

**Jaypee University of Information Technology,**  
**Waknaghat, Solan (H.P.)**



**B. Tech. 1<sup>st</sup> Year Course Structure and detailed syllabus**  
**effective from Academic Session : 2018-19 for**  
**BT, BI, CSE, IT, ECE, CE**

**BIOTECHNOLOGY, BIOINFORMATICS****FIRST SEMESTER (2018-19)**

S. No.	Course		Course Hours				Credits
	Code	Title	L	T	P	Total	
1.	18B11HS111	English and Technical Communication	2	0	0	2	2
2.	18B17HS171	English and Technical Communication Lab	0	0	2	2	1
3.	18B11MA112	Basic Mathematics – I OR	3	1	0	4	4
	18B11BT111	Fundamental Biology	3	0	0	3	3
	18B17BI171	Fundamental Biology Lab	0	0	2	2	1
4.	18B11PH112	Basic Engineering Physics-I	3	1	0	4	4
5.	18B17PH172	Basic Engineering Physics – I Lab	0	0	2	2	1
6.	18B11CI111	Programming for Problem Solving	3	0	0	3	3
7.	18B17CI171	Programming for Problem Solving Lab	0	0	2	2	1
8.	18B17GE173	Engineering Graphics	0	0	3	3	1.5
9.	18B17GE172	Mandatory Induction Program	-	-	-	-	-
		<b>Total</b>				<b>22/23</b>	<b>17.5</b>

**BIOTECHNOLOGY, BIOINFORMATICS****SECOND SEMESTER (2018-19)**

S. No.	Course		Course Hours				Credits
	Code	Title	L	T	P	Total	
1.	18B11MA212	Basic Mathematics-II	3	1	0	4	4
2.	18B11PH212	Biophysical Techniques	3	1	0	4	4
3.	18B11CI211	Data Structure and Algorithms	3	1	0	4	4
4.	18B17CI271	Data Structure and Algorithms Lab	0	0	4	4	2
5.	18B11EC112	Basic Electrical Sciences	3	1	0	4	4
6.	18B17EC172	Basic Electrical Sciences Lab	0	0	2	2	1
7.	18BI7GE171	Workshop Practices	0	0	3	3	1.5
		<b>Total</b>				<b>25</b>	<b>20.5</b>

**ECE, CS, IT, CE****FIRST SEMESTER (2018-19)**

S. No.	Course		Course Hours				Credits
	Code	Title	L	T	P	Total	
1.	18B11HS111	English and Technical Communication	2	0	0	2	2
2.	18B17HS171	English and Technical Communication Lab	0	0	2	2	1
3.	18B11MA111	Engineering Mathematics – I	3	1	0	4	4
4.	18B11PH111	Engineering Physics – I	3	1	0	4	4
5.	18B17PH171	Engineering Physics – I Lab	0	0	2	2	1
6.	18B11CI111	Programming for Problem Solving	3	0	0	3	3
7.	18B17CI171	Programming for Problem Solving Lab	0	0	2	2	1
8.	18B17GE171	Workshop Practices <b>OR</b>	0	0	3	3	1.5
	18B17GE173	Engineering Graphics	0	0	3	3	1.5
9.	18B17GE172	Mandatory Induction Program	-	-	-	-	-
		<b>Total</b>				<b>22</b>	<b>17.5</b>

**ECE, CS, IT, CE****SECOND SEMESTER (2018-19)**

S. No.	Course		Course Hours				Credits
	Code	Title	L	T	P	Total	
1.	18B11MA211	Engineering Mathematics-II	3	1	0	4	4
2.	18B11PH211	Engineering Physics-II	3	1	0	4	4
3.	18B11CI211	Data Structures and Algorithms	3	1	0	4	4
4.	18B11CI271	Data Structures and Algorithms Lab	0	0	4	4	2
5.	18B11EC211	Electrical Sciences	3	1	0	4	4
6.	18B17EC271	Electrical Sciences Lab	0	0	2	2	1
7.	18B17GE173	Engineering Graphics <b>OR</b>	0	0	3	3	1.5
	18B17GE171	Workshop Practices	0	0	3	3	1.5
		<b>Total</b>				<b>25</b>	<b>20.5</b>

## ENGLISH AND TECHNICAL COMMUNICATION (18B11HS111)

S.No.	Subtitle	Topics
1	Concept and nature of Communication	What is communication? Stages of communication, Ideation, encoding, transmission, decoding & response channels of communication, Communication in organizational settings Etiquettes in social and Office settings Work culture in Jobs, Barriers to effective communication, Guidelines to overcome communication barriers
2	Self Development and Assessment	Self Assessment, Awareness, Personal goal Setting
3	Effective presentation	Pre-presentation jitters, Preparation and practices, Delivering the presentation, Qualities of the skilful presenter, Capturing and maintaining attention, handling questions, Power point presentations
4	Nature and Mechanics of Writing (Basic Writing Skills)	Techniques for writing precisely: Defining, Describing, Classifying, use of Phrases and Clauses in sentences, Importance of Proper Punctuation, Organizing Principles of paragraphs in documents
5	Technical Writing	Importance, structure and drafting and revision of Technical Reports, Technical writing style and language, Business writing: letters, preparing resume, notices, agenda and minutes of meeting, Daily Dairy entry
6	Vocabulary Development	Word Formation, Derivatives: Prefixes & Suffixes, Root words, Synonyms, Antonyms, Homophones and Homonyms, One word substitution
7	Grammar and Usage	Subject-Verb Agreement, Noun-Pronoun Agreement, Prepositions, Articles
8	Identifying Common errors in writing	Redundancies, Cliches, misplace modifiers, words often confused and misused

## ENGLISH AND TECHNICAL COMMUNICATION LAB (18B17HS171)

S.No.	Subtitle	Topics
1	The Writing Process	Key vocabulary for writing, How do you write, vocabulary: What is a document, The Writing process, Prepositions, The Writing process: some thoughts
2	Linking Ideas (I)	Linking by time, Linking by contrast and logic, Test yourself (learn about sequencing, exemplifying, highlighting and logic)
3	Linking Ideas (I)	Referencing Words, Practice linking ideas (using connectors), Grammatical focus (Agreement)
4	Applying for a Job	Online Application (Spell Check), use action words, Resumes- the basics, Look at a Resume, Applying for a Job: a thought, The Covering letter.
5	Business Letters	Grammar focus: contractions, A letter of complaint, A letter of apology, Words: formal or informal? (Writing clearly and appropriately)
6	Writing letters	Successful emails: the basics (Alternatives to gender – specific words), marketing emails: some thoughts, perfecting your document (Spell checking), Emails and letters: case studies (analyze a formal response), Emails and Letters (Grammar Focus: Modals)
7	Use of Body Language	This exercise will include showing a couple of videos to the students on the use of Body language in communication and also how to interpret other people's body language when they communicate. This will include studying facial expressions, gestures, non – verbal cues and eye contact.
8	Use of Power point presentation	This exercise will comprise of two videos on the specifics of preparing power – point presentations; the Do's and don'ts; examples from successful business entrepreneurs' presentations.
9	Vocabulary Development	Synonyms, Antonyms, Standard Abbreviations, One word Substitution, Homophones, Homonyms, Paronyms, Words often confused and misused, Word Functioning Idiomatically, Foreign Words, prefixes Suffixes
10	Reports: Organizing Information	What will I learn?, Organizing information, Why is organization important?, Finding information, other Report types (only reading), Write a report, Grammar focus: past or present? (1), Grammar Focus: past or present?(2)
11	Reported Speech	Introduction, The Rule, Practice: Pronouns, Practice: Verbal Actions, Pronunciation: Stress and Rhythm, Do you understand, Vocab: reporting verb, Your test
12	Perfecting your Document (I)	What will I learn? The elements of formatting, Format a document, British or North American?
13	Perfecting your Document(II)	Proofreading: grammar mistakes, Practice Proofreading Spell Checking, Common Misspellings, Final thought: the golden rules

## BASIC MATHEMATICS – I (18B11MA112)

S.No.	Subtitle	Topics
1	Matrices and Determinants	Algebra of matrices. Determinant of a square matrix. Properties of determinants. Some simple type of matrices. Inverse of a matrix. Solution of equations
2	Vectors and Coordinate Geometry	Vectors and their algebra. Unit vectors. Components of a vector. Position vector. Direction cosines and direction ratios. Dot and cross products. Projection of a vector on another. Distance between two points. Equations of a line, plane and sphere. Intersections. Shortest distance between lines and planes
3	Complex Numbers	Definition and geometrical representations. Algebra. Complex conjugate. Modulus and amplitude. Polar form. De Moivre's theorem. Roots of complex numbers. Simple functions
4	Sets, Relations and Functions	Sets and their representation. Union, intersection and compliment. Mapping or function. One-one, onto mappings, Inverse and composite mappings
5	Differential Calculus	Basic concept of limit and continuity. Derivative. Rules of differentiation. Tangent to a curve. Taylor's series. Maxima and minima
6	Integral Calculus	Fundamental theorem of calculus (statement only). Integrals of elementary functions. Substitution and partial fractions. Definite integral as a limit of sum. Properties of definite integrals. Application to areas and lengths



## FUNDAMENTAL BIOLOGY (18B11BT111)

S. No.	Unit	Topics
1.	General Biology:	The nature of life, Characteristics of living organisms, Concept and use of a classification system, brief of five Kingdoms and three domain classification system.
2.	Introduction to bio-molecule: Structure and function relationship.	Structure, chemical reactions and biological functions of carbohydrate, lipid, protein and nucleotides.
3	Cell: Basic structure and functions	Structural and biochemical organization of cell. Prokaryotic and Eukaryotic cells. Cell organelles, their molecular composition, structure and functions.
4	Basic of cellular transport system	Diffusion , Osmosis, Active transport
5	Cellular inheritance	Cell division, cell cycle, Mitosis, Meiosis and Inheritance
6	Flow of genetic information	Central Dogma, replication, transcription and translation, (initiation, elongation and termination.)
7	Maintenance of Life: Adjustment and control.	Homeostasis, thermoregulation, and osmoregulation, Speciation and selection.

**Suggested text book:**

1. Neill, Campbell (1996). Biology; Fourth edition. The Benjamin/Cummings Publishing Company. p. 309,310. ISBN 0-8053-1940-9.
2. Stryer, Lubert (2002). Biochemistry; Fifth edition. W. H. Freeman and Company.
3. Principles of Biochemistry [5th edition], Lehninger.pdf
4. ARTHUR W. HAUPT, Fundamental of Biology, 3rd ed. McGRAW-HILL

## FUNDAMENTAL BIOLOGY LAB (18B17BI171)

### Experiments:

S.N.	Unit	TITLE
1	Laboratory safety and basic laboratory Instrumentation	<ul style="list-style-type: none"> <li>Basic laboratory operation: safety procedure, general safety practice and awareness. (personal safety, eye safety, handling of biologically hazardous material, handling of needles, sharps and chemicals)</li> </ul>
		<ul style="list-style-type: none"> <li>To study the different parts and application of simple and compound microscope</li> <li>To study the fundamental components of animal and plant cell and visualization through permanent slides</li> <li>To study the fundamental of different sterilization method in laboratory practices (Autoclave, Radiation sterilization)</li> </ul>
2	Biological buffers: (Preparation and application)	<ul style="list-style-type: none"> <li>Hands on training on different buffer preparation, purification and pH measurement.</li> <li>Application of purified buffer in different biotechnology experiment.</li> <li>Collect water from two different water bodies around you and study them for pH, clarity and presence of any living organism.</li> </ul>
3	Microscopic Analysis of biological sample	<ul style="list-style-type: none"> <li>To perform simple and differential staining of given microorganism and classify them ( gram staining)</li> <li>Isolation and identification of microbe from given sample: Microscopic examination and motility test.</li> <li>To perform microscopic examination of unicellular eukaryote organism: identification and characterization</li> </ul>
4	Analytical estimation of bio-molecule	<ul style="list-style-type: none"> <li>Estimation of Different macromolecules by visible spectrophotometer.</li> <li>To study the basic of standard curve preparations and application in biotechnology experiments.</li> </ul>

**Methodology:** Students will do various experiments in Undergraduate laboratory

### Reference books and related material:

1. Lab manual
2. Laboratory exercises in Microbiology – Harley Prescott
3. Biotechnology Lab Course: Jeffery M.Becker, Guy A. Caldwell, Eve Ann Zachgo
4. Biology 6<sup>th</sup> edition : Raven - Johnson

## BASIC ENGINEERING PHYSICS - I (18B11PH112)

S.No.	Subtitle	Topics
1	Nature of light and matter	The electromagnetic spectrum: Sources of light, emission and absorption spectra, Basics of Fluorescence, Brief introduction to spectroscopy, particle nature of radiation – the Photoelectric effect, Compton Effect. X-rays (continuous and characteristic), X-ray diffraction – Bragg's law. The origin of quantum theory – Planck's hypothesis, the wave nature of matter – wave-particle duality, matter waves (de Broglie hypothesis). Basic postulates of quantum mechanics – the wave function –its physical interpretation, the Schrodinger equation
2	Interference	Coherence and coherent Sources, Interference by division of wavefront (Young's double slit experiment, Fresnel's biprism), Interference by division of amplitude (Newton's rings, Michelson's Interferometer)
3	Diffraction	Fresnel and Fraunhofer types of diffraction, Fraunhofer diffraction: Single slit, double slit, circular aperture and N-slit. Diffraction grating – wavelength determination, resolving power and dispersive power. Resolving power of optical instruments – Rayleigh criterion
4	Polarization	Types of polarization, Brewster's law, Malu's law, e-ray and O-ray, dichroism, Nicol prism, double refraction, quarter-wave and half – wave plates, elliptically and circularly polarized light, optical activity, specific rotation, Laurent half-shade polarimeter.
5	Viscosity	Streamline flow, Turbulent motion, Critical velocity, Viscosity, Coefficient of viscosity, Poiseulle's equation, Stoke's method, Ostwald viscometer. Centrifugation
6	Surface tension	Excess pressure inside a liquid drop and soap bubble, Angle of contact, Searl's Torsion balance method, Jaeger's method, Quincke's method, Interfacial surface tension
7	Introduction to Nanotechnology	Origin of Nanotechnology, Nano Scale, Surface to volume Ratio, Quantum Confinement, Fabrication: Bottom-up and Top-down, Characterization, Nanobiotechnology.

**BASIC ENGINEERING PHYSICS – I LAB**  
**(18B17PH172)**

S.No.	Subtitle	Topics
1	Interference	To find the wavelength of sodium light using Fresnel's biprism.
2	Interference	To determine the wavelength of sodium light by measuring the diameters of Newton's rings.
3	Diffraction	To measure the wavelengtyhs of certain lines in the spectrum of the mercury lamp using plane transmission grating.
4	Polarization	To find the specific rotation of sugar solution by using a polarimeter.
5	Dispersion	To calculate the angle of prism and dispersive power of the materials of the prism with the help of spectrometer.
6	Absorbance and fluorescence	Studies of absorbance, excitation and emission in liquids in support of Jablonski diagram.
7	Viscosity	To determine coefficient of viscosity of water by Poiseuille's Method.

## PROGRAMMING FOR PROBLEM SOLVING (18B11CI111)

S.No.	Subtitle	Topics
1	Introduction to Programming	Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.), idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart / Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, syntax and Logical Errors in compilation, object and executable code
2		Arithmetic expressions and precedence.
3		Conditional Branching and Loops. Writing and evaluation of conditionals and consequent branching, Iteration and loops
4	Arrays	Arrays (1-D, 2-D), Character arrays and Strings
5	Basic Algorithms	Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)
6	Function	Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: idea of call by reference
7	Recursion	Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort
8	Structure and Pointers	Structures, Defining structures and Array of Structures, Idea of pointers, Defining pointers, use of Pointers in self-referential structures, notion of linked list (no implementation). File handling

**PROGRAMMING FOR PROBLEM SOLVING LAB  
(18B17CI171)**

<b>S.No.</b>	<b>Topics</b>
1	Familiarization with programming environment
2	Simple computational problems using arithmetic expressions
3	Problems involving if-then-else structures
4	Iterative problems e.g. sum of series
5	1D Array manipulation
6	Matrix problems, String operations
7	Simple functions
8	Programming for solving Numerical methods problems
9	Recursive functions
10	Pointers and structures
11	File operations

## **ENGINEERING GRAPHICS (18B17GE173)**

<b>S.No.</b>	<b>Subtitle</b>	<b>Topics</b>
1	Introduction	Drawing Instruments and use, letter writing, Geometrical configurations, Scales, Conic Sections
2	Orthographic Projections	Points, straight lines, planes, simple solids
3	Isometric Projections	Simple solids like cube, cylinder, prism, cone, orthographic projections of simple machine elements like machine clamp, dovetail brackets and bearing block, Development of Surfaces
4	Applications of AutoCAD Software	Basic terminology, Drawing commands and skills, Project Planning, 3-Dimensional drawing, Advance Tools : Template files, object snap in AutoCAD, line types, file formats, editing and modifying, Inquiry tools, X-Rays in CAD, System variables

## BASIC MATHEMATICS - II (18B11MA212)

S.No.	Subtitle	Topics
1	Sequene and series	Convergence and divergence. Simple tests for convergence. Absolute convergence
2	Calculus of two or more variables	Partial differentiation. Taylor's series. Differentiation of a vector. Tangent to a curve. Gradient of a Scalar. Tangent to a surface. Integration of a vector. Line integral. Double integral
3	Elementary Differential Equations	Definitions of order, degree, linear, nonlinear, homogeneous and nonhomogeneous. Solution of first order equations. Complementary function and particular integral. Initial and boundary value problems. Linear differential equations with constant coefficients. Cauchy-Euler equation
4	Basic Statistics and numerical Methods	Classification of data. Mean, median and standard deviation. Method of least squares. Newton-Raphson method. Linear and quadratic interpolation. Simpson's rule



## BIO-PHYSICAL TECHNIQUES (18B11PH212)

S.No.	Subtitle	Topics
1	Introduction	Quantisation of energy, Regions of the electromagnetic spectrum, Representation of spectra, Basic elements of practical spectroscopy, The width and intensity of spectral lines
2	Microwave Spectroscopy	Rotation of molecules, Rotational spectra of diatomic molecules, Rigid and non rigid rotator, Poly-atomic molecules, analysis of microwave spectroscopy technique.
3	Infrared Spectroscopy	Vibration of diatomic molecules, Simple Harmonic oscillator, Anharmonic oscillator, Vibration rotation spectra of diatomic molecules, Vibration of polyatomic molecules, Fourier Transform Infrared Spectroscopy, Analysis of Infrared techniques
4	Raman Spectroscopy	Raman effect, Molecular polarisability, Rotational and vibrational Raman Spectra, Structure determination from Raman and Infrared spectroscopy
5	Electronic Spectroscopy	Electronic spectra of diatomic molecules, Frank-Condon principle, dissociation energy, shape of molecular orbitals, Classification of states of diatomic molecules, Electronic spectra of polyatomic molecules. Analysis by electronic spectroscopy
6	X-ray crystallography	Bonding in solids, Types of crystals, Miller indices, Reciprocal lattice, X-ray diffraction and its application in structure determination
7	Mass Spectroscopy	Basics of the technique, Producing the ion, Detection of ions and identifying of compounds. Analysis and application
8	UV and Visible Spectroscopy	UV-VIS spectroscopy, Photoluminescence Spectroscopy, Circular dichroism Spectroscopy: Basic concepts, Instrumentation and analysis
9	Electron microscopy	Transmission Electron Microscope, Scanning Electron Microscope, Tunneling electron Microscope and Atomic force Microscope

## DATA STRUCTURE & ALGORITHMS (18B11CI211)

S.No.	Subtitle	Topics
1	Introduction	Basic Terminologies: Elementary Data organizations, Data Structure, Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic, Notations, Time-Space trade off. <b>Searching:</b> Linear Search and Binary Search Techniques and their complexity analysis.
2	Stacks and Queues	ADT Stack and its operations: Algorithms and their complexity analysis, applications of Stacks: Expression Conversion and evaluation – corresponding algorithms and complexity analysis. ADT queue, Types of Queue: Simple Queue, circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis
3	Linked Lists	Single linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, insertion into, Deletion from linked lists; Linked representation of Stack and Queue, header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis
4	Trees	Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis
5	Sorting and Hashing	Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, merge Sort, Heap Sort; performance and Comparison among all the methods, Hashing
6	Graph	Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis

## DATA STRUCTURE & ALGORITHMS LAB (18B17CI271)

S.No.	Topics
1	Getting acquainted with Arrays & Strings, Structures, Recursion, Pointers & Dynamic memory allocation
2	Operations on Linear Linked List, Doubly and Circular Linked List (Creation, insertion, deletion, sorting, traversing, reversing etc)
3	Operations on Stacks (Creation; pushing; popping; testing underflow, overflow; prefix and postfix)
4	Operations on Queues (Creation; enqueue; dequeue; testing underflow, overflow)
5	Operations on Tree or BST (Creation; Traversing like preorder, post-order and in-order; Searching element; finding height etc.)
6	Implementation of insertion Sort and Selection Sort Algorithm with arrays using dynamic memory allocation.
7	Implementation of Bubble Sort and Merge Sort Algorithm with arrays using dynamic memory allocation.
8	Implementation of Radix sort and Quick Sort Algorithm with arrays using dynamic memory allocation.
9	Operation on Heaps and Heap Sort
10	Implementation of Linear Search Algorithm and Binary Search Algorithm using dynamic memory allocation.
11	Operations on Graphs (Creation; entering info; printing Output and deleting; traversal of BFS and DFS algorithm etc.)

## BASIC ELECTRICAL SCIENCES (18B11EC112)

S.No.	Subtitle	Topics
1	DC Circuits	Electrical circuit elements (R,L and C), voltage and current sources, series and parallel combination of elements, star and delta connections, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation using Node and Mesh analysis. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.
2	AC Circuits	Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance.
3	Sinusoidal steady state analysis	Representation of sine function, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power.
4	Transformers:	Magnetic materials, Construction and working principle of transformer, BH characteristics, ideal and practical transformer, equivalent circuit, Step-up and step-down transformers, losses in transformers, regulation and efficiency.
5	Acquisition of biomedical signals through electrodes	Introduction to biomedical signals, Acquisition of ECG, EEG, EMG, EOG and ERG
6	Introduction to Medical Imaging Modalities	Working principle, advantages and limitations of X-ray, CT, MRI, Ultrasound, PET and SPECT.

## BASIC ELECTRICAL SCIENCES LAB (18B17EC172)

S.No.	Topics
1	Introduction to Power supply & Multimeter.
2	To determine the equivalent resistance of a circuit using color code and to verify it using a multimeter
3	To verify Voltage dividing rule and Kirchoff's Voltage Law (KVL)
4	To verify Current dividing rule and Kirchoff's Current Law (KCL)
5	To verify Superposition Theorem
6	To verify Thevenin's Theorem
7	To verify Norton's Theorem
8	To verify Maximum Power Transfer Theorem
9	To verify reciprocity theorem
10	Introduction to CRO & Function Generator
11	To study the transient response of series RC circuits using different values of R and C

## WORKSHOP PRACTICES (18B17GE171)

S.No.	Subtitle	Topics
1	Carpentry Shop	<p><b>Timber:</b> Type, Qualities of timber disease, Timber seasoning, Timber preservation, <b>Wood Working tools:</b> Wood working machinery, joints &amp; joinery. Two jobs to cover above topic such as : name Plate. Carpentry joints such as cross halving joint mortise and tennon joint, Dovetail joint etc.</p> <p><b>Fitting Shop:</b> Metal bench work Measuring instruments, Engineer steel rule, Surface gauges calliper, Feeler gauges, Try square and micrometer. Use, Care and maintenance of hand tools such as hammer, Cold chisel of different type, Center punch, Hack-saw, Dot punch, Different types of files, Use of surface plate, Surface gauges, type of drills, Taps and dies for drilling tapping and screw threads. Fitting operations: Chipping, filling, Drilling and tapping.</p>
2	Black Smithy Shop	<p>Ferrous and Non-ferrous materials, Fe-C diagram, Smithy forges, maintenance and control of fire and fuel used in smithy shop. Use of various smithy tools such as swage block. Anvil, different types of Hammers, Tongs, Flatters, Cold set, Hot set, set hammers punches, Callipers (outside and inside). Introduction to forging and forging methods heating metals for forging.</p> <p><b>Forging operations:</b> Upsetting, Punching and drafting. Forging of chisel. Forging of C-ring. Forging of Pan Hook (S-shaped), Forging of screw driver, forging of hexagonal nut etc.</p> <p><b>Foundry:</b> Pattern Making: Students are required to prepare four jobs related to pattern making and moulding and know about: Pattern materials, pattern allowances and types of patterns. Core box and core print, use and care of tools used for making wooden patterns.</p> <p><b>Moulding:</b> Properties of good moulding and core sand, Composition of green sand, Dry sand and loam sand. Care and use of moulding tools. Attempt should be made to expose students to as many workshop practices as feasible.</p>

## ENGINEERING MATHEMATICS - I (18B11MA111)

S.No.	Subtitle	Topics
1	Differential Calculus	Limits and continuity of function, Partial Differentiation, Chain rule, Total Derivative; Maxima, Minima and Saddle points; Method of Lagrange's multipliers, Taylor's series for two or more variables
2	Integral Calculus	Improper integrals; Beta and Gamma functions and their properties; Double integrals, Change of order and Change of variables, Applications to areas and volumes
3	Vector Calculus	Equations to a line and a plane, Tangent plane and Normal line, Gradient, Curl and divergence and their physical significance, Directional derivatives, Line and surface integrals
4	Laplace Transform	Laplace Transform, Inverse Laplace transform, Convolution, Dirac delta and Unit Step function, Solution of initial value problems
5	Matrices	Algebra of matrices, Row Echelon form, Inverse and Rank of a matrix, Symmetric, Skew – symmetric and Orthogonal matrices; Determinants; Solution of systems of linear equations (Gauss's elimination, Rank method), Linear Independence and Dependence of vectors. Eigen values and Eigenvectors; Cayley-Hamilton Theorem, Diagonalization of Matrices and Orthogonal transformation

## ENGINEERING PHYSICS – I (18B11PH111)

S.No.	Subtitle	Topics
1	Interference	Introduction, Young's double slit experiment, Phase difference and path Difference, coherence, Analytical treatment of interference, Methods of interference (division of wave front & division of amplitude) Applications of interference in the field of engineering, Scientific applications of interference
2	Diffraction	Introduction, Difference between interference and diffraction, Fresnel and Fraunhofer class of diffraction, Diffraction grating, Applications of diffraction grating, Resolving and dispersive power of an optical instrument
3	Polarization	Introduction, Difference between unpolarized and polarized light, Means of production of polarized light, Optical activity, specific rotation, Lorentz half shade and biquartz polarimeter
4	Atomic Physics	Introduction, Quantum numbers, spin and orbital angular momentum, Atoms and magnetic field, Zeeman effect, Atoms in electric field, Stark effect
5	Quantum Physics	Wave particle duality, uncertainty principle and its applications, wave function, Schrodinger equation and its solutions, Particle in a box, Harmonic Oscillator
6	Thermal Physics	Introduction, Zeroth law of Thermodynamics. First law of thermodynamics, Specific heat relation, Work done during an isothermal and adiabatic process. Second law of thermodynamics, concept of entropy, entropy for an ideal gas, third law of thermodynamics, Principle of increase of entropy or degradation of energy, Reversible and irreversible processes. Carnot cycle and Carnot engine, Refrigerator, Clausius-Cleyperon equation, Themodynamic Potentials, Maxwell's equations
7	Lasers	Principle of working of laser, Different types of lasers (Three level and found level lasers)
8	Relativistic Mechanics	Inertial & non-inertial frames, Michelson-Morley experiment, Einsteins postulates. Lorentz transformation, equations. Length contraction & Time dilation, Addition of velocities; Variation of mass with velocity Mass energy equivalence



**ENGINEERING PHYSICS – I LAB**  
**(18B17PH171)**

S.No.	Subtitle	Topics
1	Interference	To find the wavelength of sodium light using Fresnel's biprism.
2	Interference	To determine the wavelength of sodium light by measuring the diameters of Newton's rings.
3	Diffraction	To measure the wavelengtyhs of certain lines in the spectrum of the mercury lamp using plane transmission grating.
4	Polarization	To find the specific rotation of sugar solution by using a polarimeter.
5	Dispersion	To calculate the angle of prism and dispersive power of the materials of the prism with the help of spectrometer.
6	Absorbance and fluorescence	Studies of absorbance, excitation and emission in liquids in support of Jablonski diagram.
7	Viscosity	To determine coefficient of viscosity of water by Poiseuille's Method.

## ENGINEERING MATHEMATICS - II (18B11MA211)

S.No.	Subtitle	Topics
1	Sequence and series	Convergence of sequence and series, tests for convergence; Power series, Fourier series: Half range sine and cosine series, Parseval's theorem
2	Differential Equations Part – I	Basics of first order Differential Equations, Second and Higher order differential equations with constant coefficients. Second order linear differential equations with variable coefficients, methods of variation of parameters, Cauchy-Euler equation
3	Differential Equations Part – II	Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties. Introduction to Partial differential Equations, Solutions of one dimensional Wave, heat Equation and Laplace Equation
4	Complex Variable – Differentiation	Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties
5	Complex Variable – Integration	Contour integrals, Cauchy Theorem, Cauchy Integral formula, Liouville's theorem and Maximum-Modulus theorem; Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem, Evaluation of definite integral involving sine and cosine, improper integrals

## ENGINEERING PHYSICS - II

### (18B11PH211)

S.No.	Subtitle	Topics
1	Electromagnetism	<p>Basic knowledge of fields, gradient, divergence and curl, Coulomb's law and related numerical, electric flux, Gauss's law for the charge inside and outside the Gaussian surface, applications of Gauss law: spherical and cylindrical symmetries, electric field due to charged conductor, force per unit area on the surface of the charged conductor, treatment of electrostatic problems by solution of Laplace and Poisson's equations.</p> <p>Biot Savart law, Ampere's law, Maxwell's equations in free space and dielectric media, energy in electromagnetic waves (Poynting vector and Poynting theorem), plane electromagnetic waves in free space, transverse nature, wave impedance and energy flow, energy density and energy flux (Poynting vector) in an electromagnetic field, radiation pressure</p>
2	Statistical physics and Applications	<p>Introduction, macrostates, microstates, thermodynamic probability, distribution of n-particles in k-cells, phase space, minimum volume, classical and quantum statistics: common approach to three statistics, Maxwell-Boltzmann (ideal gas), Bose-Einstein (photon gas), Fermi-Dirac distributions (electron gas). Compton effect.</p>
3	Optical Fibers Communication	<p>Light propagation in fibers, Step index and Graded index fibers, Numerical Aperture and Attenuation, Single and Multimode fibers and their propagation characteristics, Fiber losses and optical fiber applications</p>
4	Solid State Physics	<p>Basic ideas of bonding, ionic bonding, covalent bonding (hybridization), metallic bonding, dispersion bonds, dipole bonds, hydrogen bonds, Lattice points and space lattice, basis and crystal structure, unit cell and primitive cell, seven crystal systems and fourteen Bravais space lattice, coordination number, nearest neighbour distance, atomic radius, atomic packing factor in crystal structure, calculation of lattice constant, lattice planes and Miller indices, separation between lattice planes.</p> <p>X-ray diffraction, Bragg's law of X-ray diffraction, Bragg's x-ray spectrometer, powder crystal method, rotating crystal method. Electronic conduction in metals, classical free electron theory, quantum theory of free electrons, band theory of solids, distinction between metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, carrier concentration in thermal equilibrium in intrinsic semiconductor, Fermi level and energy band diagram in intrinsic semiconductor, energy band diagram and Fermi level in extrinsic semiconductors, effect of temperature on extrinsic semiconductor, electrical conductivity of intrinsic semiconductor and extrinsic semiconductor, hall effect, allied parameters and its applications</p>

## ELECTRICAL SCIENCES 18B11EC211

S.No.	Subtitle	Topics
1	DC Circuits	Electrical circuit elements (R, L and C), Voltage and current sources, series and parallel combination of elements, star and delta connections, Kirchhoff current and voltage laws, analysis of simple circuits and dc excitation using Node and Mesh analysis. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits
2	AC Circuits	Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase AC circuits consisting of R, L, C, RL, RLC combinations (series and parallel), resonance. AC Theorems (Superposition, Thevenin, Norton and Maximum Power Theorems)
3	Sinusoidal steady state analysis	Representation of sine function, phasor diagrams, impedance and admittances, AC circuit analysis, effective or RMS values, average power and complex power
4	Network analysis	Poles and Zeros, Ports of terminals pairs. Network functions for one port and two port network (ladder and general networks). Poles and zeros of network functions. Restriction on Pole and zero locations for driving point and transfer functions. Time domain behavior from poles zero plot
5	Network Synthesis	Network functions, Impedance & Admittance function, Transfer functions, Relations between transfer and impulse response, poles and zeros and restrictions, network function for two terminal pair network. Network synthesis techniques for 2-terminal network Foster and Cauer Form

## ELECTRICAL SCIENCES LAB

### 18B17EC271

S.No.	Topics
1	Introduction to Power supply & Multimeter.
2	To determine the equivalent resistance of a circuit using color code and to verify it using a multimeter. To verify Voltage divider and Current divider.
3	To verify Kirchoff's voltage law (KVL) and Kirchoff's Current Law (KCL)
4	To verify Superposition Theorem
5	To verify Norton's Theorem
6	To verify Thevenin's Theorem and maximum Power Transfer Theorem
7	To study the transient response of series RC circuits using different values of R and C
8	Determination of frequency response of current in RLC circuit with sinusoidal ac input
9	Determination of z and h parameters (dc only) for a network
10	Determination of driving point and transfer functions of a two port ladder network and verify with theoretical values