COURSE STRUCTURE
B. TECH I SEMESTER

S. No.	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC1T01	BSC	Linear Algebra and Differential Equations	3	-	-	3	3
2	20EC1T02	BSC	Applied Physics	3	-	-	3	3
3	20EC1T03	HSMC	English	3	-	-	3	3
4	20EC1T04	ESC	Electronic Devices	2	-		2	2
5	20EC1T05	ESC	Problem solving through C	3	-	-	3	3
6	20EC1L06	HSMC	English Communication Skills Lab	-	-	3	3	1.5
7	20EC1L07	BSC	Applied Physics Lab	-	-	3	3	1.5
8	20EC1L08	ESC	Problem solving through C Lab	-	-	3	3	1.5
9	20EC1L09	ESC	Electronic Devices Lab	-	-	2	2	1
							Total Credits	**19.5**

B. TECH II SEMESTER

S.No.	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20EC2T01	BSC	Transform Techniques	3	-	-	3	3
2	20EC2T02	BSC	Applied Chemistry	3	-	-	3	3
3	20EC2T03	ESC	Network Theory	3	-	-	3	3
4	20EC2T04	ESC	Basic Electrical Technology	3	-	-	3	3
5	20EC2T05	ESC	Engineering Drawing	1	-	4	5	3
6	20EC2L06	BSC	Applied Chemistry Lab	-	-	3	3	1.5
7	20EC2L07	ESC	Engineering & IT Workshop	-	-	3	3	1.5
8	20EC2L08	ESC	Basic Electrical Technology Lab	-	-	3	3	1.5
9	20EC2M09	MC	Environmental Science	3	-	-	3	0
							Total Credits	**19.5**

B.TECH I SEMESTER **BSC**

L	T	P	C
3	0	0	3

20EC1T01 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Pre-requisite: Basic knowledge about matrices, differentiation and integration

Course Objective: Objective of the course is to impart

- Basic understanding of mathematical methods to solve simultaneous linear systems
- Understanding of formation and solutions of ordinary differential equations
- Knowing the mathematical methods to solve applications of differential equations

Course Outcomes:

At the end of the course, student will be able to

CO1: Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

CO2: Illustrate the methods of computing eigen values and eigen vectors

CO3: Able to analyze the real life situations, formulate the differential equations and then applying the methods

CO4: Determine the solutions of linear differential equations

CO5: Optimize functions of several variables and able to find extreme values of constrained functions

SYLLABUS

UNIT-I: Linear systems of equations:

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence of vectors, Consistency of linear system of equations, System of linear homogeneous equations, Gauss-elimination and Gauss -Jordan methods.

UNIT-II: Eigen values & Eigen vectors:

Eigen values, Eigen vectors, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), finding inverse and powers of a matrix using C-H theorem, Reduction to diagonal form, reduction of quadratic form to canonical form using orthogonal reduction, nature of quadratic forms.

UNIT-III: Ordinary Differential Equations of first order:

Linear equations, Bernoulli's equation, Exact differential equations. Equations reducible to exact equations, **Applications:** Orthogonal Trajectories, Newton's Law of cooling, Rate of decay & growth., R-L series circuits.

UNIT-IV: Linear Differential Equations higher order:

Definitions, Complete solution (without proof), Operator D, Rules to find complementary function, Inverse operator, Rules to find the particular integral(nonhomogeneous term of the form e^{ax} , sin(ax+b), cos(ax+b), polynomials in x^m, e^{ax} V(x), any other function), Method of variation of parameters.

UNIT-V: Partial Differentiation:

Functions of two variables, Partial derivatives, Homogeneous functions, Euler's theorem, Total derivative, Jacobian and functional dependence, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH I SEMESTER **BSC**

L	T	P	C
3	0	0	3

20EC1T02 APPLIED PHYSICS

Pre-requisite: Knowledge of basic concepts of waves, Optics, Electricity and Magnetism

Course Objective: Objective of the course is to impart

- ***Knowledge*** of fundamentals of Physics which helps them in the study of advanced topics of Engineering.
- ***Develop*** analytical capability and understand various Engineering concepts.

Course Outcomes:

At the end of the course, student will be able to

CO1: ***Impart*** knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes

CO2: ***Gain*** knowledge of applications of lasers and optical fibers in various fields .

CO3: ***Classify*** magnetic and dielectric materials and their Engineering applications.

CO4: ***Understand*** basic quantum mechanics and free electron theories.

CO5: ***Obtain*** the concept of concept of holes and electrons in semiconductors.

SYLLABUS

UNIT-I: Wave Optics:

Interference*:* Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Colors in thin films-Newton's rings-Determination of wave length nd refractive index.

Diffraction: C Introduction- Fresnel and Fraunhofer diffraction - Fraunhofer Diffraction due to Single slit, Double slit, N –slits(Qualitative) - Diffraction Grating – Resolving Power of Grating(Qualitative).

Polarizations: Introduction- Types of polarization-polarization by reflection, refraction and Double refraction-Nicol's prism –Half and Quarter wave plates.

UNIT-II: Lasers and Fiber Optics:

Lasers:: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping Schemes – Ruby laser – He-Ne laser - Applications of lasers.

***Fiber optics*:** Introduction –Principle of optical fiber-Construction- - Acceptance Angle - Numerical Aperture -Classification of optical fibers based on refractive index profile and modes .

UNIT-III: Magnetic and Dielectric Materials:

***Magnetic Materials*:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para ferro, anti ferro & ferri – Domain concept of Ferromagnetism(Qualitative) - Hysteresis – soft and hard magnetic materials .

***Dielectric Materials*:** Introduction - Dielectic polarization **–** Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation.

UNIT-IV: Quantum Mechanics,Free Electron Theory:

***Quantum Mechanics*:** Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

***Free Electron Theory*:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi-Dirac distribution-Density of States(3D),Fermi energy.

UNIT-V: Band Theory of Solids and Semiconductors:

Band theory of Solids: Introduction- Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - V vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

Semiconductors::Introduction– Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-

type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Drift and Diffusion currents – Einstein's equation-Hall effect- Hall coefficient - Applications of Hall effect.

Text Books

1. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G. Kshirsagar - S. Chand Publications, 2019.
2. "Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2015).
3. "Engineering Physics" by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

Reference Books

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).
2. Engineering Physics by M. Arumugam, Anuradha Publication (2014).
3. Physics for Engineers by M.R. Srinivasan, New Age international publishers (2009).

B.TECH I SEMESTER **HSMC**

L	T	P	C
3	0	0	3

20EC1T03 ENGLISH

Pre-requisite:

Course Objective:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Course Outcomes: At the end of the course, student will be able to

CO1 understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

CO2 ask and answer general questions on familiar topics

CO3 employ suitable strategies to master the art of letter writing and email writing

CO4 recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

CO5 form sentences using proper grammatical structures and correct word forms

SYLLABUS

UNIT-I A Drawer full of happiness (Detailed Study)
Deliverance (Non-detailed Study)

UNIT-II	Nehru's letter to his daughter Indira on her birthday(Detailed Study) Bosom Friend (Non-detailed Study)
UNIT-III	Stephen Hawking-Positivity 'Benchmark' (Detailed Study) Shakespeare's Sister(Non-detailed Study)
UNIT-IV	Liking a Tree, Unbowed: Wangari Maathai-biography (Detailed Study) Telephone Conversation(Non-detailed Study)
UNIT-V	Stay Hungry-Stay foolish (Detailed Study) Still I Rise(Non-detailed Study)

Text Books

1."Infotech English", Maruthi Publications. (Detailed)

2. "The Individual Society", Pearson Publications.(Non-detailed)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

B.TECH I SEMESTER **ESC**

L	T	P	C
3	0	0	3

20EC1T04 ELECTRONIC DEVICES

Pre-requisite: Physics

Course Objective: the students can able to Analyze the characteristics electronic devices such as diodes, transistors in different modes etc., and simple circuits like rectifiers, clippers and clampers.

Course Outcomes: At the end of the course, student will be able to

CO1: Understand basic semiconductor devices

CO2: Observe characteristics diodes

CO3: Analyze applications of Semiconductor diodes

CO4: Characterize the Bipolar Junction Transistor in different modes

CO5: Understand the construction and working of Field Effect Transistor

SYLLABUS

UNIT-I: Semi-Conductor Physics

Introduction, Insulators, semiconductors and metals, Mobility and conductivity, Intrinsic and extrinsic semiconductors, Charge density, current components in semiconductors, Continuity equation. Active and passive components.

UNIT-II: Diodes

PN junction diode- Energy band diagram of PN junction Diode- V-I Characteristics - Current components in PN junction Diode- Diode equation- Diode resistance and capacitance- Characteristics of Zener Diode- Varactor Diode- SCR ,UJT ,Photodiode and LED

UNIT-III: Diode Applications

Half wave, Full wave Rectifier and Bridge rectifier- Derivations of characteristics of rectifiers- Filters- Inductive and Capacitive filters, Clipping& Clamping Circuits.

UNIT-IV: Bipolar Junction Transistor

Bipolar Junction Transistor- Transistor current components- Transistor equation- Transistor configurations- Characteristics of a transistor in CB,CC& CE configurations- junction biasing condition for active, saturation and cut-off modes, current gain α, β and γ.h-parameter representation of a transistor.

UNIT-V: Field Effect Transistors (FET):

Junction Field Effect Transistor construction & operation- characteristics CS, CD & CG- - **MOSFET:** Metal Oxide Semiconductor Field Effect Transistor- Types- Construction- Operation & characteristics

Text Books:

1. 1.Electronic Devices & Circuits –J.Millman, C.Halkias, Tata Mc-graw Hill,2nd Edition
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA McGraw Hill, 2ndEdition
3. D.P. Kothari andI. J. Nagrath, -BasicElectrical Engineering‖, Tata McGraw Hill, 2010.

Reference Books:

1. D. C.Kulshreshtha,-Basic Electrical Engineering‖, McGraw Hill, 2009.
2. Basic Electronic Circuits -V.K.Mehta,S-chandPublications,2008.
3. Electronic Devices & Circuits-David-A-Bell,oxford University Press 5thEdition.

B.TECH I SEMESTER **ESC**

L	T	P	C
3	0	0	3

20EC1T05 PROBLEM SOLVING THROUGH C

Pre-requisite:

Course Objective:

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C. To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage. To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor. To assimilate about File I/O and significance of functions

Course Outcomes: At the end of the course, student will be able to

CO1: Understand the basic concepts of programming

CO2: Understand and Apply loop construct for a given problem

CO3: Demonstrate the use pointers

CO4: Understand the use of functions and develop modular reusable code

CO5: Understand File I/O operations

SYLLABUS

UNIT-I:

INTRODUCTION TO COMPUTERS: Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process, Computer Numbering system

BASICS OF C PROGRAMMING: Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

UNIT-II:

Decision making statements: if, if else, nester if. Multi way decision making statements: else if, Switch statement. **Loop statements**: while, do while, for, Compilation process.

UNIT-III:

Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, two dimensional arrays, Matrix Operations, Multi-dimensional Arrays

Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

UNIT-IV:

FUNCTIONS: Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion, Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

POINTERS: Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation

UNIT-V:

STRUCTURES AND UNIONS: Structure, Nested structures, Pointer and Structures, Array of structures, Example Program using structures and pointers, Self-referential structures, Unions.

FILE PROCESSING: Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command line arguments

Text Books:

1. Krnighan. B.W and Ritche, D.M, “The C Programming Language”, Second Edition, Pearson Education, 2006
2. ReemaThareja, “Programming in C”, Oxford University Press, Second Edition, 2016.

References:

1. Pradepdey, Manas Ghosh, “Fundamentals of Computing and programming in C”, First Edition, Oxford University Press, 2009.
2. Paul Deitel and Harvey Deitel, “C How to Program”, Seventh Edition,

Pearson Publication.

3. E Balagursamy, “Programming in C, Sixth Edition, Tata McGraw Hill.
4. Ajay Mittal, “Programming in C A practical Approach”, Pearson education

B.TECH I SEMESTER	HSMC	L	T	P	C
		0	0	3	1.5

20EC1L06 ENGLISH COMMUNICATION SKILLS LAB

Course Objectives:

- Facilitate effective usage of functional English through role plays
- Focus on vocabulary enhancement
- Foster various nuances of phonetics and accent neutralization

Course Outcomes: At the end of the course, student will be able to

CO1: Acquire basic proficiency in English by learning functional aspects of English language

CO2: Learn the methods of enhancing vocabulary

CO3: Acquaint himself/herself with nuances of Phonetics

LIST OF EXPERIMENTS

1 Greetings and Introductions
2 Requesting Permission & Giving Directions
3 Inviting/Complaining/Congratulating
4 Root Words
5 Phonetics-Sounds and Symbols
6 Pronunciation Rules

References:

1. Strengthen Your Steps, Maruti Publications
2. Interact, Orient Blackswan
3. Word Power Made Easy, Pocket Books

B.TECH I SEMESTER	BSC	L	T	P	C
		0	0	3	1.5

20EC1L07 APPLIED PHYSICS LAB

Pre-requisite: Fundamental understanding of usage of an instrument with proper care.

Course Objective: Objective of the course is to impart

- Training Engineering graduates to handle instruments and their usage methods to improve the accuracy of measurements.

At the end of the course, student will be able to

CO1: **Outcomes**: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

CO2: Implement the basic principles of Mechanics to measure different physical parameters.

CO3: Enhance the knowledge of Usage of electronic devices in various applications

SYLLABUS

1. Newton's rings –Determination of radius of curvature of Plano Convex Lens.
2. Determination of wavelength of spectral lines -Diffraction Grating
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating
5. Determination of Numerical Aperture and bending loss of a given Optical Fiber.
6. Determination of dispersive power of prism.
7. Determination of Rigidity modulus of a material- Torsional Pendulum.
8. Determination of Acceleration due to Gravity and Radius of Gyration-Compound Pendulum.
9. Determination of Young's modulus by method of single cantilever oscillations
10. Verification of laws of vibrations in stretched strings – Sonometer.

11. Estimation of Planck's Constant using Photo electric Effect
12. Study of I /V Characteristics of Semiconductor diode.
13. I/V characteristics of Zener diode.
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus
15. Energy Band gap of a Semiconductor using p - n junction diode

Reference Books

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017.

B.TECH I SEMESTER **ESC**

L	T	P	C
0	0	3	1.5

20EC1L08 PROBLEM SOLVING THROUGH C LAB

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers &functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

- Demonstrate Knowledge on various concepts of a C language.
- Able to draw flowcharts and write algorithms.
- Able design and development of C problem solving skills.
- Able to design and develop modular programming skills.
- Able to trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.

3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.
2. Write a program in C to display the n terms of harmonic series and their sum. 1 + 1/2 + 1/3 + 1/4 + 1/5 ... 1/n terms.
3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.
2. Write a program in C to separate odd and even integers in separate arrays.
3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.
2. Write a program in C to find transpose of a given matrix.

Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.
2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.
2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.

2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.
2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.
2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.
2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( )function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs
2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using function.
2. Write a program in C to get the largest element of an array using the function.

Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.
2. Write a program in C to copy a file in another name
3. Write a program in C to remove a file from the disk.

B.TECH I SEMESTER **ESC**

L	T	P	C
0	0	2	1

20EC1L09 ELECTRONIC DEVICES LAB

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

Course objectives:

- To study basic electronic components
- To observe characteristics of electronic devices

Course outcomes:

At the end of the course the students can able to

- Measure voltage, frequency and phase of any waveform using CRO.
- Generate sine, square and triangular waveforms with required frequency and amplitude using function generator.
- Analyze the characteristics of different electronic devices such as diodes, transistors etc., and simple circuits like rectifiers,

LIST OF EXPERIMENTS

(All Experiments has to be performed)

1. Identification of circuit Components
2. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multi meter, Function
3. Generator, Regulated Power Supply and CRO.
4. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
5. Soldering Practice- Simple circuits using active and passive components.
6. CRO Operation and its Measurements
7. **Characteristics of Semiconductor Diode and Zener Diode:** Determination of forward and reverse resistance from VI characteristics.
8. **Static Characteristics of BJT under CE Mode:** Transistor Biasing **Determination** of h-parameters h_{ie}, $h_{re}$from input characteristics

and h_{fe} & h_{oe} from output characteristics.

9. **Static Characteristics of JFET:** Determination of r_d from drain characteristics and g_m from mutual characteristics and hence obtain μ.
10. **Characteristics of UJT and SCR:** Determination of intrinsic standoff ratio from emitter characteristics.
11. **Resonant Circuits:** Characteristics of Series and Parallel Circuits, Determination of quality factor and bandwidth.
12. **Half Wave and Full Wave Rectifier with and Without Filter**: Display of output waveforms and Determination of ripple factor, efficiency and regulation for different values of load current.
13. **Bridge Rectifier with and without C-Filter:** Display of output waveforms and Determination of ripple factor, efficiency and regulation for different values of load current.
14. **Diode Clipping Circuits:** Design and display the transfer characteristics of single ended series, shunt type and double ended shunt type clipping circuits.

B.TECH II SEMESTER	BSC	L	T	P	C
		3	0	0	3

20EC2T01 TRANSFORM TECHNIQUES

Pre-requisite: Linear Algebra and Differential Equations

Course Objective: Objective of the course is to impart

- Learning the techniques of Laplace transforms to solve ordinary differential equations
- knowledge of Fourier series & Fourier transforms for piecewise continuous functions
- knowledge of solving boundary valued problems

Course Outcomes: At the end of the course, student will be able to

CO1: Able to analyze a class of integrals in terms of beta and gamma functions

CO2: Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing

CO3: Analyze the general periodic functions in the form of an infinite convergent sine and cosine series

CO4: Illustrate the methods to solve the boundary value problems

CO5: Determine a solution of a discrete system using Z- transforms

SYLLABUS

UNIT-I: Special functions:

Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

UNIT-II: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t, Evaluation of improper integrals.

Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). Application: Application to differential equations.

UNIT-III: Fourier Series & Fourier Transforms:

Euler's formulae (without proof), Conditions of Fourier expansion, Functions having points of discontinuity, Change of inerval, Even and odd functions, Half-range series.

Fourier Integral theorem (without proof), Fourier cosine & sine integral, complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms (without proof), Convolution theorem(without proof), finite & infinite Fourier sine & cosine transforms.

UNIT-IV: Partial Differential Equations:

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of Variables, Applications: One-dimensional wave and heat equations, two-dimensional heat equation.

UNIT-V: Z-Transforms: (all properties without proofs)

Introduction, definition, some standard z-transforms, linearity property, damping rule, some standard results, shifting U_n to the right, multiplication by n, initial and final value theorems, Inverse z-transforms, convolution theorem, evaluation of inverse z-transforms by partial fractions, applications to difference equations.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.

2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

3. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.

4. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH II SEMESTER **BSC**

L	T	P	C
3	0	0	3

20EC2T02 APPLIED CHEMISTRY

Pre-requisite: Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the availableresources

Course Objective: Objective of the course is to impart

- Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of green chemistry and molecular switches

Course Outcomes: At the end of the course, student will be able to

CO1: Analyze the different types of composite plastic materials and interpret the mechanism ofconduction in conducting polymers.

CO2: Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning newengineering products and categorize the reasons for corrosion and study methods to control corrosion.

CO3: Synthesize nanomaterials for modern advances of engineering technology.
Summarize the preparation of semiconductors; analyze the applications of liquid crystalsand superconductors.

CO4: Design models for energy by different natural sources.
Analyze the principles of different analytical instruments and their

applications.

CO5: Obtain the knowledge of green chemistry and molecular machines

SYLLABUS

UNIT-I: Polymer Technology

Polymerisation: Introduction, methods of polymerization (addition and Condensation), Physical and mechanical properties.

Plastics: Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets.

Elastomers: Natural rubber-Drawbacks-vulcanization, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics – GFRP and Aramid FRP

Conducting polymers: Intrinsic and extrinsic conducting polymers

Biodegradable polymers: preparation and applications

UNIT-II: Electrochemical Cells And Corrosion

Part I: ELECTROCHEMICAL CELLS: Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode,calomel electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

Part II: Corrosion: Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (cathodic protection), Protective coatings (cathodic coatings, anodic coatings, electroplating and electroless plating)

UNIT-III: Material Chemistry

Part I: Non-elemental semiconducting materials: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Super conductors:-Type –I, Type II-characteristics and applications

Part II: Nano materials: Introduction, sol-gel method, characterization by (Brunauer Emmet Teller [BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals: Introduction-types-applications.

UNIT-IV: Non-Conventional Energy Sources & Spectroscopy

Part I: NON-CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

Part II: **SPECTROSCOPY**

UV spectroscopy- Basic principle-Instrumentation-Applications

IR spectroscopy- Basic principle-Instrumentation-Applications

NMR spectroscopy- Basic principle-Instrumentation-Applications

UNIT-V: Advanced Concepts/Topics In Chemistry

Part-I: Green chemistry: Introduction, Principles of green chemistry, Green synthesis-Aquaeous Phase method-Microwave method-Phase transfer catalysis method, R4M4 principles (Econoburette).

PART-II: Molecular switches: characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid- base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor.

Text Books:

1. P.C. Jain and M. Jain “Engineering Chemistry”, 15/e, Dhanpat Rai & Sons, Delhi, (Latest edition).
2. Shikha Agarwal, “Engineering Chemistry”, Cambridge University Press, New Delhi, (2019).
3. S.S. Dara, “A Textbook of Engineering Chemistry”, S.Chand & Co, (2010).
4. Shashi Chawla, “Engineering Chemistry”, Dhanpat Rai Publicating Co. (Latest edition).

References:

1. K. Sesha Maheshwaramma and Mridula Chugh, "Engineering Chemistry", Pearson India
2. O.G. Palana, "Engineering Chemistry", Tata McGraw Hill Education Private Limited,(2009).
3. CNR Rao and JM Honig (Eds) "Preparation and characterization of materials"Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "Textbook of Nanoscience and Nanotechnology",University press (latest edition)

B.TECH II SEMESTER **ESC**

L	T	P	C
3	0	0	3

20EC2T03 NETWORK THEORY

Pre-requisite:

Course objectives:

The primary objective of this course is:

- To understand the basic concepts on RLC circuits.
- To know the behavior of the steady states and transients states in RLC circuits.
- To know the basic Laplace transforms techniques in periods' waveforms.
- To understand the two port network parameters.
- To understand the properties of LC networks and filters

Course Outcomes: At the end of the course, student will be able to

CO1: Gain the knowledge on basic network elements and graph theory.

CO2: Understand Network Theorems and applications

CO3: Analyze Coupled circuits and Resonance.

CO4: Will analyze the RLC circuit's behavior in detailed.

CO5: Gain the knowledge in characteristics of two port network parameters

SYLLABUS

UNIT-I: Introduction to Electrical Circuits

Network Elements- Sources- Sources Conversions- Kirchhoff's laws- RMS value, Average value, Form factor and peak factor- Phasor representation. **Graph Theory:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule.

UNIT-II: Network Theorems:

Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens and Duality.

UNIT-III: Coupled Circuits:

Self inductance, Mutual inductance, Coefficient of coupling, Natural current, conductively coupled equivalent circuits- **Resonance:** Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, current in anti resonance, anti resonance at all frequencies.

UNIT-IV: Time and Frequency Domain Analysis of Electrical Circuits :

Time domain analysis of R-L R-C and RL-C circuits, initial and final conditions of Network elements, steady state and transient response, Analysis of electrical circuits using Laplace Transform, steady state analysis using phasors, solutions of network equations using Laplace Transform, frequency domain analysis of RL-Circuit.

UNIT-V: Two-port networks

Relationship of two port networks, Z-parameters, Y parameters Transmission line parameters, h-parameters, Inverse h parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks.

Text books:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, 3rd Edition,2000.
2. Network Analysis by K.Satya Prasad and S Sivanagaraju, Cengage Learning,2nd Edition,2005

References:

1. Network lines and Fields by John. D. Ryder 2nd edition, Asia publishinghouse.2002
2. Basic Circuit Analysis by DR Cunninghan, JaicoPublishers pearson publishers 2005

B.TECH II SEMESTER **ESC**

L	T	P	C
3	0	0	3

20EC2T04 BASIC ELECTRICAL TECHNOLOGY

Pre-requisite: Fundamental in Engineering Mathematics and Physics

Course Objective:

- To understand the principle of operation and construction details of DC machines.
- To understand the principle of operation and construction details of transformer.
- To understand the principle of operation and construction details of 3-Phase induction motor.
- To Understand the principles and construction of special machines

Course Outcomes: At the end of the course, student will be able to

CO1: Understand the operation of DC generators.

CO2: Able to understand the operation of DC motors, Speed control methods.

CO3: analyses the performance of transformer.

CO4: Explain the operation of 3-phase induction motors.

CO5: Able to explain the operation of Stepper & BLDC motors.

SYLLABUS

UNIT-I: DC GENERATORS:

Principle of operation and construction of DC generators - EMF equation – types of generators – magnetization and load characteristics of DC generators.

UNIT-II: DC MOTORS:

Principle of operation of DC Motors – types of DC Motors –Characteristics of DC motors – losses and efficiency – Swinburne's test – speed control of DC shunt motor – flux and Armature voltage control methods.

UNIT-III: TRANSFORMERS:

Principle of operation and construction of single phase transformer– types- phasor diagram on no load and load –equivalent circuit, losses and efficiency of transformer - regulation of transformer – OC and SC tests.

UNIT-IV: INDUCTION MACHINES:

Principle of operation and construction of three phase induction motors –slip ring and squirrel cage motors – slip-torque characteristics –efficiency calculation – starting methods.

UNIT-V: SPECIAL MACHINES:

STEPPER MOTOR: Principle of Operation and construction of stepper motor, Classification of stepper motors – Hybrid and Variable Reluctance Motor (VRM) – Different configuration for switching the phase windings.

BLDC MOTOR: Principle of Operation and Types of constructions – Surface mounted and interior type permanent magnet, Torque speed characteristics.

Text Book(s)

1. Principles of Electrical Machines by V.K. Mehta & Rohit Mehta, S.Chand publications.
2. Theory & performance of Electrical Machines by J.B.Guptha, S.K.Kataria & Sons.

References

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications.
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.
4. Brushless Permanent magnet and reluctance motor drives, Clarenden press,T.J.E. Miller, 1989, Oxford.
5. Special electrical Machines, K.VenkataRatnam, University press, 2009, New Delhi.

B.TECH II SEMESTER	ESC	L	T	P	C
		1	0	4	3

20EC2T05 ENGINEERING DRAWING

Course Objective: Engineering drawing being the principal method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons and curves. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

Course Outcomes:

At the end of the course, the student will be able to

1. Understand the techniques of constructing various polygons and curves
2. Understand the concepts of projections and draw projections for simple entities such as points and lines.
3. Draw orthographic projections of planes and simple solids
4. Analyze the 2D drawings and convert to 3D isometric views

UNIT I

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general and special methods, cycloids, involutes, tangents & normal for the curves.

UNIT II

Orthographic Projections: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane. Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces.

UNIT III

Projections of planes: regular planes perpendicular/parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT IV

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one plane

UNIT V

Conversion of orthographic views to isometric view for Simple Solids such as prism, pyramid, cylinder and cone; Conversion of isometric view to orthographic views.

Text books:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers

Reference books:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Graphics by PI Varghese, McGrawHill Publishers
3. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age
4. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

B.TECH II SEMESTER	BSC	L	T	P	C
		0	0	3	1.5

20EC2L06 APPLIED CHEMISTRYLAB

Pre-requisite: Acquire some experimental skills.

Course Objective: Objective of the course is to impart

- The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations.
- A few instrumental methods of chemical analysis.

Course Outcomes:

At the end of the course, student will be able to

CO1: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

LIST OF EXPERIMENTS

1 Determination of HCl using standard Na2CO3 solution.

2 Determination of alkalinity of a sample containing Na2CO3 and NaOH.

3 Determination of Mn+2 using standard oxalic acid solution.

4 Determination of ferrous iron using standard K2Cr2O7 solution.

5 Determination of Cu+2 using standard hypo solution.

6 Determination of temporary and permanent hardness of water using standard EDTA solution.

7 Determination of Fe+3 by a colorimetric method.

8 Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).

9 Determination of iso-electric point of amino acids using pH-metry method/conductometric method

10 Determination of the concentration of strong acid vs strong base (by conductometric method).

11 Determination of strong acid vs strong base (by potentiometric method).

12 Determination of Mg+2 present in an antacid.

13 Determination of CaCO3 present in an egg shell.

14 Estimation of Vitamin C.

15 Determination of phosphoric content in soft drinks.

16 Adsorption of acetic acid by charcoal.

17 Preparation of nylon-6, 6 and Bakelite (demonstration only).

B.TECH II SEMESTER	ESC	L	T	P	C
		0	0	3	1.5

20EC2L07: ENGINEERING & IT WORKSHOP

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Trade:

1. **Carpentry**
   a. T-Lap Joint
   b. Cross Lap Joint
   c. Dovetail Joint
   d. Mortise and Tenon Joint
2. **Fitting**
   a. Vee Fit
   b. Square Fit
   c. Half Round Fit
   d. Dovetail Fit
3. **House Wiring**
   a. Parallel / Series Connection of three bulbs
   b. Stair Case wiring
   c. Florescent Lamp Fitting
   d. Measurement of Earth Resistance
4. **Tin Smithy**
   a. Taper Tray
   b. Square Box without lid
   c. Open Scoop
   d. Funnel
5. **Product prototyping using 3D Printing**
6. **IT Workshop**

Task 1: Identification of the peripherals of a computer - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage.

Task 2: Practicing disassembling and assembling components of a PC

Note: At least two exercises to be done from each trade.

B.TECH II SEMESTER **ESC**

L	T	P	C
0	0	3	1.5

20EC2L08 BASIC ELECTRICAL TECHNOLOGY LAB

Course Objectives: To understand the operation of network elements &electrical machines

Course Outcomes:

CO 1 Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.

CO 2 Determination of time constant and steady state error & Two port network parameters

CO 3 Experimentation of network theorems

CO 4 Compute the efficiency of DC shunt machine without actual loading of the machine

CO 5 Estimate the efficiency and regulation at different load conditions and power factors for single phase transformer with OC and SC tests.

CO 6 Analyze the performance characteristics and to determine efficiency of DC shunt motor &3-Phase induction motor.

	LIST OF EXPERIMENTS
1	Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q-factor determination for RLC network.
2	Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3	Two port network parameters – Z-Y Parameters, chain matrix and analytical verification.
4	Verification of Superposition and Reciprocity theorems.
5	Verification of maximum power transfer theorem. Verification on DC, verification on AC with Resistive and Reactive loads.
6	Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

7	Magnetization characteristics of D.C. Shunt generator. Determination of critical field resistance.
8	Speed control of D.C. Shunt motor by Armature & flux control methods
9	Brake test on DC shunt motor. Determination of performance characteristics.
10	OC & SC tests on Single-phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
11	Brake test on 3-phase Induction motor (performance characteristics).
12	Swimburne's test on DC shunt machine

B.TECH II SEMESTER

	L	T	P	C
MC	2	0	2	--

20EC2M09 ENVIRONMENTAL SCIENCE

Course objective:

To understand the importance of Environment and the importance of biodiversity

Course outcomes:

- The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
- The concepts of the ecosystem and its function in the environment.
- 3.The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
- The environmental legislations of India and Social issues and the possible means
- Environmental assessment and the stages involved in EIA.

SYLLABUS

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^{o}production& 2^{o}production- Major ecosystems: Forest ecosystem- Grassland ecosystem,

Desert ecosystem- Aquatic ecosystem: pond, Lake Ecosystem- Streams, river ecosystem, Oceans

UNIT-II: NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources-Forest resources**:** Use and over-exploitation- Deforestation-Timber extraction-Mining- Conservation-Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management-Energy resources**:** renewable energy sources –solar-wind-hydro-tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

UNIT-III: **BIODIVERSITY AND ITS CONSERVATION**

Definition, classification- Value of biodiversity-Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India-Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

UNIT-IV: ENVIRONMENTAL PROBLEMS

Global warming, Climate change- Acid rain, Ozone depletion- Air pollution-Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures-Pollution case studies- Role of an individual in prevention of pollution

UNIT-V: ENVIRONMENTALLEGISLATION & MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks-Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks-Environmental Protection Act- Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi

2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCES:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi