Curriculum for Undergraduate Degree (B.Tech.) in Electronics and Communication (VLSI Design) (w.e.f. AY: 2020-21)

Part III: Detailed Curriculum

Second Semester

Course Name:	**Chemistry**		
Course Code:	BS-CH201	**Category:**	Basic Science Courses
Semester:	Second	**Credit:**	4.0
L-T-P:	3-1-0	**Pre-Requisites:**	Nil
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To understand the concepts of chemistry as a groundwork for subsequent studies in the fields such as chemical, mechanical, civil, environmental, electrical and electronics engineering etc.
2	To comprehend microscopic chemistry in terms of atomic, molecular orbitals and intermolecular forces.
3	To determine water quality parameters and its significance in industrial and domestic applications.
4	To determine the structure of organic molecules using different spectroscopic techniques.
5	To understand major chemical reactions that are used in the synthesis of molecules.
6	To apply the electrochemical principles in batteries, understand the fundamentals of corrosion.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	**Atomic and molecular structure:** ***Atomic Structure*:** Dalton's atomic theory; Fundamental of sub atomic particles; Rutherford's atomic model; Bohr's atomic model; Dual nature of electron; Heisenberg's uncertainty principle; Schrodinger wave equation; Orbitals and Quantum numbers; Particle in a box solutions (One dimension) and their applications for simple sample. ***Molecular Structure*:** Molecular orbital theory: Postulates of MOT; Bonding and anti-bonding orbital's; MO diagram of diatomic molecules (H_2, He_2, Li_2, Be_2); Crystal field theory and the energy level diagrams for transition metal	10L

	ions and their magnetic properties (Octahedral and tetrahedral complexes); Band structure of solids and the role of doping on band structures (Band theory, Valence band and conduction band, Conductor, Semiconductor, Insulator, p-Type and n-Type semiconductor).	
2	**Intermolecular forces and potential energy surfaces** Ionic, dipolar and van Der Waals' interactions; Ideal gas equation, compressibility factor, Real gas equation, Boyles Temperature, Critical state (Critical pressure, critical volume and critical temperature).	4L
3	**Periodic properties** Mendeleev's periodic table; Periodic properties (Atomic radii, Ionic radii, Ionization potential, electron affinity, Electronegativity, metallic and non-metallic character, oxidizing and reducing character); Polarizability (Fajans' rule); Hard soft acids and bases; molecular geometries (VSEPR theory, Hybridization, sigma and pi bond, determination of hybridization state and structure of molecules); Hydrogen bond (Inter and intra molecular H bond); Effective nuclear charge; oxidation states.	4L
4	**Use of free energy in chemical equilibria** ***Thermodynamics*:** First law of thermodynamics, Internal energy & Enthalpy, Heat capacity, Adiabatic & Isothermal process, Reversible & Irreversible process, Second law of thermodynamics, Entropy, Free energy, Gibbs-Helmholtz equation. ***Electrochemistry*:** Electrochemical cell (Electrolytic cell & Galvanic cell), Representation of cell, Free energy and EMF, Reversible and Irreversible cell, Nernst equation and application, Application of EMF measurement on$\Delta G, \Delta H, \Delta S$, equilibrium constant of a reversible chemical reaction and valency of an ion. Hydrogen Half cell, calomel half cell, Quinhydronehalf cell. ***Water Chemistry*:** Hydrosphere; Hydrological cycle; Sources of water; Acidity and alkalinity of water; Pollutants of water; Biochemical and Chemical oxygen demand; Removal of dissolved solids from water (Electrodialysis& Reverse osmosis); Hardness of water (Types of hardness, Removal of hardness of water). ***Corrosion***: Oxidation corrosion, Corrosion by gases, Pilling Bedworth rule, Electrochemical corrosion, Hydrogen evolution type & oxygen absorption type of corrosion, Corrosion of bimetals, Waterline corrosion, Crevice corrosion, Pitting corrosion, Stress corrosion, Factors influencing the corrosion, Prevention of corrosion.	10L

5	**Spectroscopic techniques and applications** Electromagnetic spectrum; Principles of spectroscopy and selection rules; UV/Vis Spectroscopy (Energy diagram of electron excitation, Lambert-Beer's law, Bathochromic and Hypsochromic shift, Hyperchromic and hypochromic effect, Instrumental technique, Solvent effect, application); IR spectroscopy [Basic principle, Stretching and bending vibration of AX_2 type molecule(nonlinear), Calculation of stretching frequency, Identification of organic compounds by IR spectroscopy, Instrumental technique and application]; NMR spectroscopy (Principle of NMR spectra, chemical shift, shielding and deshielding nucleus, application of NMR).	5L
6	**Stereochemistry** Isomerism, Structural isomerism, Metamerism, Tautomerism, Stereoisomerism, Optical activity, Configurations and symmetry and Chirality, Enantiomers and Diastereomers, Conformational analysis, Fischer and Sawhorse and Newman projection (inter conversion), R-, S- and E-, Z-Nomenclature.	5L
7	**Organic reactions and synthesis of a drug molecule** Introduction to reactions involving ***Addition Reaction*:** Nucleophilic addition reaction [Acid catalysed reaction; Base catalysed reaction, Reactions of aldehyde or ketone with hydrocyanic acid, sodium bisulphite, water, Grignard reagent, alcohols], Electrophilic addition reaction [addition of Br_2 to alkene; addition of hydrogen halide in symmetrical and unsymmetrical alkene (Markownikov rule); addition of Hypohalous acid, sulphuric acid and water to unsymmetrical alkene; addition of hydrogen halide in unsymmetrical alkene in presence of peroxide (Anti Markownikov rule) Ozonolysis reaction. ***Substitution Reaction*:** Electrophilic substitution reaction [Chlorination of Benzene; Nitration of Benzene; Friedel-Crafts Reaction (Alkylation, Acylation)], Nucleophilic substitution reaction [S_N1 and S_N2 reaction]. ***Elimination Reaction*:** E1 elimination and E2 elimination: Hofmann and Saytzev elimination. ***Nucleophilic addition followed by elimination Reaction*:** Reaction of carbonyl compound with ammonia, Primary amine. ***Cyclization reaction*:** Diels-Alder reaction. ***Oxidation Reaction*:** Oxidation of alcohol (Primary, secondary and tertiary alcohol); autoxidation of ether; Oxidation of aldehyde and ketone; Baeyer-Villiger oxidation; Oxidation of aromatic compounds (Oxidation of toluene and its derivatives, benzaldehyde, acetophenone, phenol).	7L

	Reduction Reaction: Reduction of alkenes; Alkynes; carbonyl compounds (aldehydes and ketones); Carboxylic acid and esters; Bouveault-Blanc reduction; Clemensen reduction; Wolf-Kishner reduction; Meerwein-Pondorf-Verley reduction; Pinacol-Pinacolone rearrangement; Reduction of aromatic compounds (Benzaldehyde, Benzoic acid, Nitrobenzene, m-dinitrobenzene, Diazonium salt). ***Name Reactions*:** Aldol condensation and Mixed Aldol condensation; Claisen-schmidt reaction; Cannizaro reaction; Crossed Cannizaro reaction; Kolbe-Schmitt reaction; Gattermann-Koch aldehyde synthesis ***Synthesis of a commonly used drug molecule*:** Paracetamol, Aspirin	
Total		**45L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Demonstrate microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces and understand MOT of covalent bonding and bonding in complexes.
2	Illustrate bulk properties and processes using thermodynamic considerations and understand the conditions of spontaneity and equilibrium. Use electrochemical cell to measure pH, equilibrium constant, understand working principles of modern batteries and theories of corrosion and explain different processes of waste water treatment.
3	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques and determine the in structure elucidation and characterization of various molecules by using different types of spectroscopy.
4	Articulate periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5	List major chemical reactions that are used in the synthesis of various drug molecules.

Learning Resources:	
1	'Chemistry: Principles and Applications' by M. J. Sienko and R. A. Plane.
2	'University Chemistry' by B. H. Mahan.
3	'Fundamentals of Environment and Ecology' by D. De & D. De, S. Chand Publishing.
4	'Chemistry-I' by Gourkrishna Das Mohapatra, VIKAS Publishing House Pvt. Ltd.
5	'Fundamentals of Molecular Spectroscopy' by C. N. Banwell.
6	'Engineering Chemistry (NPTEL Web-book)' by B.L.Tembe, Kamaluddin and M.S. Krishnan.
7	'Physical Chemistry' by P. W. Atkins.
8	'Spectroscopy of Organic Compounds' by P.S.Kalsi, New Age International Pvt Ltd Pub.
9	'Physical Chemistry' by P. C. Rakshit, Sarat Book House.
10	'Organic Chemistry', Volume I by I. L. Finar, Pearson.

Course Name:	**Mathematics-II**		
Course Code:	BS-M201	**Category:**	Basic Science Courses
Semester:	Second	**Credit:**	4.0
L-T-P:	3-1-0	**Pre-Requisites:**	High School Mathematics, BS-M101
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To learn how to solve different types of differential equation.
2	To solve different types of improper integrals.
3	To comprehend Laplace transform & inverse Laplace transform.
4	To understand basic concept of graph, digraph, walk, Hamiltonian graph, Euler circuit.
5	To understand basic concept of tree, binary tree and different algorithms.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	**Ordinary Differential Equations of First order:** ❖ Formation of ordinary differential equation, order and degree. ❖ Equations of first order and first degree (i) Method of separation of variables; Homogeneous equations (ii) Exact equations and their solution, Non-exact equations, Integrating Factors (iii) Linear and Bernoulli's equations ❖ Equations of first order and higher degree Equations solvable for p, solvable for x, solvable for y; Clairaut's equations	8L
2	**Higher Order Ordinary Differential Equations:** (i) Equations with constant coefficients, D-operator, Complementary Function (CF) and Particular Integral (PI) (ii) Cauchy-Euler's homogeneous equations (iii) Method of variation of parameters (iv) Solution of simultaneous first order ordinary differential equations	8L
3	**Improper Integrals:** (i) Improper integrals, their types, convergence criterion of some standard improper integrals (ii) Gamma and Beta functions, their relation (no proof) and applications	3L

4	**Laplace Transforms and Inverse Laplace Transforms:** (i) Definition of LT, LT of some standard functions; Properties of LT: Linearity, Change of scale property, First and Second Shifting property; LT of a function multiplied by t^n and divided by t; LT of unit step and periodic functions; LT of derivatives. (ii) Inverse LT: Method of partial fractions, Convolution theorem (iii)Solutions of initial and boundary value problems by LT	8L
5	**Graph Theory:** (i) Introduction: Vertices, edges, loops, parallel edges, walk, trail, path, circuit; Euler and Hamiltonian circuits (ii) Connected and disconnected graph, directed and non-directed graph, simple graph, complete and bi-partite graph; Theorems on graph. (iii) Incidence and adjacency matrix; Graph isomorphism (iv) Shortest path: Dijkstra's algorithm	8L
6	**Tree:** (i) Definition of tree, binary tree; Theorems. (ii) Spanning tree: BFS and DFS algorithms (iii) Minimal spanning tree: Kruskal's and Prim's algorithms	5L
Total		**40L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Understand different techniques to solve first and second order ordinary differential equations with its formulation to address the modelling of systems and problems of engineering sciences.
2	Apply different types of transformations between two 2-dimensional planes for analysis of physical and engineering problems.
3	Utilize tree and graph algorithms for solving different physical and engineering problems.
4	Evaluate different types of improper integrals and apply into engineering problems.

Learning Resources:	
1	'Higher Engineering Mathematics' by B.S. Grewal, Khanna Publishers.
2	'Advanced Engineering Mathematics'by Erwin Kreyszig, , John Wiley & Sons.
3	'Mathematical Methods of Science and Engineering' by Kanti B. Dutta, Cengage Learning.
4	'An Introduction to Differential Equation' by Maity&Ghosh,NCBA.
5	'Advanced Engineering Mathematics' byMichael Greenberg, Pearson.
6	'Engineering Mathematics for First Year' by T. Veerarajan, Tata McGraw-Hill, New Delhi.
7	'An Introduction to Integral Calculus' by Maity and Ghosh, NCBA.
8	'Advanced Differential Equation' by M.D Raisinghania, S. Chand Publication.
9	'An Introduction to Engineering Mathematics-II' by G.P. Samanta, New Age Publication.
10	'Introduction to Graph Theory' by Dipak Kumar Ghosh, NCBA.

11	'Advanced Engineering Mathematics' by H. K. Dass, S. Chand Publication.

Course Name:	**Programming for Problem Solving**		
Course Code:	ES-CS201	**Category:**	Engineering Science Courses
Semester:	Second	**Credit:**	3.0
L-T-P:	3-0-0	**Pre-Requisites:**	Basic concepts of Computer
Full Marks:	100		
Examination Scheme:	Semester Examination: 70	Continuous Assessment: 25	Attendance: 05

Course Objectives:	
1	To facilitate students with the basic concept of a programming language (C programming language).
2	To develop the ability to apply knowledge of programming for solution of science & engineering problems.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, 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: Basic I/O operations, keywords, data types, variables &memorylocations, source code, Syntax and Logical Errors in compilation, object and executable code. Operators and Expressions, operator precedence in C programming Language.	5L
2	Conditional Branching and Looping: Concepts of Conditional Branching: if-else, nested if-else, switch-case Concepts of Loops: While, do-while, for loops, Use of break and continue statement.	8L
3	Arrays: Concepts of 1-D, 2-D array, array manipulation, Concepts of character array, Strings and their uses. Basic Algorithms using array: Searching (linear and binary search) and Sorting Algorithms (Bubble, Insertion and Selection sort),	9L
4	Functions: Functions (including using built in libraries), Parameter passing in functions, function call by value, Recursive functions. Pointers: Idea of pointers, Defining pointers, relation between array and pointer, idea of function call by address, Dynamic memory allocation.	8L

5	Structure: Structures, Array of Structures, Self-referential structures. Storage Class and Preprocessor Directives. Disk I/O operations - File handling: open, read, write, close a file.	6L
Total		**36L**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Understand the concept of structured programming language.
2	Implement conditional branching, iteration and recursive functions.
3	Apply programming concepts to solve matrix manipulation, searching and sorting problems.
4	Use pointers and structures to solve related problems of different domain.

Learning Resources:	
1	'Schaum's Outline of Programming with C' by Byron Gottfried, McGraw-Hill
2	'Programming in ANSI C' by E. Balaguruswamy, Tata McGraw-Hill
3	'Let Us C' by Yashavant Kanetkar, BPB Publication
4	'Computer Fundamentals and Programming in C' by Reema Thereja, Oxford
5	'The C Programming Language' by Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India

Course Name:	**Chemistry Laboratory**		
Course Code:	BS-CH291	**Category:**	Basic Science Courses
Semester:	Second	**Credit:**	1.5
L-T-P:	0-0-3	**Pre-Requisites:**	Nil
Full Marks:	100		
Examination Scheme:	Semester Examination: 60	Continuous Assessment: 35	Attendance: 05

Course Objectives:	
1	To determine the strength of an unknown solution through conductometric and pH metric titration.
2	To estimate the chloride ion concentration, alkalinity and hardness in water to check its suitability for drinking and industrial purposes.
3	To calculate the rate constant of a heterogeneous reaction.
4	To synthesize polymer molecules.

Course Contents: (Choose 10 experiments from the following)		
Module No.	**Description of Topic**	**Contact Hrs.**
1	Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.	3P/ week
2	pH-metric titration for determination of strength of a given HCl solution against a standard NaOH solution.	
3	To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution).	
4	Determination of dissolved oxygen present in a given water sample.	
5	Determination of viscosity of the given liquid by Ostwald –Viscometer.	
6	Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water).	
7	Chemical kinetics (determination of relative rates of reaction of iodide with H_2O_2 at room temperature).	
8	Determination of acid value (Acidity) of oil.	
9	The adsorption of acetic acid on active charcoal.	
10	Complexometric titration (estimation of hardness of water using EDTA).	
11	Redox titration (estimation of iron using permanganometry).	
12	Determination ofalkalinity of a given water sample.	
13	Synthesis of a polymer (Polyacrylamide) and determine its molecular weight by solution viscosity method.	
14	Determination of cell constant and conductance of solutions.	
Total		**36P**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Estimate rate constants of reactions from concentration of reactants/products as a function of time.
2	Measure molecular/system properties such as viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3	Synthesize a macromolecule and determine its molecular weight by solution viscosity method.

Learning Resources:	
1	'Laboratory Manual on Engineering Chemistry' by Sudha Rani, Dhanpat Rai, Publishing house.
2	'A Text book on Experiments and Calculations in Engineering Chemistry' by S. S. Dara, S. Chand publications.
3	'Laboratory Manual of Organic Chemistry' by Raj K. Bansal, Wiley Eastern Limited, New age international limited.

Course Name:	**Programming for Problem Solving Lab**		
Course Code:	ES-CS291	**Category:**	Engineering Science Courses
Semester:	Second	**Credit:**	2.0
L-T-P:	0-0-4	**Pre-Requisites:**	Basic concepts of Computer
Full Marks:	100		
Examination Scheme:	Semester Examination: 60	Continuous Assessment: 35	Attendance: 05

Course Objectives:	
1	To facilitate students with the basic concept of a programming language (C programming language) and its execution using a compiler.
2	To develop the ability to apply the programming skills for solution of problems.

Course Contents:

Module No.	Description of Topic	Contact Hrs.
1	Lab1: Familiarization with C programming environment with simple problems, use of format specifier in printf(). Lab 2: Simple computational problems using different operators, expressions.	8P
2	Lab 3: Problems involving using Conditional Statements (if-else, nested if-else) Lab 4: Iterative problems using while, do-while, for loops (eg. Series sum, sum of digits etc). Lab 5: Problems to be solved using switch-case, nested loop (pattern).	12P
3	Lab 6& 7: Concepts of Array and problems using 1-D and 2-D array (array manipulation, searching, sorting, matrix manipulation).	8P

4	Lab 8: Concepts of Functions (call by value) and Recursive function. Lab 9: Problems for String manipulation (using library function and user defined functions). Lab 10: Problems to be solved using concepts of pointer, function call by address, relation between array and pointer.	12P
5	Lab 11: Problems to be solved using concepts of array and structure. Lab 12: Problems involving File handling operations.	8P
Total		**48P**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Understand the concept of programming language.
2	Implement conditional branching, iteration and recursive functions.
3	Apply programming concepts to solve basic data manipulation related problem.
4	Apply programming concepts to handle memory allocation and files.

Learning Resources:	
1	'Schaum's Outline of Programming with C' by Byron Gottfried, McGraw-Hill.
2	'Programming in ANSI C' by E. Balaguruswamy, Tata McGraw-Hill.
3	'Let Us C' by Yashavant Kanetkar, BPB Publication.
4	'Computer Fundamentals and Programming in C' by Reema Thereja, Oxford.
5	'The C Programming Language' by Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India.

CourseName:	**Workshop/ Manufacturing Practices**		
CourseCode:	ES-ME292	**Category:**	Engineering Science Courses
Semester:	Second	**Credit:**	3.0
L-T-P:	1-0-4	**Pre-Requisites:**	Nil
Full Marks:	100		
Examination Scheme:	Semester Examination: 60	Continuous Assessment: 35	Attendance: 05

CourseObjectives:	
1	Toimpartbasicknowledgeofvarioushandtoolsandtheirapplicationsindifferent sections of manufacturing
2	Todevelopbasicmanufacturingskills,precision,safetyatworkplace,teamworking and development ofright attitude.

CourseContents:	
Lectures and videos:	
1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods 2. CNC machining, Additive manufacturing 3. Fitting operations & power tools 4. Electrical &Electronics 5. Carpentry 6. Plastic moulding, glass cutting 7. Metal casting 8. Welding (arc welding& gas welding), brazing	14L

Workshop Practice:

Module No.	Description of Topic/ Experiment	Contact Hrs.
1	**Machine shop:** *Typical jobs that maybe made in this practice module:* • To make a pin from a mild steel rod in a lathe. • To make rectangular and veeslot in a block of cast iron or mild steel in a shaping and / or milling machine.	8P
2	**Fitting shop:** Typical jobs that may be made in this practice module: • To make aGaugefrom MS plate.	8P
3	**Carpentry:** Typical jobs that may be made in this practice module: • To make wooden joints and/or a pattern o rlike.	8P
4	**Welding shop (Arc welding 4 hrs + gas welding 4hrs):** Typical jobs that may be made in this practice module: ARC WELDING(4 hours): • To join two thick (approx 6mm) MS plates by manual metal arc welding. GAS WELDING (4 hours): • To join two thin mild steel plates or sheets by gas welding.	8P
5	**Casting:** Typical jobs that may bemade in this practice module: • One/ two green sand moulds to prepare, and a casting bedemonstrated.	8P
6	**Smithy:** Typical jobs that may be madein this practice module: • A simple job of making a squarerod from a roundbar or like.	4P

7	**Plastic moulding &Glass cutting:** Typical jobs that may be made in this practice module: • For plastic moulding, making at least one simple plastic component should be made. • For glasscutting, three rectangular glass pieces may be cut to make a kaleidoscope using a blackcolourdiamondcutter,or similar other components may be made.	4P
8	**Electrical &Electronics:** • Familiarization with LT switch gear elements, making its sketches and noting down its specification. Kitkat fuse, Glass cartridgefuse, Plastic fuseholders (optional),Ironclad isolators, MCB style isolators, Single phase MCB, Single-phase wire, wiring cable. • Demonstration of domestic wiring involving two MCB, two piano key switches, one incandescent lamp, one LED lamp and plug point. • Simple wiring exercise to be executed to understand the basic electrical circuit. • Simple soldering exercises to be executed to understand the basic process of soldering. • Fabrication of a single-phase full wave rectifier with a step down transformer using four diodes and electrolytic capacitor and to find its volt-ampere characteristics to understand basic electronic circuit fabrication.	8P
Total		**14L+56P**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Identify and utilize machine tools for producing components through machining.
2	Demonstrate fundamental concept of pattern making, moulding and casting processes for engineering applications.
3	Practice fitting, carpentry, and smithy operations for manufacturing of components.
4	Explain concepts and applications of various types of fabrication processes.

Learning Resources:	
1	'Elements of Workshop Technology' by S.K.HajraChoudhury, A.K.HajraChoudhuryand NirjharRoy,Vol.I2008andVol.II2010,Mediapromotersandpublishers private limited, Mumbai.
2	'Manufacturing EngineeringandTechnology' by S. Kalpakjian andSteven R.Schmid,4th edition, Pearson EducationIndia Edition, 2002.
3	'Manufacturing Technology– I' by S. Gowri, P.HariharanandA.SureshBabu,Pearson Education, 2008.
4	'Processes and Materials of Manufacture' by RoyA.Lindberg,4thedition,PrenticeHall India, 1998
5	'Manufacturing Technology' by P.N.Rao, Vol.IandVol.II,TataMcGrawHillHouse, 2017.

Course Name:	**Language Laboratory**		
Course Code:	HM-HU291	**Category:**	Humanities and Social Sciences including Management Courses
Semester:	Second	**Credit:**	1.0
L-T-P:	0-0-2	**Pre-Requisites:**	Students must have basic knowledge of English Language.
Full Marks:	100		
Examination Scheme:	Semester Examination: 60	Continuous Assessment: 35	Attendance: 05

Course Objectives:	
1	To develop technical communication skills (listening, speaking, reading and writing).

Course Contents:		
Module No.	**Description of Topic**	**Contact Hrs.**
1	Honing 'Listening Skill' and its sub skills through Language Lab Audio device	4P
2	Honing 'Speaking Skill' and its sub skills: Extempore, Public speaking, etc. Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/ Voice modulation/ Stress/ Intonation/ Pitch & Accent) of connected speech.	6P

3	Honing 'Conversation Skill' using Language Lab Audio –Visual input; Conversational Practice Sessions (Debate, Role Play etc.)	4P
4	Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success. G D Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD.	6P
5	Honing 'Reading Skills' and its sub skills.	2P
6.	Honing 'Writing Skill' and its sub skills by using Language Lab Audio – Visual input; Practice Sessions	2P
Total		**24P**

Course Outcomes:	
After completion of the course, students will be able to:	
1	Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
2	Acquire basic language skills (listening, speaking, reading and writing) in order to communicate in English.
3	Acquire linguistic competence necessarily required in various life situations.
4	Develop intellectual, personal and professional abilities.

Learning Resources:	
1	'Communication Skills' by Sanjay Kumar and Pushp Lata. Oxford University Press, 2011.
2	'Exercises in Spoken English', Parts. I-III, CIEFL, Hyderabad, Oxford University Press.
3	'On Writing Well, by William Zinsser, Harper Resource Book, 2001.
4	'Study Writing' by Liz Hamp-Lyons and Ben Heasly, Cambridge University Press, 2006.
5	'Effective Communication Skills' by Kulbushan Kumar, R S Salaria, Khanna Publishing House, Delhi.
6	'Functional English' by Gajendra Singh Chauhan, SmitaKashiramka and L. Thimmesha,Cengage, 2019.