Subject Category

Acronym	Category Name
BSC	Basic Science Courses
ESC	Engineering Science Courses
HSMC	Humanities and Social Sciences including Management Courses
AU	Audit Courses

Semester-wise Curriculum Structure

B. Tech. (CSE)						
Semester - I						
Compulsory Induction Programme (3 Weeks)						
Sl No.	**Code**	**Title**	**L**	**T**	**P**	**Credit**
1	RCC-BSC-CH-101/ RCC-BSC-CH-191	Chemistry	3	1	2	5
2	RCC-BSC-M-101	Mathematics - I-A	3	1	0	4
3	RCC-ESC-ME-191	Engineering Graphics and Design	0	0	4	2
4	RCC-ESC-EC-101/ RCC-ESC-EC-191	Basic Electronics Engineering	2	0	2	3
5	RCC-ESC-CS-101/ RCC-ESC-CS-191	Programming for Problem Solving	2	0	4	4
6	RCC-HSMC-191	English and Technical Communication	0	0	4	2
7	RCC-AU-181	Idea and Entrepreneurship	2	0	0	0
Total			**12**	**2**	**16**	**20**

B. Tech. (CSE)						
Semester - II						
Sl No.	**Code**	**Title**	**L**	**T**	**P**	**Credit**
1	RCC-BSC-PH-201/ RCC-BSC-PH-291	Physics	3	1	2	5
2	RCC-BSC-M-201	Mathematics - II -A	3	1	0	4
3	RCC-ESC-ME-292	Workshop/ Manufacturing Practices	0	0	4	2
4	RCC-ESC-EE-201/ RCC-ESC-EE-291	Basic Electrical Engineering	3	1	2	5
5	RCC-HSMC-201	UHV - II: Understanding Harmony	2	0	0	2
6	RCC-AU-282	NSS & Yoga	2	0	0	0
Total			**13**	**3**	**8**	**18**

Course Details for Semester - I

Course Name	Chemistry	**Course Code**	RCC-BSC-CH-101
Semester	1st	**Program Name**	B.Tech. (CSE)
L:T:P	3:1:0	**Total Hours**	36

Course Pre-requisite: Class 12 knowledge of Chemistry

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-BSC-CH-101.CO1	Illustrate structure, colour and magnetic properties of coordination complexes using periodic properties of elements	Analyzing (Level IV)
RCC-BSC-CH-101.CO2	Analyze the structural features and properties of molecules by using various spectroscopic techniques like NMR, IR, Fluorescence and phosphorescence etc.	Analyzing (Level IV)
RCC-BSC-CH-101.CO3	Predict bulk properties of systems, spontaneity of processes in diverse conditions like isothermal, adiabatic etc. considering changes of different thermodynamic parameters.	Applying (Level III)
RCC-BSC-CH-101.CO4	Apply the knowledge of electrochemical cells to form different types of battery, fuel cell etc.	Applying (Level III)
RCC-BSC-CH-101.CO5	Describe the properties and possible area of application of different types of nanomaterials, photovoltaic materials, conducting and biodegradable polymers.	Understanding (Level II)
RCC-BSC-CH-101.CO6	Demonstrate the mechanism of formation of different types of substituted and unsaturated compounds and drug materials from the basic understanding of organic chemistry considering their stereo chemical aspect	Analyzing (Level IV)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	**Periodic Table (Periodicity), Molecular Orbital Theory and Crystal Field Theory:** Effective Nuclear Charge (Using Slater's Rule), Ionization Energy, Electron affinity and Electronegativity- trends across a period and down a group.	7	CO1

	MO of diatomic Molecules (Homonuclear- O_2, N_2, C_2, B_2, F_2, H_2; Heteronuclear- CO, NO, HF), π molecular orbitals of Butadiene & Benzene. CFT and its assumptions. (Crystal field splitting diagram of Tetrahedral, Octahedral. Explanation of magnetic behaviour and origin of colour in complexes. Limitations of CFT.		
2	**Spectroscopy:** Introduction to Spectroscopy; Principles and applications of UV-Vis/ IR/ NMR spectroscopy for material characterization. Jablonski Diagram, Fluorescence, Phosphorescence, Chemiluminescence and Photosensitization.	7	CO2
3	**Thermodynamics:** Introduction and terminology of Thermodynamic parameters, First law of thermodynamics, ΔU, ΔH, C_p, C_v, 2nd Law of Thermodynamics & Concept of Entropy, Carnot's Cycle, Entropy of mixing of Ideal Gases, Gibb's and Helmholtz Free Energy, Gibb's Helmholtz equation	6	CO3
4	**Electrochemistry:** Introduction to conductance/ Specific Conductance/ Equivalent Conductance & Molar Conductance, their relationship, variation of Equivalent Conductance with concentration for strong and weak electrolytes, Kohlrausch's Law, Transport No., Conductometric titrations Galvanic Cell/ Nernst Equation/ Reference Electrodes/Applications of Nernst Equation/ Types of Cells- Primary Battery and Secondary Battery/Fuel Cells.	6	CO4
5	**Advanced Materials and Polymer Chemistry:** Photovoltaic materials: Solar Cells and Dye-sensitized solar cells-Principle and applications. Nanomaterials: Synthesis, characterizations and applications of nano material (viz: fullerene, carbon nanotubes, quantum dots etc.). Degree of polymerization, Classification of polymers. Conducting polymers, Biopolymer and Biodegradable polymers.	5	CO5
6	**Organic Chemistry and Stereochemistry:** Substitution and elimination reactions (S_N1 , S_N2, S_Ni, E_1, E_2, $E1_{cb}$). Drug Synthesis: Chemical structure, preparations and medicinal applications- Paracetamol, Aspirin, Salbutamol, Ibuprofen. Origin of Chirality, Geometrical and optical isomerism, measurement of Optical Activity, Specific Rotation, Elements of Symmetry. Stereoisomers- Enantiomers and Diastereomers. E/Z, R/S, D/L-Configurations, Conformational isomerism (n-Butane).	5	CO6

Text Books:

1. *Chemistry-I* by GK Das Mahapatra
2. Kuriacose, J.C., Rajaram, J.; *Chemistry in Engineering and Technology (Vol. 1&2)*; McGraw Hill, 1984.
3. Chemistry for Engineers by T. Deb, S. Agarwal, First Edition, McGraw Hill, 2021

Reference Books:

1. *Inorganic Chemistry* by R. L. Dutta
2. *Physical Chemistry*, P.C. Rakshit, Sarat Book distributors, Calcutta, 7th Edition
3. *Fundamentals of Molecular Spectroscopy* by C. N. Banwell&E.M.McCash, Mcgraw Hill Education India Publishers, 5th Edition
4. *A Guide-Book to Mechanism in Organic Chemistry* by Peter Sykes, Pearson Publishers, 6th Edition
5. *Nanoscience and Nanotechnology: Fundamentals of Frontiers*, by M.S. Ramachandra Rao & Shubra Singh, Wiley Publisher, 1st Edition.

Course Name	Chemistry Laboratory	**Course Code**	RCC-BSC-CH-191
Semester	1st	**Program Name**	B.Tech. (CSE)
L:T:P	0:0:3	**Total Hours**	24

Course Pre-requisite: Knowledge of 12th standard Chemistry Laboratory

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-BSC-CH-191.CO1	Determine the strength of an acid using conductometric method	Evaluating (Level V)
RCC-BSC-CH-191.CO2	Determine the strength of an acid using pH-metric methods	Evaluating (Level V)
RCC-BSC-CH-191.CO3	Determine partition coefficient of a substance between two immiscible liquids	Evaluating (Level V)
RCC-BSC-CH-191.CO4	Determine some physical property like surface tension and viscosity of different solutions at room temperature	Evaluating (Level V)
RCC-BSC-CH-191.CO5	Estimate the amount of different ions present in a given water sample using titrimetric methods	Evaluating (Level V)
RCC-BSC-CH-191.CO6	Determine the cell constant and limiting conductance of solutions	Evaluating (Level V)

Detailed Syllabus:

Module #	Module Name	Experiment Topics	No of Labs Required	CO Linked
1	**Conductometric experiment**	1. Conductometric titration for determination of the strength of a strong acid against a strong base 2. Conductometric titration for determination of the strength of a weak acid against a strong base	6	CO1
2	**pH-metric experiment**	pH- metric titration for determination of strength of a strong acid against a strong base	3	CO2
3	**Hardness experiment**	Determination of hardness of water (in terms of Ca) by complexometric titration	3	CO3
4	**Viscosity/ Partition coefficient experiment**	1. Determination of viscosity of different sugar solutions at room temperature 2. Determination of partition coefficient of immiscible solutions at room temperature	6	CO4
5	**Argentometric titration**	1. Determination of chloride content in a given water sample by argentometric method	3	CO5
6	**Cell constant experiment**	Determination of cell constant and conductance of different solutions	3	CO6

Text Books:

Lab manual of chemistry 2024

Reference Books

Vogel's Quantitative Chemical Analysis 6th Edition by J. Mendham, January 2009

Course Name	Mathematics-IA	**Course Code**	RCC-BSC-M-101
Semester	I	**Program Name**	B.Tech. (CSE)
L:T:P	3:1:0	**Total Hours**	48

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-BSC-M101.CO1	Evaluate definite integrals using reduction formulae, and determine the convergence of improper integrals using various tests, including applications to surface areas and volumes of revolutions.	Applying (Level III)
RCC-BSC-M101.CO2	Analyze Functions using Rolle's Theorem, Mean Value Theorems, Taylor's and Maclaurin's Theorems.	Analyzing (Level IV)
RCC-BSC-M101.CO3	Apply concepts of Abstract Algebra, including groups, subgroups, permutation groups, cyclic groups, Lagrange's Theorem, homomorphisms, normal subgroups, rings, subrings, and integral domains.	Understanding (Level II)
RCC-BSC-M101.CO4	Describe systems of linear equations and transform vectors using Linear Algebra techniques, including matrix operations, elementary row and column operations, echelon form, rank, and inverse matrices.	Applying (Level III)
RCC-BSC-M101.CO5	Demonstrate understanding of linear transformations, vector spaces, linear dependence, basis, dimension, range, kernel, rank, nullity, and inner product spaces, including Gram-Schmidt orthogonalization.	Understanding (Level II)
RCC-BSC-M101.CO6	Solve Real-World Problems using Mathematical Concepts from Calculus, Abstract Algebra, and Linear Algebra.	Creating (Level VI)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	**Calculus (Integration):** Evaluation of definite integrals – reduction formulae. Convergence of improper integrals, tests of convergence, Beta and Gamma functions – elementary; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	10	CO1, CO6
2	**Calculus (Differentiation):** Rolle’s Theorem, Mean value theorems, Taylor’s and	8	CO2, CO6

	Maclaurin's theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.		
3	**Abstract Algebra:** Groups,; subgroups; permutation groups; cyclic groups; Lagrange's Theorem on finite groups; Homomorphisms of groups; normal subgroups; Rings; subrings; Integral domains, Field(definition and example).	14	CO3, CO6
4	**Linear Algebra:** Inverse of a square matrix; Elementary row and column operations; Echelon form; Rank of a matrix; Solution of system of linear equations; Cramer's rule; Matrix inversion method. Characteristic equations; Eigenvalues and Eigenvectors; Cayley-Hamilton theorem. Vector Space, linear dependence of vectors, Basis, Dimension; Linear transformations (maps), Range and Kernel of a linear map, Rank and Nullity, Rank-Nullity theorem, diagonalisation of matrices, Matrix associated with a linear transformations, Inner product spaces, Gram-Schmidt orthogonalization.	16	CO4, CO5, CO6

Text Books:

1. S.K. Mapa, *Higher Algebra: Abstract and Linear*, Sarat Book House Pvt.Ltd.
2. B.K. Pal and K. Das, *Engineering Mathematics, Volume -I*, U. N. Dhur& Sons Pvt.Ltd.
3. S. C. Malik & Savita Arora, *Mathematical Analysis*, 5 th Ed., New Age International, New Delhi, 2017.

Reference Books:

1. B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers.
2. Shanti Narayan & P. K. Mittal, *Course of Mathematical analysis*. S Chand, New Delhi:, 2016.
3. S. C. Malik & Savita Arora, *Mathematical Analysis*, 5 th Ed., New Age International, New Delhi, 2017.

Course Name	Engineering Graphics & Design	**Course Code**	RCC-ESC-ME-191
Semester	1st	**Program Name**	B.Tech (CSE)
L:T:P	0:0:4	**Total Hours**	44

Course Pre-requisite: Basic Mathematics

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-ME-191.CO1	Use of drawing instruments, dimensions, lines and projections in technical drawing.	Applying (Level III)
RCC-ESC-ME-191.CO2	Sketch various types of scales and curves with standard drawing conventions.	Applying (Level III)
RCC-ESC-ME-191.CO3	Apply the fundamental theory of orthographic projections to draw the projection of points, lines and surfaces.	Applying (Level III)
RCC-ESC-ME-191.CO4	Apply basic concepts of CAD to develop and construct accurate 2D geometry through creation of basic geometric constructions.	Applying (Level III)
RCC-ESC-ME-191.CO5	Apply the theory isometric projection through some Mechanical Model Diagram.	Applying (Level III)
RCC-ESC-ME-191.CO6	Use of CAD Software to generate 3D Modeling.	Applying (Level III)

Detailed Syllabus:

Module #	Module Name	Experiment Topics	No of Labs Required	CO Linked
1	**Introduction to Engineering Drawing**	Principles of Engineering Graphics and their significance, usage of drawing instruments, Different types of lines and their use.	4	CO1
	Lettering, Dimensioning, Scales	Lettering, Types of dimensioning system & drawing standard, scales.	8	CO1, CO2
	Geometrical Constructions and Curves	Construction of polygons, Conic sections, roulettes.	4	CO1, CO2
2	**Projection of Points, Lines and Surfaces**	Principles of Orthographic Projections-conventions - 1st and 3rd angle projection, Projections of points, lines and surfaces inclined to	4	CO1, CO3

		single or both planes.		
3	**Introduction to Computer-aided Drawing**	Introduction of CAD, CAD versions interface, The Menu System, Toolbars, Function keys, CAD basics, Cartesian Coordinate System, Absolute Coordinate System, Relative Coordinate System.	4	CO4
	Basic Drawing and Editing Commands	Draw commands, Line command, Polyline command, Rectangle command, Modify commands: move, rotate, scale, copy, mirror, erase, trim, extend etc, Annotate, Dimension Style Manager: Linear, Aligned, Radius Angular, Arc length, Object Snaps.	4	CO4
	Layers and Blocks	Setting up and use of Layers, Layers to create drawings, Create, edit and use customized layers, Layer properties, blocks, Insert blocks, Create blocks, Working with Dynamic Blocks. Text command, Single line text, Multiline text.	4	CO4
4	**Isometric Views**	Isometric view page setup, Drawing on Isometric top, left, right planes, Isometric diagrams exercise, 2D Fundamentals, Drawing units, Sheet settings, Mechanical diagrams	4	CO4, CO5
5	**3D Modeling**	Introduction to 3D Interface, CAD workspaces, Mechanical 3D Modeling features, Editing of 3D Modeling, Orthographic projection techniques; Drawing sectional views of regular geometric solids.	8	CO6

Text Books:

1. Bhatt N.D, (54th Edition 2023), *Engineering Drawing*, Charotar Publishing House

Reference Books:

1. Pradeep Jain, Ankita Maheswari, A.P. Gautam, *Engineering Graphics & Design*, Khanna Publishing House
2. Dr. Mohd. Parvez & Osama Khan (Reprint 2023), *Engineering Graphics & Design*, S.K. Kataria& Sons
3. Agrawal B. & Agrawal C. M. (2012), *Engineering Graphics*, TMH Publication

Course Name	Basic Electronics Engineering	**Course Code**	RCC-ESC-EC-101
Semester	1st	**Program Name**	B.Tech. (CSE)
L:T:P	2:0:0	**Total Hours**	24

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-EC-101.CO1	Distinguish materials for two and three terminal device design	Applying (Level III)
RCC-ESC-EC-101.CO2	Interpret electrical properties of two-terminal junction devices	Applying (Level III)
RCC-ESC-EC-101.CO3	Construct analog circuits using two-terminal devices for voltage regulation and rectification	Applying (Level III)
RCC-ESC-EC-101.CO4	Demonstrate operation of three-terminal devices for amplifier applications	Applying (Level III)
RCC-ESC-EC-101.CO5	Solve Boolean expressions using laws of Boolean algebra	Applying (Level III)
RCC-ESC-EC-101.CO6	Implement logic circuits with optimum number of gates after simplifying Boolean expressions	Applying (Level III)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	Conductor, Semiconductor, Insulator; Intrinsic and Extrinsic semiconductor; Fermi level Direct and Indirect Bandgap semiconductor; Degenerate and Nondegenerate semiconductor; Concept of Effective mass	2	CO1
2	Formation of p-n junction; Electrical characteristics of junction in absence of bias I-V characteristics of p-n junction under forward and reverse bias; Dynamic resistance; Cut-in voltage Diode load line; Diode approximations; Working principle of photodiode, solar cell, LED Tunneling of carriers through junction; Working principle of Zener diode; Breakdown voltage; Reverse bias resistance; Difference between Avalanche and Zener Breakdown	4	CO2
3	Use of Zener diode as voltage regulator; Sensitivity analysis for line regulation circuit using Zener diode	3	CO3

	Half-wave and Full-wave rectifier using p-n junction diode; Estimation of performance parameters (Ripple factor, Rectification efficiency, Percentage regulation, TUF) Bridge rectifier; Different types of filters (C, π); Calculation of performance parameters in presence of filters		
4	Working principle of n-p-n and p-n-p transistors; Different current components Input and Output characteristics of n-p-n BJT in CE mode, CB mode, CC mode Current gain parameters and their limits; Base-spreading resistance Fixed bias; Collector-to-Base bias; Self-bias; Stability analysis DC load line; Q-point; Punch-through; BJT as switch	5	CO4
5	Working principle of Field-Effect Transistor; Difference with BJT; Pinch-off voltage Working principle of MOSFET; Enhancement and Depletion mode Static and Transfer characteristics of FET; small-signal parameters and their relations	3	CO4
6	Binary, Octal, Hexadecimal number systems; Inter-conversions with Decimal systems BCD numbers (8421-2421), Gray code, Excess–3 code, Cyclic code, Code conversion, ASCII, EBCDIC code Complement of a number; Binary Addition, Subtraction, Multiplication, Division Boolean algebra; Useful laws; de Morgan's theorem Fundamental and Universal logic gates; Construction of fundamental gates by universal gates Karnaugh map; Don't care condition Learning Outcome: Simplify Boolean expressions using Karnaugh map for implementing logic circuit [RBT3] Min term; Max term; POS; SOP	7	CO5, CO6

Text Books:

1. *Solid State Electronic Devices*: Ben Streetman, Sanjay Banerjee, 7th Ed, Pearson
2. *Electronics Fundamentals and Applications*: D. Chattopadhyay, P. C. Rakshit, 15th Ed, New Age International
3. *Electronic Devices and Circuits*: Jacob Millman, Christos C. Halkias, Satyabrata Jit, MH
4. *Electronic Devices and Circuits Theory*: Robert L. Boylestad, Louis Nashelsky, 10th Edition, Pearson

5. *Electronic Circuits*: Discrete and Integrated: Donald Schilling, Charles Belove, Tuvia Apelewicz, Raymond Saccardi, TMH
6. *Digital Design*: M. Morris Mano, Michael D. Ciletti, 4th Ed, Pearson
7. *Fundamentals of Digital Circuits*: A Anand Kumar, PHI

Reference Books:

1. *Basic Electronic Devices and Circuits*: Mahesh B Patil, PHI
2. *Electronic Devices and Circuits*: Varsha Agrawal, Anil K. Maini, Wiley
3. *Basic Electronics*: D P Kothari, I J Nagrath, 2nd Ed, MH
4. *Electronic Devices and Circuits*: David A. Bell, 5th Ed, OUP
5. *Basic Electronics*: B L Theraja, S. Chand
6. *Digital Circuits & Design*: D.P Kothari, J.S Dhillon, Pearson

Web-Resource:

1. https://www.youtube.com/watch?v=UGGaGUPF2fg
2. https://www.youtube.com/watch?v=-ga2S2LOtjs
3. https://www.youtube.com/watch?v=d-FTt-ihMxs
4. https://www.youtube.com/watch?v=I2nrBITEVls
5. https://www.youtube.com/watch?v=XwbG6iqB7GA
6. https://www.youtube.com/watch?v=6k1N6rWB-4c
7. https://www.youtube.com/watch?v=_y9e1A2Ka1Q
8. https://www.youtube.com/watch?v=9kBog5wYVKM

Course Name	Basic Electronics Engineering Laboratory	**Course Code**	RCC-ESC-EC-191
Semester	1st	**Program Name**	B.Tech. (CSE)
L:T:P	0:0:2	**Total Hours**	16

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-EC-191.CO1	Distinguish active and passive components using measuring instruments	Understanding (Level II)
RCC-ESC-EC-191.CO2	Determine the electrical characteristics and corresponding parameters of two-terminal junction devices	Applying (Level III)
RCC-ESC-EC-191.CO3	Develop rectifier circuits for estimating performance using two-terminal junction devices	Applying (Level III)
RCC-ESC-EC-191.CO4	Verify truth table of different logic gates	Applying (Level III)
RCC-ESC-EC-191.CO5	Design combinational digital circuits using Universal Gates	Applying (Level III)
RCC-ESC-EC-191.CO6	Construct electronic circuits adapting the knowledge of junction devices and logic gates	Analyzing (Level IV)

Detailed Syllabus:

Module #	Experiment Topics	No of Labs Required	CO Linked
1	**Experiment 1** A. Study of different instruments (Multimeter, Function Generator, Oscilloscope) and accessories (Breadboard) B. Identification of passive (Resistor, Capacitor) and active components (p-n junction diode, Zener diode, BJT)	2	CO1
2	**Experiment 2** Current-voltage characteristics of p-n junction diodes under forward and reverse bias conditions. Determine cut-in voltage, dynamic resistance from the profile. **Experiment 3** Current-voltage characteristics of Zener diodes under reverse bias condition. Determine breakdown voltage and reverse bias resistance	4	CO2

3	**Experiment 4** Calculation of performance parameters (rms voltages and currents, Ripple factor, Rectification efficiency) for half-wave rectifier **Experiment 5** Calculation of performance parameters (rms voltages and currents, Ripple factor, Rectification efficiency) for full-wave rectifier	4	CO3
4	**Experiment 6** Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates **Experiment 7** Implementation of NOT, OR, AND, Ex-OR, Ex-NOR Gates using Universal Gates	4	CO4, CO5
5	**Micro-project/ Innovative experiment**	2	CO6

Text Books:

1. *Electronics Fundamentals and Applications*: D. Chattopadhyay, P. C. Rakshit, 15th Ed, New Age International
2. *Fundamentals of Digital Circuits*: A Anand Kumar, PHI

Reference Books:

1. *Basic Electronics*: B L Theraja, S. Chand
2. *Digital Circuits & Design*: D.P Kothari, J.S Dhillon, Pearson

Web-Resource:

1. http://vlabs.iitkgp.ac.in/be/

Course Name	Programming for Problem Solving	**Course Code**	RCC-ESC-CS-101
Semester	1st	**Program Name**	B.Tech. (CSE)
L:T:P	2:0:0	**Total Hours**	34

Course Pre-requisite: Basic knowledge of digital system & number system.

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-CS-101.CO1	Gain a comprehensive understanding of computer system architecture, components, and their interactions, along with foundational knowledge of operating systems, networking, data representation, and basic troubleshooting.	Understanding (Level - II)
RCC-ESC-CS-101.CO2	Understand the fundamental concepts of the C programming language, including syntax, data types.	Understanding (Level - II)
RCC-ESC-CS-101.CO3	Apply C programming constructs to develop efficient and effective code to solve flow, and control structures problems.	Applying (Level - III)
RCC-ESC-CS-101.CO4	Implement user-defined data structures such as arrays, structures, and pointers in C to manage and manipulate data.	Applying (Level - III)
RCC-ESC-CS-101.CO5	Design to develop modular programs using functions and procedures to enhance code reusability and maintainability.	Creating (Level - VI)
RCC-ESC-CS-101.CO6	Understanding of file I/O operations to read from and write to files in C and dynamic memory management technique.	Understanding (Level - II)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	**Fundamental of computing :** Introduction to Computer Hardware and Software: Computer generations, computer types , CPU, Primary memory, Secondary memory, input/output devices, Operating system. [2L] Data & number systems : Bits, bytes and words, Number System (Binary, octal , hexadecimal, BCD, ASCII) &	6	CO1

	conversion . 1s & 2s complement. [2L] Algorithm &flowchart : Properties of Algorithm , flowchart , space & time complexity (Big O notation only) [2L]		
2	**Fundamentals of C language : Operators & Expressions :** Basic structure of C program, executing a C program. Constant, variable and data types, Storage Class, keywords, Operators (Arithmetic , logical, conditional, bitwise etc.) , Precedence and associativity of operators ,Expressions.	4	CO2
3	**Flow of Control :** Statement and blocks, if - else, switch. [2L] Loops - while, for , do while, break and continue. [4L]	6	CO3
4	**Functions &Arguments :** Basics of functions, function types, function parameters & return values , recursion , call by value & call by address . Command line arguments .	4	CO5
5	**Array & Pointers :** 1D Array , 2D array , Character array & Strings . [3L] Different types of pointers (far near, huge), pointer to array , array of pointers , function pointer . Dynamic memory allocation technique, Preprocessor &Macro . [3L] Basic Searching (Linear) & Sorting (Bubble , Insertion & Selection) techniques [2L]	8	CO4
6	**Structure, Union &File :** Basic of structures, structures and functions, arrays of structures, structure pointer, Union. [3L] Different modes of file opening, different process of reading & writing from file. [3L]	6	CO6

Text Books:

1. E. Balaguruswamy, Programming in ANSI C,7th Edition, Tata McGraw-Hill
2. Reema Thereja ,Programming in C, Cengage publication

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The ‘C’ Programming Language, Prentice Hall of India.

Web-Resource:

1. https://www.w3schools.com/c/c_intro.php
2. https://www.geeksforgeeks.org/c-programming-language/

Course Name	Programming for Problem Solving Laboratory	**Course Code**	RCC-ESC-CS-191
Semester	1st	**Program Name**	B.Tech. (CSE)
L:T:P	0:0:4	**Total Hours**	48

Course Pre-requisite: Basic programming knowledge

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-CS-191.CO1	Debug and troubleshoot C programs to identify errors effectively.	Understanding (Level - II)
RCC-ESC-CS-191.CO2	Demonstrate proficiency in writing, compiling, and executing C programs.	Applying (Level - III)
RCC-ESC-CS-191.CO3	Apply fundamental programming constructs such as loops, conditionals, and functions to solve problems.	Applying (Level - III)
RCC-ESC-CS-191.CO4	Implement and manipulate data structures such as arrays, structures, Union and pointers in C.	Applying (Level - III)
RCC-ESC-CS-191.CO5	Develop modular and maintainable programs using functions and procedures.	Creating (Level - VI)
RCC-ESC-CS-191.CO6	Implement file input/output operations and manage memory efficiently in C programs.	Applying (Level - III)

Detailed Syllabus:

Module #	Module Name	Experiment Topics	No of Labs Required	CO Linked
1	**Basic C programming using Flow Control**	1. Introduction to programming paradigms ,– Structure of C program, Compilation process – Data Types – Constants – Enumeration Constants – Keywords –. 2. Operators: Precedence and Associativity – Expressions – Input/Output statements, Assignment statements – 3. Conditional statements – Switch	4	CO1, CO2, CO3

		statements – Looping statements – Preprocessor directives .		
2	**C programming using Array, Function, Recursion and Strings**	1. Introduction to Arrays: Declaration, Initialization – One dimensional array –Two dimensional arrays – String operations: length, compare, concatenate, copy – Selection sort, linear and binary search.**[CO4]** 2. Modular programming – Function prototype, function definition, function call, Built-in functions (string functions, math functions) – Recursion, Binary Search using recursive functions **[CO5]**	4	CO4, CO5
3	**C programming using Pointers,Structures And Union**	1. Pointers – Pointer operators – Pointer arithmetic – Arrays and pointers – Array of pointers – Parameter passing: Pass by value, Pass by reference. 2. Structure – Nested structures – Pointer and Structures – Array of structures — Dynamic memory allocation – typedef – Union – Storage classes and Visibility.	3	CO4
4	**C programming using FILE& Command line**	1. Files – Types of file processing: Modes of opening files (R,W,A), Read write operations on file, Command line arguments.	1	CO6

Text Books:

1. E. Balaguruswamy, Programming in ANSI C,7th Edition, Tata McGraw-Hill
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

Reference Books:

1. Reema Thereja ,Programming in C, Cengage publication,

Web-Resource:

1. https://www.w3schools.com/c/c_intro.php
2. https://www.geeksforgeeks.org/c-programming-language/

Course Name	English and Technical Communication	**Course Code**	RCC-HSMC-191
Semester	1st	**Program Name**	B.Tech. (CSE)
L:T:P	0:0:4	**Total Hours**	30

Course Pre-requisite: Basic understanding of English language

Course Outcomes (CO):

CO Number	Statement	Knowledge Level
RCC-HSMC-191.CO1	Build active listening skills for effective technical communication.	Applying (Level III)
RCC-HSMC-191.CO2	Apply English language effectively in spoken and written forms	Applying (Level III)
RCC-HSMC-191.CO3	Interpret written technical and non-technical English	Evaluating (Level V)
RCC-HSMC-191.CO4	Apply technical writing skill effectively	Applying (Level III)
RCC-HSMC-191.CO5	Demonstrate problem-solving skill through effective communication	Understanding (Level II)
RCC-HSMC-191.CO6	Adapt organizational communication skill by relating to various contexts	Analyzing (Level IV)

Detailed Syllabus:

Module #	Module Name	Activities	No of Labs Required	CO Linked
1	**Listening Skill**	1. Analyzing Listening and its sub-skills 2. Listening Comprehension	3	CO1
2	**Speaking Skill**	1. Learning phonetics and applying it in English pronunciation 2. Applying proper stress and intonation in spoken form. 3. Extempore 4. Practice Situational Dialogues 5. Role Play 6. Formal Self Introduction 7. JAM	6	CO2, CO5
3	**Reading Skill**	1. Applying Skimming and Scanning techniques in reading	3	CO3

		2. Reading Aloud 3. Reading Comprehension and answering questions 4. Close Reading and forming conclusions		
4	**Grammatical Application**	1. Sentence structures and respective transformations 2. Voice Change 3. Change of Narration 4. Applying correct articles, Punctuations and Prepositions 5. Applying rules of Subject-verb Agreement 6. Identifying Misplaced Modifiers 7. Arranging Sentences in logical orders	6	CO2
5	**Writing Skill**	1. Applying synonyms and antonyms in writing precisely 2. Applying homonyms and idioms in effective written communication 3. Paragraph writing using cohesion and coherence techniques 4. Precis writing	6	CO2, CO3, CO4
6	**Organizational Communication**	1. Group Discussion 2. CV and Cover Letter Writing 3. Business Letter writing 4. Email writing 5. Memorandum and minute writing 6. Technical Report Writing	6	CO5, CO6

Text Books:

1. *English (with Lab Manual) - AICTE Prescribed Textbook (English)* by Kulbhushan Kumar
2. *Oxford Modern English Grammar* by Bas Aarts
3. *Oxford Practical English Usage - (Fully Revised International Edition)* by Michael Swan
4. *Technical Communication: Principles and Practice - (4th edition)* by Meenakshi Raman, Sangeeta Sharma
5. *Professional Speaking Skills* by ArunaKoneru
6. *English Language Laboratories – A Comprehensive Manual* by NiraKonar
7. *Model Business Letters, Emails and Other Business Documents - (7th edition)* by Shirley Taylor

Reference Books:

1. *Linguistics: An Introduction to Language and Communication - (7th edition)* by Adrian Akmajian, Ann K. Farmer, Lee S. Bickmore, Richard A. Demers and Robert M. Harnish
2. *English for Technical Communication* by K. R. Lakshminarayan
3. *Advanced English Communication Skills Lab* by K. R. Lakshminarayan
4. *The Art of Communication* by K.C. Verma
5. *Business Communication* by R.C Bhatia
6. *Objective English For Competitive Examinations* by Hari Mohan Prasad, Uma Rani Sinha
7. *A Book for IELTS* by Sam McCarter, Julie Easton, Judith Ash
8. *English Grammar in Use Book with Answers: A Self-Study Reference and Practice Book for Intermediate Learners of English* by Raymond Murphy

Web-Resource:

1. BBC Learning English (https://www.bbc.co.uk/learningenglish/)
2. Pearson (https:// in.pearson.com)
3. British Council IELTS practice (https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-english-practice-tests)

Course Name	Idea and Entrepreneurship	**Course Code**	RCC-AU-181
Semester	First	**Program Name**	B. Tech. (CSE)
L:T:P	2:0:0	**Total Hours**	20

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-AU-181.CO1	Understand the process of ideation to product transformation	Understanding (Level – II)
RCC-AU-181.CO2	Understand the nature of business opportunities and resources	Understanding (Level – II)
RCC-AU-181.CO3	Examine critical and creative aspects of business	Analyzing (Level – IV)
RCC-AU-181.CO4	Identify market potential of new product through customer need analysis, market competitions and industry needs	Analyzing (Level – IV)
RCC-AU-181.CO5	Demonstrate a new business model from new ideas including economical need analysis	Applying (Level – III)
RCC-AU-181.CO6	Design the product from an idea using technical concepts	Creating (Level – VI)

Detailed Syllabus:

Module #	Module Name	Activities	Maximum Activities	CO Linked
1	**Inspiration, motivation and ideation**	1. Entrepreneurship and Innovation as career opportunities 2. Motivational session by an successful innovators 3. Motivational session by successful Entrepreneur/ Start-up founder 4. Problem solving and Ideation workshop 5. Exposure/ field visit for problem identification 6. Inter/ intra institute idea competition/ challenge/ hackathon 7. Exhibition/ Poster presentation of ideas	4	CO1
2	**Validation and concept development**	1. Workshop on design thinking, critical thinking and innovative design 2. Process of innovation development/ Technology readiness level (TRL), Commercialization of technology/	4	CO2, CO3

Module #	Module Name	Activities	Maximum Activities	CO Linked
		Technology transfer 3. Workshop on Entrepreneurship skill/ attitude/ behaviour development 4. Session on Problem solution fit and Product market fit 5. Idea lab visit/ MSME cluster visit (Field visit/ Exposure visit) 6. Inter/ intra institute idea competition/ challenge/ hackathon 7. Exhibition/ Poster presentation of innovations		
3	**Prototype, design, process development for business model**	1. Session/ workshop on Business model canvas 2. Incubation unit/ patent facilitation centre (Field visit) 3. Session on Planning a start-up – legal and ethical steps 4. Workshop on Intellectual property right (IPR) and IP management for start-up 5. Inter/ intra institute business plan competition 6. Poster presentation of business plan	4	CO2, CO3, CO4, CO5
4	**Awareness for start-up and related ecosystem support services for start-up development**	1. Session on converting innovation into start-up 2. Session on achieving value proposition fit and business fit 3. Session on accelerators/ incubation opportunities for students – early stage entrepreneurs 4. Session on Lean start-up and Minimum viable product 5. Session on angel investment and VC funding opportunities for early stage entrepreneurs 6. Session with innovation and start-up ecosystem enablers 7. Organizing innovation/ outreach program at schools/ community 8. Inter/ intra institute start-up competition 9. Poster presentation on start-up	4	CO2, CO3, CO4, CO6

Text Books:

1. *Trajectory: Startup: Ideation to Product/Market Fit*, Dave Parker, Publisher: Matt Holt (2021)
2. *StartUpYaan: Mission To StartUp Success*, Krupesh Raut, Publisher: Notion Press (2023)
3. *Startup Compass: How Iconic Entrepreneurs Got It Right*, Ujwal Kalra and ShobhitShubhankar, Publisher: HarperCollins (2022)
4. *The Side Hustle Revolution: An Ultimate Business Building Guide from Ideation to Launch*, Anjali Sharma, Publisher: Notion Press (2023)

Reference Books:

1. *Business Ideation: The Five Steps*, HendrithVanlon Smith Jr., Publisher: Lulu.com (2023)
2. *The Spark Within: Igniting Your Startup Journey*, Ejaz Samnani, Publisher: Publisher: Notion Press (2023)
3. *The Business Model Book*, Adam J. Bock and Gerard George, Publisher: Pearson Education (2019)
4. *Hackathons: From Idea to Successful Implementation*, Andreas Kohne and Volker Wehmeier, Publisher: Springer Nature Switzerland (2020)

Web-Resource:

1. *Mastering Smart India Hackathon: A Comprehensive Guide to Winning Strategies and Success*, Rajkumar Deshpande, Publisher: Kindle Edition (2024)

Course Details for Semester - II

Course Name	Physics	**Course Code**	RCC-BSC-PH-201
Semester	2nd	**Program Name**	B.Tech. (CSE)
L:T:P	3:1:0	**Total Hours**	36

Course Pre-requisite: Basic knowledge of Physics at 10+2 level

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-BSC-PH-201.CO1	Solve basic problems of classical mechanics using Newtonian formulation	Applying (Level III)
RCC-BSC-PH-201.CO2	Investigate three level and four level lasers following semi-classical approach	Creating (Level VI)
RCC-BSC-PH-201.CO3	Interpret Maxwells' equations for steady and time varying electromagnetic fields	Applying (Level III)
RCC-BSC-PH-201.CO4	Develop time evolution of quantum mechanical systems using Schrodinger equation	Creating (Level VI)
RCC-BSC-PH-201.CO5	Evaluate conductivity problems of conductors, semiconductor, insulator relating origin of allowed and forbidden energy band	Evaluating (Level V)
RCC-BSC-PH-201.CO6	Distinguish statistical mechanical problems based on MB, BE and FD distributions for micro canonical ensembles	Evaluating (Level V)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	Elementary concepts of vector analysis (gradient, divergence and curl of vector) and numerical application, principles of virtual work, degrees of Freedom, Generalized Coordinates, cyclic coordinate, Lagrange's equation of motion, Hamiltonian formulation (no derivation), solving problems of Lagrangian formulation (Simple pendulum and Simple harmonic oscillation).	6	CO1
2	Laser: Principles, Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients, examples of 3 level and 4 level lasers: Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, and Applications of Lasers.	4	CO2
3	Gauss's law in free space and Biot-Savart law (statements	8	CO3

	only), formulation and significance of Maxwell's equations in vacuum, dielectrics and conducting medium, Poynting's theorem, relating flow of energy in an electromagnetic field, electromagnetic wave equation in vacuum, concept of skin effect for conductors.		
4	Transition from Classical mechanics to Quantum Physics, Planck's law of blackbody radiation, Compton effect and photoelectric effect, wave nature of particles, de-Broglie hypothesis, Heisenberg's uncertainty principle, postulates of quantum mechanics, time independent and dependent Schrödinger equation, applications of Schrödinger equation: One- dimensional problems - particle in one dimensional potential box, particle in three dimensional potential box (infinite potential), particle in finite potential barrier and concept of tunneling.	8	CO4
5	Concept of energy band diagram for conductor, semiconductor and insulator, p type and n type semiconductors, direct and indirect band gap semiconductors, examples with technology applications, concept of Fermi level, application to optoelectronic devices (solar cell, photodiode, LED, QLED)	6	CO5
6	Concept of ensemble and classification, phase space, Microstates and Macrostates, statistical distributions functions for three different statistics- Maxwell Boltzmann, Bose Einstein, Fermi-Dirac statistics	4	CO6

Text Books:

1. *Vector analysis, Schaum's outline series*, M. R. Spiegel, McGraw Hill Education
2. *Fundamentals Of Classical Mechanics*, A. B. Gupta, Books and Allied (P) Ltd
3. *A Text Book On Light*, B. Ghosh and K. G. Mazumdar, Sreedhar Publishers
4. *Fundamental of Electricity and Magnetism*, B. Ghosh, Books and Allied (P) Ltd
5. *Quantum Mechanics Statistical Mechanics and Solid State Physics*, D. Chattopadhya and P. C. Rakshit, S. Chand
6. *Introductory Quantum Mechanics*, S. N. Ghoshal, Calcutta Book House

Reference Books:

1. *Engineering Physics*, Sujau Kumar Bhattacharya, McGraw Hill Education
2. *Physics*, B. K. Pandey, Cengage.
3. *Principles of Physics*, 10ed, David Halliday, Robert Resnick Jearl Walker , Wiley
4. *A Textbook of Integrated Engineering Physics*, Amal Kr. Chakraborty, ChhayaPrakashani Pvt. Ltd.
5. *Solid State Physics*, S. O. Pillai, New Age International Private Limited
6. *Introduction to Solid State Physics*, Charles Kittel, Wiley
7. *Introduction to Electrodynamics*, David. J. Griffiths, Pearson

Course Name	Physics Laboratory	**Course Code**	RCC-BSC-PH-291
Semester	2nd	**Program Name**	B.Tech. (CSE)
L:T:P	0:0:2	**Total Hours**	14

Course Pre-requisite: Basic Physics lab knowledge of 10+2 courses

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-BSC-PH-291.CO1	Determine moduli of elasticity by operating basic measuring instruments	Evaluating (Level V)
RCC-BSC-PH-291.CO2	Evaluate band gap energy of semiconductor using four probe set up	Evaluating (Level V)
RCC-BSC-PH-291.CO3	Calculate unknown resistance using Carey-Foster bridge	Applying (Level III)
RCC-BSC-PH-291.CO4	Examine the medium specific physical properties of light using optical instruments	Analyzing (Level IV)
RCC-BSC-PH-291.CO5	Determine fundamental constants using quantum physical laws (blackbody radiation and photoelectric effect)	Evaluating (Level V)
RCC-BSC-PH-291.CO6	Analyze discrete nature of atomic orbitals by Frank Hertz experiment	Analyzing (Level IV)

Detailed Syllabus:

Module #	Module Name	Experiment Topics	No of Labs Required	CO Linked
1	General Properties of Matter	Determination Elastic moduli	3	CO1
2	Semiconductor Physics	Estimation of Band gap energy	1	CO2
3	Electricity & Magnetism	Conduction of Bridge experiment	2	CO3
4	Optics	Investigation of Physical optics phenomena	3	CO4
5	Quantum Physics	Application of thermodynamic and quantum physical law	4	CO5
6	Atomic Physics	Verification of Bohr's postulates	1	CO6

Text Books:

1. *Advanced practical physics (Vol-1)* by B. Ghosh and K. G. Mazumder, Sreedhar Publishers.
2. *Advanced practical physics (Vol-2)* by B. Ghosh and K. G. Mazumder, Sreedhar Publishers.
3. *An advanced course in practical physics* by D. Chattopadhyay and P. C. Raksit, New Central Book Agency Pvt. Ltd.

Reference Books:

1. *Engineering physics* by Sujay kumarbhattacharya, McGraw Hill Education.
2. *Engineering physics practical manual* by O. P. Sing, V. Kumar and R. P. Sing, Ram Prasad Publications.
3. *Engineering practical physics* by S. Panigrahi and B. Mallick, Cengage Publications.

Web-Resource:

1. https://www.vlab.co.in/
2. https://be-iitkgp.vlabs.ac.in/
3. http://vlabs.iitkgp.ac.in/vlt/project.html

Course Name	Mathematics - II - A	**Course Code**	RCC-BSC-M-201
Semester	2nd	**Program Name**	B. Tech. (CSE)
L:T:P	3:1:0	**Total Hours**	48

Course Pre-requisite: High School Mathematics and RCC-BSC-M-101

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-BSC-M-201.CO1	Outline the ideas of basic probability.	Understanding (Level II)
RCC-BSC-M-201.CO2	Distinguish probability distribution for discrete and continuous variables to quantify physical and engineering phenomenon.	Analyzing (Level IV)
RCC-BSC-M-201.CO3	Demonstrate the concept of bi-variate distribution.	Understanding (Level II)
RCC-BSC-M-201.CO4	Understand the basic ideas of statistics with different characterisation of a univariate and bivariate data set.	Understanding (Level II)
RCC-BSC-M-201.CO5	Explain sampling theory and estimation.	Evaluating (Level V)
RCC-BSC-M-201.CO6	Apply statistical tools of formal inference.	Applying (Level III)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	Basic Probability: Probability spaces, Conditional probability, Independence, Bayes' theorem, Bernoulli trials.	5	CO1
2	Probability Distribution: Random variables, Discrete and Continuous random variables, Cumulative distribution function, Probability mass/density functions; Mathematical expectation, variance, moments; Discrete distributions : Binomial, Poisson; Continuous distributions : Normal, Exponential, Gamma.	12	CO2
3	Bi-variate Distributions: Bi-variate distributions and their properties, Distribution of sums and quotients, Conditional densities, Chebyshev's inequality.	7	CO3
4	Basic Statistics: Measures of Central tendency, Moments, Skewness and Kurtosis; Binomial, Poisson and Normal -	12	CO4

	evaluation of statistical parameters for these three distributions; Covariance, Correlation, Regression, Spearman's rank correlation coefficient; Curve fitting by least square method: straight line and parabola.		
5	Sampling Theory: Population and Samples, Random Sampling, Statistic, Sampling distribution of sample mean and sample variance, Central limit theorem, Point and Interval Estimations.	5	CO5
6	Statistical Hypothesis: Simple and Composite hypothesis, Null and Alternative hypothesis, Test statistic, Critical region and Level of significance, Type I error and Type II error, Hypothesis testing for mean and variance, Chi-square test for goodness of fit.	7	CO6

Text Books:

1. B.K. Pal and K. Das, *Engineering Mathematics*, Volume -IIA, U. N. Dhur& Sons Pvt.Ltd.
2. A.K. Mukherjee and N.K. Bej, *Engineering Mathematics*, Volume- IIA, ShreedharPrakashani.

Reference Books:

1. S.M. Ross ,*Introduction to Probability Models*, Elsevier.
2. W. Feller, *An Introduction to Probability theory and its applications* Vol-I, John Wiley and Sons.
3. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, Sultan Chand and Sons.
4. N.G. Das, *Statistical Methods (Combined Volume)*, Tata-McGraw Hill.
5. A. Gupta, *Groundwork of Mathematical Probability and Statistics*, Academic publishers.

Course Name	Workshop/ Manufacturing Practices	**Course Code**	RCC-ESC-ME-292
Semester	2nd	**Program Name**	B.Tech (CSE)
L:T:P	0:0:4	**Total Hours**	48

Course Pre-requisite: Basic Mathematics

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-ME-292.CO1	Understand the use of hand tools and machine tools used in workshops	Understanding (Level II)
RCC-ESC-ME-292.CO2	Discuss the safety measures required to be taken while using the tools.	Understanding (Level II)
RCC-ESC-ME-292.CO3	Select the appropriate machine tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	Understanding (Level II)
RCC-ESC-ME-292.CO4	Fabricate components with their own hands.	Applying (Level III)
RCC-ESC-ME-292.CO5	Apply the practical knowledge of the dimensional accuracies and dimensional tolerances possible in different manufacturing processes	Applying (Level III)
RCC-ESC-ME-292.CO6	Assemble different components, to produce small device/parts for project or research purpose	Applying (Level III)

Detailed Syllabus:

Module	Module Name	Experiment Topics	No of Labs Required	CO Linked
1	**Fitting**	General safety to be followed in mechanical workshop Demonstration, usage of different fitting tools. Job 1: To make a Gauge from MS plate using various fitting operation	10	CO1 to CO6
2	**Machine Tools**	Brief Study of different Machine tools and safety measure Job 1: To make a pin from a mild steel rod in a lathe.	12	CO1 to CO6

		Job 2: To make vee slot in a block of cast iron or mild steel in a shaping Job 3: To make rectangular slot in a block of cast iron or mild steel in a milling machine		
3	**Carpentry**	Demonstration, usage of different carpentry tools and safety practices. Job 1: To make wooden Half-lap/ Tee joints.	4	CO1 to CO6
4	**Welding**	Introduction of welding equipment and safety practices. Job 1: To join two thick (approx. 6mm) MS plates by manual metal arc welding Job 2: To join two thin mild steel plates (approx. 3mm) by gas welding.	8	CO1 to CO6
5	**Electrical & Electronics**	Job 1: Simple domestic wiring involving MCB, switches, LED lamp fan and 5-pin socket point. Job 2: Electric connection of fluorescent lamp by using two-way switch Job 3: 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 by using a simple soldering process.	8	CO1 to CO6
6	**Advance manufacturing**	Introduction to CNC Machine; Develop its part programme. Additive manufacturing and its application	6	CO1 to CO6

Text Books:

1. *Elements of workshop Technology*: Vol 1 & Vol 2 : Manufacturing Processes, S K Hajra Choudhury A, K Hajra Choudhury, 15th Edition required 2013, Media promoters & publishers Pvt Ltd, Mumbai.
2. *Workshop Technology* -O. P Khanna ,Dhanpat Rai Publications

Reference Books:

1. *Workshop Technology* vol 1 & Vol 2 by B S Raghuwanshi. Dhanpat Rai & Co.
2. *Manufacturing Practices* by Dr. R.K. Singal, S.K. Kataria& Sons.

Course Name	Basic Electrical Engineering	**Course Code**	RCC-ESC-EE-201
Semester	2nd	**Program Name**	B.Tech. (CSE)
L:T:P	3:1:0	**Total Hours**	40

Course Pre-requisite: (10th +2 Level) Physics & Mathematics

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-EE-201.CO1	To explain the properties of DC electric circuits and its working principles.	Understanding (Level II)
RCC-ESC-EE-201.CO2	To examine different AC signals and their behaviour on different AC circuits.	Applying (Level III)
RCC-ESC-EE-201.CO3	To describe the constructions & working principles of DC machines and their characteristics.	Understanding (Level II)
RCC-ESC-EE-201.CO4	To evaluate the parameters of single phase transformers	Analyzing (Level IV)
RCC-ESC-EE-201.CO5	To explain the construction & working principles of different types of AC Machines.	Understanding (Level II)
RCC-ESC-EE-201.CO6	To summarize the concept of electrical Power Generation and the components of low voltage protection.	Understanding (Level II)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	**DC Circuits**-Electrical circuit elements (R, L and C), voltage and current sources, Voltage and Current Division Rules. Series, Parallel and Star-Delta Conversions. Kirchoff's current and voltage laws, Mesh and Node analysis. Superposition, Thevenin's, Norton's and Maximum Power transfer theorems.	8	CO1
2	**AC Circuits**- Representation of sinusoidal waveforms. Calculation of peak, rms and average values of different waveforms. Form factor and Peak factor. Phasor representation. Analysis of single-phase ac circuits consisting of RL, RC, RLC combinations (series and parallel). Apparent power, real power, reactive power and power factor. Series and parallel resonance.	8	CO2
3	**DC Machine**-Construction, working Principle, types of DC machines. Emf Equation, Armature reaction. Characteristics of dc generator. Torque equation and torque-speed characteristic	8	CO3

	of dc shunt motor.		
4	**Transformers**-Ideal and practical transformer, equivalent circuit, Phasor diagram, OC and SC tests, losses in transformers, voltage regulation and efficiency.	6	CO4
5	**AC Machines**-Construction and working principle of 3-phase Induction Machine. Equivalent circuit and Torque-speed characteristics of Induction Motor (IM). Introduction to Synchronous generator.	6	CO5
6	Electrical Installations and Batteries-Overview of power system from generation to utilization. Single line diagram. Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Basic Characteristics for Batteries.	4	CO6

Text Books:

1. *Basic Electrical Engineering*, RituSahdev, Khanna Book Publishing Co. (P) Ltd., Edition: 2018, New Delhi.
2. *"Basic Electrical Engineering"*, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2nd Edition, 2020.
3. V.N Mittle& Arvind Mittal, *Basic Electrical Engineering*, TMH, 2nd Edition, 2010
4. *Electrical and Electronics Technology*, Hughes, Pearson Education Prentice Hall, 10th Edition, 2008,
5. *Electrical Technology*, Vol-I, Vol-II, Surinder Pal Bali, Pearson Education India; First Edition (1 January 2013)
6. *A Text Book of Electrical Technology*, Vol. I & II, B.L. Theraja, A.K. Theraja, S.Chand& Company, 1959.

Reference Books:

1. *Electrical Engineering Fundamentals*, Vincent Del Toro, Prentice-Hall, 2nd Edition, Jan 2015.
2. *Advance Electrical Technology*, H. Cotton, Reem Publication, Edition: 2011
3. *Basic Electrical Engineering*, R. A. Natarajan, P.R. Babu, Scitech Publishers, Aug. 2009
4. *Basic Electrical Engineering*, N.K. Mondal, Dhanpat Rai Publishing Company.
5. *Basic Electrical Engineering*, A. Chakrabarti, S. Debnath & C. K. Chanda, Publisher: McGraw Hill Education (I) Pvt. Ltd., 2nd Edition, 2022.
6. *Fundamental of Electrical Engineering*, Rajendra Prasad, PHI, Edition 2005.

Web-Resource:

1. https://archive.nptel.ac.in/courses/108/105/108105053/#
2. https://archive.nptel.ac.in/courses/108/105/108105053/#
3. https://archive.nptel.ac.in/courses/108/105/108105112/#
4. https://archive.nptel.ac.in/courses/108/105/108105112/#

Course Name	Basic Electrical Engineering Laboratory	**Course Code**	RCC-ESC-EE-291
Semester	2nd Sem	**Program Name**	B.Tech. (CSE)
L:T:P	0:0:2	**Total Hours**	20

Course Pre-requisite: (10th +2 Level) Physics & Mathematics

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-ESC-EE291.CO1	To identify with common electrical apparatus, components and their ratings.	Remembering (Level II)
RCC-ESC-EE291.CO2	To examine various network theorems in DC electrical circuits.	Applying (Level III)
RCC-ESC-EE291.CO3	To test common electrical devices & measuring instruments.	Evaluating (Level V)
RCC-ESC-EE291.CO4	To measure electrical parameters in different types of AC circuits.	Evaluating (Level V)
RCC-ESC-EE291.CO5	To verify the characteristics of DC machines	Applying (Level III)
RCC-ESC-EE291.CO6	To plot the characteristics of different electrical lamps.	Applying (Level III)

Detailed Syllabus:

Module #	Module Name	Experiment Topics	No of Labs Required	CO Linked
1	**Familiarization with Equipments and instruments**	Familiarization with following instruments/components: a. Wattmeter b. Multimeter c. Oscilloscope/DSO d. MI Voltmeter/ Ammeter e. PMMC Voltmeter/ Ammeter f. Resistors with color code, capacitors, inductors g. Autotransformer/ Variac.	1	CO1
2	**Network Theorem**	a. Verification of Superposition Theorem. b. Verification of Thevenin's Theorem / Norton's Theorem.	1	CO2

4	**Calibration of Measuring Instruments**	Calibration of Ammeter and Wattmeter.	1	CO3
5	**AC circuit Fundamentals**	To study R-L-C series/parallel circuit and calculation of impedance and power factor.	1	CO4
6	**Single-phase Transformer**	Open-circuit and Short-circuit test of single-phase transformer	1	CO3
7	**Power Measurement**	Measurement of power in Three-phase balanced circuit by two wattmeter method.	1	CO4
8	**DC Generator**	To study the Open Circuit Characteristics (OCC) of a DC shunt and separately excited generator.	1	CO5
9	**DC Motor**	a) To study the Starting and speed reversal of DC shunt motor. b) To study the speed controls of DC shunt motor.	1	CO5
10	**Characteristics of lamp**	Study of different LT Switch gears: SFU, MCB, ELCB, MCCB	2	CO6

Text Books:

1. *Experiments in Basic Electrical Engineering*, S. K Bhattacharya, New Age International, 2007.
2. *Basic Electrical Engineering laboratory*, Dr.M.Siva Ramkumar, Dr.A. Amudha, M. Sivaram Krishnan, Dr . G Emayavaramban, Notion Press.

Reference Books:

1. *A Text Book of Electrical Technology*, Vol. I & II, B.L. Theraja, A.K. Theraja, S.Chand & Company, 1959.
2. *Basic Electrical Engineering*, Ritu Sahdev, Khanna Book Publishing Co. (P) Ltd., Edition: 2018, New Delhi.
3. *Basic Electrical Engineering*, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill, 2nd Edition, 2020.

Web-Resource:

1. https://archive.nptel.ac.in/courses/108/105/108105053/#
2. https://archive.nptel.ac.in/courses/108/105/108105053/#
3. https://archive.nptel.ac.in/courses/108/105/108105112/#

Course Name	UHV II: Understanding Harmony	**Course Code**	RCC-HSMC-201
Semester	2nd	**Program Name**	B. Tech. (CSE)
L:T:P	2-0-0	**Total Hours**	24

Course Prerequisite: Attending UHV I during Induction Programme

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-HSMC-201.CO1	Apply a holistic perspective towards Human being, Family, Society and Nature & Existence	Understanding (Level II)
RCC-HSMC-201.CO2	Analyze "Self Exploration" as an integral tool for Right Understanding and Right Feeling;	Applying (Level III)
RCC-HSMC-201.CO3	Evaluate "Self- Exploration" to distinguish between "Natural Acceptance." and acceptance;	Analyzing (Level IV)
RCC-HSMC-201.CO4	Discuss the understanding of the Harmony in the Human Being, Family, Society and Nature Existence;	Analyzing (Level IV)
RCC-HSMC-201.CO5	Demonstrate the Self- determination and Commitment towards social welfare Self-Reflection;	Analyzing (Level IV)
RCC-HSMC-201.CO6	Discover the principles of harmony in day to day living for life long happiness in continuity;	Evaluating (Level V)

Detailed Syllabus:

Module #	Contents	Contact Hours	CO Linked
1	**Introduction - Need, Basic Guidelines, Content and Process for Value Education** a. A look at basic Human Aspirations: Continuous Happiness & Prosperity b. Need of Right understanding, Relationship and Physical Facility c. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	4	CO1 & CO2
2	**Understanding Harmony in the Human Being - Harmony in Myself!** a. Human being as coexistence of Self andBody	4	CO2 & CO3

	b. Understanding the needs of Self and 'Body' - happiness and physical facility c. Understanding the Body as an instrument of the Self d. Understanding the harmony of "I" (Self) with the Body: *Sanyam* and Health; Programs to ensure *Sanyam* and Health; Correct appraisal of Physical needs: Meaning of Prosperity in detail:		
3	**Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship** a. Understanding the harmony in the society (society being an extension of family): b. Resolution forProsperity in every family and fearlessness (trust) in society and co-existence as comprehensive Human Goals c. Visualizing a universal harmonious order in society: Undivided Society, Universal Human Order (UHO) from family to world family.	4	CO3 & CO4
4	**Understanding Harmony in the Nature and Existence** a. Evaluating the harmony in the Nature b. Discovering Interconnectedness and mutual fulfillment among the four orders of Nature- recyclability and self regulation in nature	4	CO4 & CO5
5	**Understanding Whole existence as Coexistence** a. Discoverding Existence as Coexistence of mutually interacting units in all- pervasive space b. Holistic perception of harmony at all levels of existence.	4	CO4 & CO5
6	**Implications of the Holistic Understanding of Harmony on Professional Ethics** a. Natural Acceptance of human values b. Definitiveness of Ethical Human Conduct c. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Orde	4	CO5 & CO6

Text Books:

1. R Sangal, G P Bagaria, Excel Books,New Delhi, 2010. Human Values and Professional Ethics by R R Gaur,

Reference Books:

1. R. K. Mission Kolkata. The Life of Vivekananda and the Universal Gospel - Romain Rolland

Web-Resource:

1. https://webstor.srmist.edu.in/web_assets/downloads/2024/human-values-and-professional-ethics-ebook.pdf
2. https://www.youtube.com/watch?v=abJdq7ekIJ0&t=28s

Course Name	NSS & Yoga	**Course Code**	RCC-AU-282
Semester	II	**Program Name**	B.Tech.(CSE)
L:T:P	0:0:2	**Total Hours**	26

Course Outcome (CO):

CO Number	Statement	Knowledge Level
RCC-AU-282.CO1	Understand the importance of his / her responsibilities towards society.	Understanding (Level II)
RCC-AU-282.CO2	Develop competence required for group-living, sharing of responsibilities, and national pride	Understanding (Level II)
RCC-AU-282.CO3	Understand the importance of health, hygiene and sanitation and its role in societal development	Understanding (Level II)
RCC-AU-282.CO4	Understand Yoga and its Philosophy	Understanding (Level II)
RCC-AU-282.CO5	Understand the environmental and societal issues to design solutions and to meet emergencies and natural disasters	Understanding (Level II)
RCC-AU-282.CO6	Apply skills in mobilizing community participation, leadership qualities and democratic attitudes	Applying (Level III)

Detailed Syllabus:

Module #	Module Name	Activity Topics	No. of labs required	CO Linked
1	**Introduction to National Service Scheme**	1. Celebration of NSS Day 2. Celebration of Constitution Day 3. Organization of Fundraiser events 4. Participation in Outreach Program 5. Participation in Special Camping (not for all students based on selection by RDNSS, Kolkata) 6. Participation in National Integration Camp (not for all students based on	2	CO1

		selection by RDNSS, Kolkata) 7. Special drives*		
2	**Life Competencies & Youth Leadership**	1. Celebration of Republic day 2. Celebration of Independence Day 3. Celebration of National Youth Day 4. Participation in Pre-Republic Day parade 5. Participation in Road safety Awareness Program 6. Understanding the third Gender through Sensitization Program 7. Cyber Security Awareness	4	CO2
3	**Health, Hygiene and Sanitation**	1. Participation in Health Camps 2. Organization of Blood Donation Camp 3. Participation in SwachhtaDiwas 4. Participation in World AIDS day 5. Observation of No Tobacco Day 6. Observation of World Health Day 7. Observation of PoshanPakwara	6	CO3
4	**Understanding Yoga & Fitness**	1. Celebration of International Yoga Day 2. Participation in Yoga Classes in the Institute 3. Participation in Mountaineering Camp (Organized by MAKAUT)	4	CO4
5	**Understanding Environment& Disaster Management**	1. Celebration of Jal Divas 2. Celebration of Ozone Day (Tree plantation drive and its nurturing by external expert, SAB) 3. Participation in Composting of Biodegradable waste (by external expert from SAB) 4. Plantation drive and nurturing of plants 5. Participation in World environment day (Tree plantation drive, with SAB) 6. Observation of Earth Day 7. Collecting funds/food/clothes etc for Relief programs during natural calamity 8. Recycling waste and e-waste	4	CO5

		management		
6	**Volunteerism and Shramdan**	1. Visit to orphanage /old age home 2. Voluntarily Cleaning drive in-house and outside , removing single use plastics 3. Conducting Youth Survey for Localities' who are not in regular employment	4	CO6

Text Books:

1. NSS Manual, 2006, Government of India, Ministry of Youth Affairs & Sports New Delhi
2. Draft National Youth Policy Document, 2022, Government of India, Ministry of Youth Affairs & Sports, New Delhi
3. National Service Scheme - A Youth Volunteers Programme For Undergraduate Students As Per UGC Guidelines by J D S Panwar, A K Jain & B K Rathi (Astral) Publisher : Daya Pub. House (1 January 2018)

Curriculum Structure

Semester III (Second Year)						
Sl. No.	Code	Course Title	Hours per week			Credits
			L	T	P	
Theory						
1.	RCC-PCC-CSE-301	Data Structure & Algorithms	3	0	0	3
2.	RCC-PCC-CSE-302	Digital Systems & comp organization	3	0	0	3
3.	RCC-PCC-CSE-303	Object Oriented Programming	3	0	0	3
4.	RCC-PCC-CSE-304	Discrete Mathematics	3	1	0	4
5.	RCC-HSMC-CSE-301	Industrial Management	3	1	0	4
6.	RCC-AU-CSE-381	Soft skill & Ethics	2	0	0	0
Practical						
7.	RCC-PCC-CSE-391	Data Structure & Algorithms Lab	0	0	4	2
8.	RCC-PCC-CSE- 392	Digital Systems & Computer Organization Lab	0	0	4	2
9.	RCC-PCC-CSE-393	Object-Oriented Programming Lab	0	0	4	2
					Total Credits	**23**

Semester IV (Second Year)						
Sl. No.	**Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory						
1.	RCC-PCC-CSE-401	Operating System	3	0	0	3
2.	RCC-PCC-CSE-402	Computer Architecture & VHDL	3	0	0	3
3.	RCC-PCC-CSE-403	Database Management Systems	3	0	0	3
4.	RCC-HSMC-CSE-401	Human Resource Development	3	1	0	4
5.	RCC-AU-CSE-481	Environmental Sciences	2	0	0	0
Practical						
6.	RCC-PCC-CSE-491	Operating System Lab	0	0	4	2
7.	RCC-PCC-CSE-492	Computer Architecture & VHDL Lab	0	0	4	2
8.	RCC-PCC-CSE-493	Database Management Systems Lab	0	0	4	2
9.	RCC-PCC-CSE-494	Small-Scale Software Development Using Python	0	0	4	2
10.	RCC-PCC-CSE-495	C++ Programming Practices Lab	0	0	4	2
				Total Credits		**23**

Semester V (Third year)						
Theory						
Sl. No.	**Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
1.	RCC-PCC-CSE-501	Software Engineering	3	0	0	3
2.	RCC-PCC-CSE-502	Design & Analysis of Algorithms	3	0	0	3
3.	RCC-PCC-CSE-503	Computer Network	3	0	0	3
4.	RCC-PCC-CSE-504	Artificial Intelligence	3	0	0	3
5.	RCC-PCC-CSE-505	Formal Language & Automata Theory (FLAT)	3	0	0	3
Practical						
6.	RCC-PCC-CSE-591	Software Engineering Lab	0	0	4	2
7.	RCC-PCC-CSE-592	Design & Analysis of Algorithms Lab	0	0	4	2
8.	RCC-PCC-CSE-593	Computer Networks Lab	0	0	4	2
9.	RCC-PCC-CSE-594	Artificial Intelligence Lab	0	0	4	2
Sessional						
10.	RCC-PROJ-CSE-581	Seminar Leading to project	0	0	2	1
					Total Credits	**24**

Semester VI (Third year)						
Sl. No.	**Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory						
1.	RCC-PCC-CSE-601	Compiler Design	3	0	0	3
2.	RCC-PCC-CSE-602	Machine Learning	3	0	0	3
3.	RCC-PEC- CSE-601 (A/B/C)	**Professional Elective-I** A. Distributed Database Management System B. Image Processing C. Pattern Recognition	3	0	0	3
4.	RCC-OEC- CSE-601 (A/B/C)	**Open Elective I** A. Operations Research B. Digital Signal Processing C. Control Systems	3	0	0	3
5.	RCC-HSMC-CSE-681	Organizational Behavior	2	0	0	2
6.	RCC-PROJ-CSE-681	Research Methodology	2	0	0	2
Practical						
7.	RCC- PEC-CSE-691 (A/B/C)	**Professional Elective-II** A. Distributed Database Management System Lab B. Image Processing Lab C. Pattern Recognition Lab	0	0	4	2
8.	RCC- PCC-CSE-692	Machine Learning Lab	0	0	4	2
9.	RCC-ESC-CSE-681	Design & Thinking Lab	0	0	2	1
Sessional						
10.	RCC-PROJ-CSE-682	Project I (Mini)	0	0	2	1
			Total credits			**22**

Semester VII (Fourth year)						
Sl. No.	**Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory						
1.	RCC-PEC- CSE-701 (A/B/C/D)	**Professional Elective-III** A. Quantum Computing B. Cloud Computing C. Multi-agent Intelligent Systems D. Statistical Machine Learning	3	0	0	3
2.	RCC-PEC- CSE-702 (A/B/C/D)	**Professional Elective-IV** A. Deep Learning B. Soft Computing C. Ad-Hoc and Sensor Networks D. Cyber Security	3	0	0	3
3.	RCC-OEC- CSE-701 (A/B/C/D)	**Open Elective-II** A. Multimedia Systems B. Introduction to Philosophical Thoughts C. Digital Marketing D. Numerical Methods for Engineers	3	0	0	3
Sessional						
4.	RCC-PROJ-CSE-781	Project-II	0	0	12	6
5.	RCC-PROJ- CSE-782	Viva - Voce	0	0	0	2
					Total credits	**17**

Semester VIII (Fourth year)						
Sl. No	**Code**	**Course Title**	**Hours per week**			**Credits**
			L	**T**	**P**	
Theory						
1.	RCC-PEC- CSE-801	**Professional Elective-V** A. Signals and Networks B. Cryptography & Network Security C. Speech and Natural Language Processing D. Web and Internet Technology E. Internet of Things	3	0	0	3
2.	RCC-OEC- CSE-801	**Open Elective-III** A. Big Data Analysis B. Cyber Law and Ethics C. Mobile Computing D. Robotics E. Soft Skill & Interpersonal Communication	3	0	0	3
3.	RCC-OEC- CSE-802	**Open Elective-IV** A. E-Commerce and ERP B. Micro-electronics and VLSI Design C. Data Analysis with R D. Data Science	3	0	0	3
Sessional						
4.	RCC-PROJ- CSE- 881	Project-III	0	0	12	6
			Total credits			**15**

Total credits = 134 (From 2nd year to 4th year) + 38 (First year) = 162