, Application of fiber.	
Laser: Absorption of radiation, Spontaneous and stimulated emission of radiation, Population inversion, Einstein's Coefficients, Principles of laser action, Solid state Laser (Ruby laser) and Gas Laser (He-Ne laser), Laser applications.	
Unit-5: Superconductors and Nano-Materials:	**8**
Superconductors: Temperature dependence of resistivity in superconducting materials, Meissner effect, Temperature dependence of critical field, Persistent current, Type I and Type II superconductors, High temperature superconductors, Properties and Applications of Super-conductors.	
Nano-Materials: Introduction and properties of nano materials, Basics concept of Quantum Dots, Quantum wires and Quantum well, Fabrication of nano materials -Top-Down approach (CVD) and Bottom-Up approach (Sol Gel), Properties and Application of nano materials.	

BAS103 : ENGINEERING MATHEMATICS-I

Course Objectives:

The objective of this course is to familiarize the graduate engineers with techniques in matrix, calculus, multivariate analysis and vector calculus. It aims to equip the students with standard concepts and tools from intermediate to advanced level that will enable them to tacklemore advanced level of mathematics and applications that they would find useful in their disciplines.
The students will learn:

- The essential tools of matrices, Eigen values and its application in a Comprehensive manner.
- To apply the knowledge of differential calculus in the field of engineering.
- To deal with functions of several variables that is essential in optimizing the results ofreal life problems.
- To apply integral calculus in various field of engineering and have a basicunderstanding of Beta and Gamma functions and application of Dirichlet's integral.
- To deal with vector calculus that is required in different branches of Engineering tograduate engineer.

Content	Contact Hours
Unit-1: Matrices	**8**
Elementary transformations, Inverse of a matrix, Rank of matrix, Solution of system of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Linear Dependence and Independence of vectors, Eigen values and Eigen vectors, Complex Matrices, Hermitian, Skew-Hermitian andUnitary Matrices, Applications to Engineering problems.	
Unit-2: Differential Calculus- I	8
Successive Differentiation (nth order derivatives), Leibnitz theorem, Curve tracing, Partial derivatives, Euler's Theorem for homogeneous functions, Total derivative.	
Unit-3: Differential Calculus-II	8
Expansion of functions by Taylor's and Maclaurin's theorems for functions of one and two variables, Maxima and Minima of functions of several variables, Lagrange's method of multipliers, Jacobians, Approximation of errors.	
Unit-4: Multiple integration	8
Double integral, Triple integral, Change oforder of integration, Change of variables, Beta and Gama function and their properties, Dirichlet's integral and its applications to area and volume, Liouville's extensions of Dirichlet's integral.	
Unit-5: Vector Calculus	8
Vector differentiation: Gradient, Curl and Divergence and their Physical interpretation, Directional derivatives. **Vector Integration**: Line integral, Surface integral, Volume integral, Gauss's Divergence theorem, Green's theorem and Stoke's theorem (without proof) and their applications.	

BAS203 : ENGINEERING MATHEMATICS-II

Content	Contact Hours
Unit -1: Ordinary Differential Equation of Higher Order	8
Linear differential equation of nth order with constant coefficients, Simultaneous linear differential equations, Second order linear differential equations with variable coefficients, Solution by changing independent variable, Method of variation of parameters, Cauchy-Euler equation, Application of differential equations in solving engineering problems.	
Unit-2: Laplace Transform	10
Laplace transform, Existence theorem, Properties of Laplace Transform, Laplace transform of derivates and integrals, Unit step function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem. Application of Laplace Transform to solve ordinary differential equations and simultaneous differential equations.	
Unit-3: Sequence and Series	8
Definition of Sequence and series with examples, Convergence of series, Tests for convergence of series, Ratio test, D' Alembert's test, Raabe's test, Comparison test. Fourier series, Half range Fouriersine and cosine series.	
Unit-4: Complex Variable–Differentiation	8
Functions of complex variable, Limit, Continuity and differentiability, Analytic functions, Cauchy- Riemann equations (Cartesian and Polar form), Harmonic function, Method to find Analytic functions, Milne's Thompson Method, Conformal mapping, Mobius transformation and their properties.	
Unit-5: Complex Variable –Integration	8
Complex integration, Cauchy- Integral theorem, Cauchy integral formula, Taylor's and Laurent's series, singularities and itsclassification, zeros of analytic functions, Residues, Cauchy's Residue theorem and its application.	

BEC101 / BEC201 : FUNDAMENTALS OF ELECTRONICS ENGINEERING

Topics	Contact Hours
Unit-1	**8**
Semiconductor Diode: Depletion layer, V-I characteristics, ideal and practical Diodes, Diode Equivalent Circuits, Zener Diodes breakdown mechanism (Zener and avalanche) **Diode Application:** Diode Configuration, Half and Full Wave rectification, Clippers, Clampers, Zener diode as shunt regulator, Voltage-Multiplier Circuits **Special Purpose two terminal Devices:** Light-Emitting Diodes, Photo Diodes, Varactor Diodes, Tunnel Diodes.	
Unit-2	8
Bipolar Junction Transistor: Transistor Construction, Operation, Amplification action. Common Base, Common Emitter, Common Collector Configuration **Field Effect Transistor:** Construction and Characteristic of JFETs. Transfer Characteristic. MOSFET (MOS) (Depletion and Enhancement) Type, Transfer Characteristic.	
Unit-3	8
Operational Amplifiers: Introduction, Op-Amp basic, Practical Op-Amp Circuits (Inverting Amplifier, Non-inverting Amplifier, Unit Follower, Summing Amplifier, Integrator, Differentiator).Differential and Common-Mode Operation, Comparators.	
Unit-4	8
Digital Electronics: Number system & representation, Binary arithmetic, Introduction of Basic and Universal Gates, using Boolean algebra simplification of Boolean function. K Map Minimization upto 6 Variables.	
Unit-5	8
Fundamentals of Communication Engineering: Basics of signal representation and analysis, Electromagnetic spectrum Elements of a Communication System, Need of modulation and typical applications, Fundamentals of amplitude modulation and demodulation techniques. **Introduction to Wireless Communication:** Overview of wireless communication, cellular communication, different generations and standards in cellular communication systems, Fundamentals of Satellite & Radar Communication.	

BCS101 / BCS201: PROGRAMMING FOR PROBLEM SOLVING

Content	Contact Hours
Unit -1:	8
Introduction to Components of a Computer System: Memory, Processor, I/O Devices, Storage, Operating System, Concept of Assembler, Compiler, Interpreter, Loader and Linker. **Idea of Algorithm:** Representation of Algorithm, Flowchart, Pseudo Code with Examples, From Algorithms to Programs, Source Code. **Programming Basics:** Structure of C Program, Writing and Executing the First C Program, Syntax and Logical Errors in Compilation, Object and Executable Code. Components of C Language. Standard I/O in C , Fundamental Data types, Variables and Memory Locations, Storage Classes.	
Unit-2:	8
Arithmetic Expressions and Precedence : Operators and Expression Using Numeric and Relational Operators, Mixed Operands, Type Conversion, Logical Operators, Bit Operations, Assignment Operator, Operator precedence and Associatively. **Conditional Branching:** Applying if and Switch Statements, Nesting if and Else and Switch.	
Unit-3:	8
Iteration and Loops: Use of While, do While and for Loops, Multiple Loop Variables, Use of Break , Goto and Continue Statements. **Arrays:** Array Notation and Representation, Manipulating Array Elements, using Multi Dimensional Arrays. Character Arrays and Strings, Structure, union, Enumerated Data types, Array of Structures, Passing Arrays to Functions.	
Unit-4:	8
Functions: Introduction, Types of Functions, Functions with Array, Passing Parameters to Functions, Call by Value, Call by Reference, Recursive Functions. **Basic of searching and Sorting Algorithms:** Searching & Sorting Algorithms (Linear Search , Binary search , Bubble Sort, Insertion and Selection Sort)	
Unit-5:	8
Pointers: Introduction, Declaration, Applications, Introduction to Dynamic Memory Allocation (Malloc, Calloc, Realloc, Free), String and String functions , Use of Pointers in Self-Referential Structures, Notion of Linked List (No Implementation) **File Handling:** File I/O Functions, Standard C Preprocessors, Defining and Calling Macros and Command-Line Arguments.	

BAS104 / BAS204: ENVIRONMENT AND ECOLOGY

Topics	Contact Hours
Unit-1	**8**
Environment: Definition, Types of Environment, Components of environment, Segments of environment, Scope and importance, Need for Public Awareness. *Ecosystem:* Definition, Types of ecosystem, Structure of ecosystem, Food Chain, Food Web, Ecological pyramid. Balance Ecosystem. Effects of Human Activities such as Food, Shelter, Housing, Agriculture, Industry, Mining, Transportation, Economic and Social security on Environment, Environment Impact Assessment, Sustainable Development.	
Unit-2	8
Natural Resources: Introduction, Classification. *Water Resources;* Availability, sources and Quality Aspects, Water Borne and Water Induced Diseases, Fluoride and arsenic Problems in Drinking Water. *Mineral Resources;* Material Cycles; Carbon, Nitrogen and Sulfur cycles. *Energy Resources;* Conventional and Non conventional Sources of Energy. *Forest Resources;* Availability, Depletion of Forests, Environment impact of forest depletion on society.	
Unit-3	8
Pollution and their Effects; Public Health Aspects of Environmental; Water Pollution, Air Pollution, Soil Pollution, Noise Pollution, Solid waste management.	
Unit-4	8
Current Environmental Issues of Importance; Global Warming, Green House Effects, Climate Change, Acid Rain, Ozone Layer Formation and Depletion, Population Growth and Automobile pollution, Burning of paddy straw.	
Unit-5	8
Environmental Protection; Environmental Protection Act 1986, Initiatives by Non Governmental Organizations (NGO's), Human **Human Population and the Environment:** Population growth, Environmental Education, Women Education.	