ETERNAL UNIVERSITY

(ESTABLISHED UNDER HIMACHAL PRADESH GOVERNMENT ACT NO.3 OF 2009)

BARU SAHIB
HIMACHAL PRADESH

WORLD PEACE THROUGH VALUE BASED EDUCATION

AKAL COLLEGE OF ENGINEERING & TECHNOLOGY

B.TECH. CSE (BATCH 2025-2029) CURRICULUM (SEMESTER I & II)

APPROVED VIDE ANNEXURE 4.5.1 OF 87TH ACADEMIC COUNCIL MEETING HELD ON 25TH JULY, 2025

TO BE IMPLEMENTED FROM THE ACADEMIC SESSION 2025-26

Dean
Academic Affairs
Eternal University
Baru Sahib (H.P.) 173101

Registrar (Officiating)
Eternal University
Baru Sahib (H.P.) 173101

CURRICULUM
for
UNDERGRADUATE DEGREE PROGRAM

BACHELOR OF TECHNOLOGY
IN
COMPUTER SCIENCE AND ENGINEERING
(Batch 2025-29) onwards

In accordance with NEP 2020

Akal College of Engineering & Technology
Department of Computer Science and Engineering
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1. Preamble

The importance of higher education cannot be overstated in terms of helping one obtain gainful employment and/or granting access to additional study on par with that offered by internationally renowned universities. In order to help the next generation of students develop the skills, knowledge, and training necessary to improve their thinking, comprehension, and application abilities as well as to position them to compete, succeed, and excel globally, it is imperative that the quality of higher education be improved. Sustained initiatives are required to reform the present higher education system for improving and upgrading the academic resources and learning environments by raising the quality of teaching and standards of achievements in learning outcomes in undergraduate programs. The Eternal University, Barusahib upgraded its undergraduate programmes in Computer Science and Engineering in accordance with NEP, 2020 along with the Learning Outcomes-based Curriculum Framework (LOCF) which makes it student-centric, interactive and outcome-oriented with well- defined aims, objectives and goals to achieve. NEP, 2020 aims at making higher education a multidisciplinary learning process. In other words, the curriculum will be flexible, it will allow students to take up creative subject-combinations.

2. Introduction

The Department of Computer Science & Engineering was established in the year 2007. It has consistently fulfilled its role of producing Computer Engineers ready to meet the demands of the IT world. The department has always attracted the best of engineering aspirants from all over the country. It has a well-qualified and experienced team of faculty. The Department offers B.Tech., M.Tech., and Ph.D. courses in Computer Science and Engineering. The department has adequate facilities to support these teaching activities. Students of the department have access to sufficient high end computing facilities. The Department is also actively involved in various research activities. The facilities are adequate to cater to the needs of Research activities.

3. Nature of Bachelor's Degree Programme in Computer Science and Engineering

The curriculum of bachelor's degree in Computer Science and Engineering is divided into 4 stages with multiple exit-entry as per NEP 2020. The type of award, stage of exit and the mandatory credits to be achieved by the student at the time of exit is described in the table below.

S. No	Type of Award	Stage of Exit	Mandatory credits to be secured for the award
1.	Undergraduate Certificate in Computer Science	For those who exit after the first year (two semesters) of the undergraduate programme. (Programme duration: first year or two semesters of the undergraduate programme)	44
2.	Undergraduate Diploma in Computer Science	For those who exit after two years (four semesters) of the undergraduate programme (Programme duration: First two years or four semesters of the undergraduate programme)	88
3.	Bachelor of Science in Computer Science	For those who exit after three years (six semesters) of the undergraduate programme (Programme duration: First three years or six semesters of the undergraduate programme).	132
4.	Bachelor of Technology in Computer Science and Engineering	For those who exit after four years (eight semesters) of the undergraduate programme (Programme duration: First four years or eight semesters of the undergraduate programme).	169

4. Programme Educational Objectives

PEO1: To produce students employable towards building a successful career based on sound understanding of theoretical and applied aspects as well as methodology to solve multidisciplinary real-life problems.

PEO2: To produce professional graduates ready to work with a sense of responsibility, ethics and enabling them to work efficiently individually and also as a team.

PEO3: To impart the competency in students so that they are able to pursue higher studies and research in areas of engineering and other professionally related fields.

PEO4: To inculcate ability to adapt to the changing technology through continuous

5. Programme Outcomes (POs): Engineering Graduates will be able to:

PO1: Engineering Knowledge

Apply the knowledge of mathematics, science, and engineering fundamentals to solve complex computing and programming problems.

PO2: Problem Analysis

Identify, analyze, and formulate solutions for complex problems using appropriate algorithms and programming techniques.

PO3: Design & Development of Solutions

Design software systems and applications that meet desired needs within realistic constraints such as societal, health, and environmental aspects.

PO4: Modern Tool Usage

Use appropriate tools, modern techniques, and computing platforms for coding, debugging, modeling, and analysis of computer-based systems.

PO5: Communication & Teamwork

Communicate effectively and function as an individual or team member in multidisciplinary environments, presenting solutions clearly through documentation and presentations.

6. Programme Specific Outcomes (PSOs)

In addition to these twelve POs, three Programme Specific Outcomes (PSOs) are formulated

PSO1: Ability to analyze, design, implement, and test software systems based on requirement specifications and development methodologies of software systems.

PSO2: Apply computer science theory blended with engineering mathematics to solve computational tasks and model real world problems using appropriate programming language, data structure, and algorithms.

PSO3: Ability to explore technological advancements in various domains, evaluate its merits and identify research gaps to provide solution to new ideas and innovations.

7. Programme Structure

a. Definition of Credit:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
2 Hours Practical (P) per week	1 Credit

b. Code and Definition

Code	Definitions
L	Lecture
T	Tutorial
P	Practical
DC	Discipline Specific Core
AE	Ability Enhancement Course
SE	Skill Enhancement Course
IA	Internship/Apprenticeship/Project/Community Outreach
VA	Value Addition Course

Definitions

i. **Courses of study** – Courses of study indicates pursuance of study in a particular discipline. Every discipline shall offer various categories of courses of study, viz. Discipline Specific Core courses (DC), Ability Enhancement Course (AE), Skill Enhancement Course (SE), Value Addition Course (VA) and Internship/Apprenticeship/Project/Community Outreach (IA)

a) Discipline Specific Core (DC): Discipline Specific Core is a course of study, which should be pursued by a student as a mandatory requirement of his/her programme of study. DC shall be the core credit courses of that particular discipline which will be appropriately graded and arranged across the semesters of study, being undertaken by the student, with multiple exit options as per NEP 2020.

b) Ability Enhancement Course (AE): AE courses are the courses based upon the content that leads to knowledge enhancement through various areas of study.

c) Skill Enhancement Course (SE): SE courses are skill-based courses in all disciplines and are aimed at providing hands-on-training, competencies, skills, etc. SE courses may be chosen from a pool of courses designed to provide skill-based instruction.

d) Value Addition Course (VA): VA courses are value-based courses which are meant to inculcate ethics, culture, Indian Knowledge systems, constitutional values, soft

skills, sports education and such similar values to students which will help in all round development of students.

e) Internship/Apprenticeship/Project/Community Outreach (IA):

i. **Internship /Apprenticeship**: All students will also undergo internships / Apprenticeships in a firm, industry, or organization or Training in-house labs with faculty.

ii. **Project:** Students are required to take up either a research project track or create hardware or software-based project under the guidance of a faculty member. The project will be done in the eighth semester and may build on the work done during the previous semester in capstone project. The project is to build an idea into a demonstrable working prototype. Students will be encouraged to solve problems using technology for social good. For research-based track, outcomes of their project work may be published in peer-reviewed journals or may be presented in conferences /seminars or may be patented.

c. Course level coding scheme

Three-digit number used as suffix with the Course Code for identifying the level of the course. Digit at hundred's place signifies the semester in which the course is offered. e.g.

101, 102 … etc. for first year

201, 202 …. etc. for second

year 301, 302 … etc. for third

year 401,402 etc. for

fourth year

d. Total Course Credit: 169

B.Tech. (Computer Science and Engineering)

CURRICULUM STRUCTURE AND EVALUATION SCHEME W.E.F 2025-29

SEMESTER: I

COURSE MODULE						
COURSES			Credits	L	T	P
COURSE CODE	Title	Component				
MATH101	Mathematics for Computer Science	DC	3	3	0	0
CSE101	C Programming	DC	4	3	0	1
PHY101	Engineering Physics	DC	4	3	0	1
EEE101	Fundamentals of Electrical and Electronics Engineering	DC	4	3	0	1
EVS301	Environmental Science	VA	3	3	0	0
HUM101	Communication Skills	AE	3	2	0	1
CSL102	IT Workshop	SE	1	0	0	1
Total			**22**	**17**	**0**	**5**

SEMESTER: II

COURSE MODULE						
COURSE			Credits	L	T	P
COURSE CODE	Title	Component				
MATH102	Probability & Statistics	DC	4	3	1	0
CSE103	Introduction to Python	DC	4	3	0	1
CSE104	Discrete Structure	DC	3	3	0	0
CSE105	Digital Circuits and Logic Design	DC	5	3	0	2
HUM102	Indian Constitutional Values	VA	3	3	0	0
EDU101	Human Values and Professional Ethics	VA	3	3	0	0
Total			**22**	**18**	**1**	**3**

SEMESTER: III

COURSE MODULE						
COURSE			Credits	L	T	P
Course Code	Title	Component				
CSE201	Object Oriented Programming	DC	5	2	1	2
CSE202	Data Structures and Algorithm	DC	5	2	1	2
CSE203	Foundation of Cyber Security	DC	5	2	1	2
CSE204	Computer Organization Architecture	DC	3	3	0	0
CSE205	Introduction to Data Science	DC	4	2	0	2
Total			**22**	**11**	**3**	**8**

SEMESTER: IV

COURSE MODULE						
COURSE			Credits	L	T	P
Course Code	Title	Component				
CSE206	Computer Networks	DC	4	2	1	1
CSE207	Theory of Computation	DC	3	3	0	0
CSE208	Operating System	DC	5	2	1	2
CSE209	Microprocessors and Applications	DC	5	3	0	2
CSE210	Cryptography	DC	5	2	1	2
Total			**22**	**12**	**3**	**7**

SEMESTER: V

COURSE MODULE						
COURSE			Credits	L	T	P
Course Code	Title	Component				
CSE301	Design and Analysis of Algorithms	DC	5	3	0	2
CSE302	Compiler Design	DC	3	3	0	0
CSE303	Web Technologies	DC	5	3	0	2
	Elective -I	DC	4	3	0	1
CSE308	Database Management System	DE	5	3	0	2
Total			**22**	**15**	**0**	**7**

DISCIPLINE SPECIFIC ELECTIVE-I

Course Code	Title
CSE304	Number Theory and Cryptology
CSE305	Human Computer Interaction
CSE306	Internet of Things
CSE307	Information Retrieval

SEMESTER: VI

COURSE MODULE						
COURSE			Credits	L	T	P
Course Code	Title	Component				
CSE309	Cloud Computing	DC	4	1	1	2
CSE310	Machine Learning	DC	4	2	1	1
CSE311	Data Encryption & Network Security	DC	5	3	0	2
CSE312	Mobile Applications Development	DC	4	2	0	2
	Elective -II	DE	3	3	0	0
PROJ301	Capstone Project -I	AE	2	0	0	2
Total			**22**	**11**	**2**	**9**

DISCIPLINE SPECIFIC ELECTIVE-II

Course Code	COURSE NAME
CSE313	Software Testing
CSE314	Distributed System Principles
CSE315	Mobile Computing
CSE316	Prompt Engineering
CSE317	Data Warehousing and Data Mining

SEMESTER: VII

COURSE MODULE						
COURSE			Credits	L	T	P
Course Code	Title	Component				
	Elective III	AE	2	2	0	0
CSE401	Deep Learning	DC	5	3	1	1
CSE402	MERN Stack	DC	5	3	0	2
CSE403	Penetration Testing & Auditing	DC	4	2	0	2
	Elective-IV	DE	3	3	0	0
PROJ401	Capstone Project-II	AE	3	0	0	3
Total			**22**	**13**	**1**	**8**

DISCIPLINE SPECIFIC ELECTIVE-III

Course Code	COURSE NAME
HUM401	Divine Music
HUM402	Business Communication Essentials
HUM403	Introduction to Positive Psychology

DISCIPLINE SPECIFIC ELECTIVE-IV

Course Code	COURSE NAME
CSE405	Cloud Infrastructure Services
CSE406	Cyber Crime & Investigation
CSE407	Mobile & Wireless Network Security
CSE408	Remote Sensing & Geographic Information System
CSE409	Bioinformatics
CSE410	Computer Forensics

SEMESTER: VIII

COURSE DETAILS						
COURSE						
Course Code	Title	Component	Credits	L	T	P
NS401	NCC/NSS	**AE**	2	0	0	0
	Elective-V	**DC**	3	3	0	0
PROJ402	Major Project/Internship & Viva-Voce	**IA**	10	0	0	10
Total			**15**	**3**	**0**	**10**

DISCIPLINE SPECIFIC ELECTIVE-V

Course Code	COURSE NAME
CSE411	Big Data Computing
CSE412	Drone Engineering
CSE413	Large Language Models
CSE414	Reinforcement Learning
CSE415	Blockchain
CSE416	Advanced Cryptography
CSE417	Generative AI
CSE418	AWS Cloud Computing
CSE419	Augmented Reality & Virtual Reality

*NCC/NSS: Marked based on reports received from NSS/NCC throughout until seventh semester

B.Tech. CSE **Semester-I** **Batch: 2025-29**

Course Code: MATH101 **L-T-P: 3-0-0** **Credit: 3**

Course Title: Mathematics for Computer Science

Course Objectives:

1. Develop Analytical and Problem-Solving Skills
2. Understand Fundamental Mathematical Concepts and Theories
3. Apply Mathematical Techniques to Engineering Problems
4. Learn Mathematical Modelling and Simulation
5. Enhance Computational Skills for Computer Science & EngineeringApplications

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1: Understand and analyze the theoretical & practical aspects of matrices and calculus.

CO2: Solve systems of linear equations using multiple methods, demonstrate understanding of linear independence, and determine eigenvalues and eigenvectors and solve eigenvalue problems.

CO3: Understand the various solution techniques and practical aspects of differential and Integral calculus.

CO4: Apply the concepts of matrices and calculus in various engineering problems.

Unit	Course Outline	No. of Lectures
Unit-I	**Introduction to Linear Algebra:** Matrices, Equivalent Matrix, Elementary Matrix, Normal form of a matrix, Gauss-Jordan reduction and inverse of matrices, Row-reduced matrix, Linear dependence and independence of vectors, Rank of a matrix, Consistency and Solution of linear system of equations **Eigenvalues and Eigenvectors:** Characteristic equation, Eigenvalues, Eigen vectors, Properties of Eigenvalues, Orthogonal vectors and its properties, Cayley-Hamilton theorem and its applications.	**11**
Unit-II	**Differential Calculus:** Function of two variables, Limit, Continuity and Differentiability, Partial Differentiation and its geometrical interpretation, Homogeneous functions, Euler‘s theorem and its extension, Total differentials, Composite function, Jacobian, Taylor’s and Maclaurin‘s series (for one and two variables), Maxima and minima of functions of two variables, Method of undetermined multipliers, Curve tracing. **Integral Calculus:** Double Integrals (Cartesian and Polar), Change of Order of Integration, Change of Variables, Applications of Double Integrals, Triple integrals, Change of variables, Applications of Triple Integrals.	**12**

Unit-III	**Linear differential equations:** Linear differential equations with constant coefficients, Cauchy's homogeneous linear equation Legendre's linear equation, simultaneous linear equations with constant coefficients.	**12**
Unit-IV	**Fourier series** of periodic functions, even and odd functions, half range expansions and Fourier series of different waveforms, complex form of Fourier series and practical harmonic analysis. **Laplace transforms** of various standard functions, properties of Laplace transforms and inverse Laplace transforms, Convolution theorem, Laplace transforms of unit step function, impulse function and periodic functions.	**10**
	Total Theory:	**45**

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	**3**	**3**	**1**	**2**	**2**	**3**	**2**	**1**
CO2	**3**	**3**	**1**	**2**	**1**	**3**	**3**	**2**
CO3	**3**	**3**	**2**	**1**	**2**	**3**	**3**	**2**
CO4	**3**	**2**	**2**	**1**	**2**	**2**	**3**	**2**

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Recommended Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, NC, New York
3. Gilbert Strang, Calculus, Wellesley-Cambridge Press
4. R.K. Jain and S.R.K. Iyenger, Advanced Engineering Mathematics, Narosa Pub. House.
5. B.V. Ramana, Higher Engineering Mathematics, Mc Graw Hill, India.

B.Tech. CSE **Semester-I** **Batch: 2025-29**

Course Code: CSE101 **L-T-P: 3-0-1** **Credit:4**

Course Title: C Programming

Course Objectives:

1. Grasp the foundational components and functions of computer systems.
2. Learn the syntax, constructs, and principles of the C programming language.
3. Cultivate the ability to analyze problems and design solutions using C.
4. Practice writing, compiling, and executing C programs to reinforce learning.
5. Understand memory allocation, pointers, and memory manipulation in C for efficient programming.

Course Outcomes:

After completing this course satisfactorily, a student will be able to:

CO1: Confidently operate computers to carry out computational tasks and understand the working of hardware, software, and operating systems.

CO2: Understand programming concepts, including programming languages, number systems, peripheral devices, networking, multimedia, and internet fundamentals.

CO3: Read, understand, and trace the execution of programs written in the C programming language, and write correct C code for a given problem.

CO4:Perform input and output operations and write programs that effectively use arrays, strings, structures, unions, and functions in C.

Unit	Course Outline	No. of Lectures
Unit-I	**Types of programming language:** Machine language, Assembly level language, higher level language, source file, object file, translators-assembler, compiler, interpreter. Evolution and classification of programming languages. **Programming Techniques:** Steps in program development, algorithm, flowchart, pseudo-code	**10**
Unit-II	**C Language:** C' character set, literals, keywords, identifiers, data types and size, variable declaration, expression, labels, statements, formatted input output statements, types of operators, data type conversion, mixed mode arithmetic **Control Statement:** Control Statement and Expressions, Looping	**12**
Unit-III	**Arrays and Strings**- Introduction, Types of arrays, Introduction to strings and String Functions. **Pointers-–** Introduction to Pointers – declaring Pointer Variables – Pointer Expressions and Pointer Arithmetic – Null Pointers – Generic Pointers **Structures and Union -** Introduction to Structure and Union, Difference between them**.**	**12**
Unit-IV	**Functions and File Handling**: C functions, library functions, parameter passing, recursion, C files, function for file handling, C preprocessors and command line arguments, macros and conditional compiler directives.	**11**
	Practicals:	**30**

	Total Theory+Practicals:	**45+30=75**

Total Hours for Practicals: 15X2

List of Experiments:

1. Write a Program to Print "Hello World!" on the Console.
2. Write a Program to find the Sum of two numbers entered by the user.
3. Write a Program to Swap the values of two variables.
4. Write a Program to calculate Compound Interest.
5. Write a Program to check if the given number is Even or Odd.
6. Write a Program to find the largest number among three numbers.
7. Write a Program to make a simple calculator.
8. Write a Program to find the factorial of a given number.
9. Write a Program to Convert Binary to Decimal.
10. Write a Program to print the Fibonacci series using recursion.
11. Write a Program to Calculate the Sum of Natural Numbers using recursion.
12. Write a Program to find the maximum and minimum of an Array.
13. Write a Program to Reverse an Array.
14. Write a Program to rotate the array to the left.
15. Write a Program to remove duplicates from the Sorted array.
16. Write a Program to find the Transpose of a Matrix.
17. Write a Program to check if the given string is a palindrome string or not.
18. Write a program to print half-pyramid pattern.
19. Write a program to print Pascal's triangle pattern.
20. Write a program to sort an array of strings.
21. Write a program to sort an array of numbers.
22. Write a program to calculate the length of a string with space and without space using function.
23. Write a program to calculate the factorial of any number using recursive function.
24. Write a program to store information on students using structure.
25. Write a program to copy the contents of one file to another file.
26. Write a program to perform read/write operation on the file using file handling technique.

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	2	1	2	1	2	2	1
CO2	3	3	2	1	1	2	3	2
CO3	3	3	3	2	1	3	3	2
CO4	3	3	3	2	1	3	3	2

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication
2. M.T Somashekara, D.S Guru and K.S. Manjunatha: Problem solving with C, PHI publication.
3. E. Balagurusamy: Programming in ANSI C (TMH)

Reference Books:

1. V. Rajaraman: Programming in C (PHI – EEE)
2. S. ByronGottfried: Programming with C (TMH)
3. Kernighan & Ritche: The C Programming Language (PHI)
4. Yashwant Kanitkar: Let us C
5. P.B. Kottur: Programming in C (Sapna Book House)

B.Tech. CSE **Semester-I** **Batch: 2025-29**
Course Code: PHY101 **L-T-P: 3-0-1** **Credit: 4**

Course Title: Engineering Physics

Course Objectives:

1. Develop a solid understanding of fundamental principles in physics for engineering applications.
2. Enhance analytical and critical thinking abilities to solve complex engineering problems.
3. Gain practical experience in designing, conducting, and interpreting experiments.
4. Apply physics concepts to various engineering disciplines to innovate and improve technology.
5. Prepare for advanced study and research in engineering physics.

Course Outcomes:

Upon successful completion of the course, the student will be able to
CO1: Describe the optical devices and their applications.
CO2: Identify the applications of electrodynamics using Maxwell equations.
CO3: Apply concepts of Quantum mechanics in solving physics problems at nanoscale.
CO4: Understanding Electric Vehicles and their applications.

Unit	Course Outline	No. of Lectures
Unit-I	**Electrostatics and Electrodynamics:** Gauss's Law in dielectric medium, Equation of continuity, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem & Poynting vector.	**13**
Unit-II	**Fibers Optics and Photonics:** Optical Fiber, physical structure and basic theory, modes in optical fibers, step index and graded index fibers, losses in optical fibers, sources and sensors for optical fibers, applications of optical fibers in communication.	**10**
Unit-III	**Quantum Mechanics:** Need of quantum mechanics, Compton effect, Born's concept of wave function, Eigen function and Eigen values, operators in quantum mechanics, expectation values, time independent, time dependent. **Introduction to Quantum Computing:** Basics of Qubits, Quantum gates and Applications of quantum computing.	**12**
Unit-IV	**Electric Vehicle:** Need, Its types, Cost and Emissions. Batteries: Lead Acid Battery, Nickel based batteries, Sodium based batteries, Lithium based batteries – Li-ion & Li-poly, Battery plug-in and life, Ultra-capacitor, Charging – Methods and Standards. Alternate charging sources – Wireless & Solar	**10**
	Practicals:	**30**
	Total Theory+Practicals:	**45+30=75**

Total Hours for Practicals: 15 X 2
List of Experiments:

1. Experiment to measure electric flux through a surface in the presence of a dielectric material.

2. Demonstration using a simple circuit to show the conservation of charge.
3. Use of antennas to transmit and receive electromagnetic waves, measuring the speed of propagation.
4. Examination of the physical structure of optical fibers and calculation of numerical aperture.
5. Investigation of different light sources (LEDs, lasers) and sensors (photodiodes) used in optical fiber communication.
6. Setting up a simple optical fiber communication system to transmit and receive data.
7. Simulation or practical demonstration of the wave function and its probability interpretation.
8. Practical application of operators on wave functions and measurement of observable quantities.
9. Examination of different types of electric vehicles (EVs, HEVs, PHEVs) and their key components.
10. Case studies and analysis comparing the cost and emissions of electric vehicles to traditional vehicles.
11. Practical examination of various battery types (Lead Acid, Nickel-based, Sodium-based, Lithium-based) and their characteristics.
12. Practical setup of different charging methods (AC, DC) and understanding of relevant standards.
13. Experiment to measure attenuation and losses in optical fibers due to absorption, scattering, and bending.
14. Calculation of expectation values for different quantum mechanical observables.

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	2	2	2
CO2	3	2	2	2	1	3	2	1
CO3	3	3	2	2	1	2	3	3
CO4	2	2	3	2	1	2	2	3

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. Beiser, “Concepts of Modern Physics”, McGraw Hill, New Delhi, 6th Ed. (2002).
2. K S Krane, “Modern Physics”, John Wiely& Sons, Inc., 3rd Ed. (2011).
3. D. McIntyre, CA Manogue , J Tat, “ Quantum Mechanics”,Pearson,(2013).
4. William D. Calister, Jr. “Materials Science and Engineering” John Wiley and Sons.

Reference Books:

1. M. N. Avadhanulu and P. G. Kshirsagar, A Textbook of Engineering Physics by S. Chand.
2. P. S. Aithal and H. J. Ravindra,Textbook of Engineering Physics by Acme Learning Pvt. Ltd., New Delhi.
3. Kittle C,State Physics by John Wiley & Sons, 2005.

Web References:

1. https://youtu.be/qe_pQso6xyg?si=OsF4g3iQQKGBox-A
2. https://youtu.be/i1EI503LhFQ?si=ZDekGfJYyOxghusj
3. https://youtu.be/AwcV3eHHxss?si=2iK5LmT9NXjLzV5f

4. https://youtu.be/6WjEt8VRntY?si=xMv5w6X_mXkAybBM
5. https://youtu.be/zBi5ZJjjGl8?list=PL72ggpROIt5krh2lWIxRZb3RJl-X7ZxZl

B. Tech CSE **Sem: I** **Batch: 2025-29**

Course Code: EEE101 **LTP: 3-0-1** **Credit: 4**

Course Title: Fundamentals of Electrical and Electronics Engineering

Course Objectives:

1. This course aims to equip the students with a basic understanding of Electrical circuits and machines for specific types of applications.
2. The course gives a comprehensive exposure to house wiring.
3. This course also equips students with an ability to understand basic analog and digital electronics.

Course Outcomes:

CO1: Understand and apply basic laws of DC and AC circuits, including Ohm's Law, Kirchhoff's Laws, mesh and nodal analysis.
CO2: Analyze and apply theorems in electrical circuits and understand the construction, operation, and applications of DC and AC machines and transformers.
CO3: Understand semiconductor devices such as PN junction and Zener diodes and evaluate rectification circuits and power supply configurations.
CO4: Analyze and implement basic transistor circuits and digital logic systems, including number systems, Boolean algebra, and logic gates.

Unit	Course Content	No. of Lectures
Unit– I	DC & AC Circuits: Current, voltage, power, Kirchhoff's Laws - circuit elements R, L and C, Ohm's Law, KCL, KVL Mesh and Nodal Analysis.	**10**
Unit– II	Superposition, Thevenin's, Norton's, Reciprocity, Maximum Power Transfer Theorem, DC & AC Machines: DC Motor, Induction motor, Transformers- construction, principle of operation, types and applications.	**12**
Unit– III	Introduction to semiconductor diode, ideal diode, Characteristics of PN junction diode, drift & amp; diffusion currents, Zener diode characteristics, Rectifications of Half wave and full wave rectifier, Filters, Unregulated and regulated power supplies.	**12**
Unit- IV	Bipolar junction transistor: Introduction, Transistor, construction, transistor operations, BJT characteristics, load line, operating point. Digital Electronics: Introduction to numbers system, basic Boolean laws, reduction of Boolean expressions and implementation with logic gates.	**11**
	Practicals:	**30**
	Total Theory+Practicals:	**45+30=75**

Total Hours for Practicals: 15 X 2
List of Experiments:

1. To verify KCL and KVL.
2. To verify Thevenin's theorem.
3. To verify Norton's theorem.

4. Verification of Maximum power transfer theorem. 5. Verification of Reciprocity theorem. 6. To study waveforms using CRO. 7. To study the characteristics of forward biased PN junction Diode, reversed biased PN junction Diode. 8. To study half wave and full wave rectifier 9. To study Zener diodes as voltage regulators. 10. Verification of different logic gates

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	2	2	1
CO2	3	3	3	2	1	3	2	2
CO3	3	2	2	2	1	2	2	2
CO4	3	2	3	2	2	2	3	2

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. R.J. Smith, R.C. Dorf, 'Circuits Devices and Systems', 5th Edition, John Wiley and sons, 2001.
2. P. S. Dhogal, ' Basic Electrical Engineering – Vol. I & II', 42nd Reprint, Mc Graw Hill, 2012.

Reference Books:

1. Malvino, A. P., Leach D. P. and Gowtham Sha, 'Digital Principles and Applications', 6th Edition, Tata Mc Graw Hill, 2007.
2. Vincent Del Toro, 'Electrical Engineering Fundamental', Prentice Hall India, 2002.

Web References

1. https://youtu.be/eQNMh8h9wbA?si=csNVk-JTlDqZhEtw
2. https://youtu.be/DLQfxf-D9B8?si=HIht0Jc3hR9xl3wb
3. https://youtu.be/hXyBPj4lmok?si=uYozm6Qf8faZjeED
4. https://youtu.be/RSL7gGgBeG0?si=IJRqClg-xD7D3oTQ

B.Tech. CSE **Semester-I** **Batch: 2025-29**
Course Code: EVS301 **L-T-P: 3-0-0** **Credit: 3**

Course Title: Environmental Science

Course Objectives:

1. Understanding Ecosystems and Biodiversity
2. Comprehending Environmental Pollution and Control Measures
3. Learning Sustainable Development and Resource Management
4. Awareness of Environmental Policies and Legislation
5. Developing Skills for Environmental Impact Assessment and Management

Course Outcomes:

CO1: Understand and apply core concepts from ecological and physical sciences to solve environmental problems using scientific methods.
CO2: Analyze the global-to-local dynamics of environmental issues and evaluate transnational approaches to address them.
CO3: Critically reflect on their roles as individuals and citizens in the environmental context and assess human-environment interactions using systems thinking.
CO4: Apply interdisciplinary tools from natural and social sciences to work collaboratively, communicate effectively, and develop integrated solutions for complex environmental issues.

Unit	Course Content	No. of Lectures
Unit– I	**Humans and the Environment:** Definition, scope and importance. Multidisciplinary Nature. Environmental Ethics and Emergence of Environmentalism: Anthropocentric and ecocentric perspectives (major thinkers).	**7**
Unit– II	**Natural Resources and Sustainable Development: Water resources**- Use and over-utilization of surface and groundwater. Floods, droughts, conflicts over water, dams-benefits and problems. **Mineral resources-** Use and exploitation. Environmental effects of extracting and using mineral resources. **Energy resources-** Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. **Sustainable Development:** Chemistry approaches towards Environment Sustainability: Green Chemistry and Green Engineering. **Environmental Issues:** Local, Regional and Global **Solid waste:** Municipal and hazardous waste and its management. **Land use and Land cover change:** Land degradation, deforestation, desertification and urbanization. **Disasters:** Natural and Man-made (Anthropogenic)	**14**

Unit– III	**Conservation of Biodiversity and Ecosystems: Biodiversity and its distribution**: Biodiversity as a natural resource, biodiversity in India and world, biodiversity hotspots**.** **Major Ecosystem types in India and their basic characteristics:** General and brief introduction to different ecosystems (Forests, Wetlands, Grasslands, Agriculture, Coastal and Marine). **Major conservation policies:** in-situ and ex-situ conservation approaches Environmental Pollution and Health **Air pollution:** Adverse health impacts of air pollutants, National Ambient Air Quality Standards. **Water pollution:** Water quality parameters and standards, adverse health impacts of water pollution on human and aquatic life. **Soil pollution:** Impact on human health and ecosystems**.** **Noise pollution:** Noise standards and adverse impacts of noise on human health	**14**
Unit- IV	**Climate Change:** Impacts, Adaptation and Mitigation, Climate change, global warming, acid rain and ozone layer depletion. **Mitigation of climate change:** Green House Gas (GHG) reduction vs. sink enhancement, concept of carbon intensity, energy intensity and carbon neutrality, carbon capture and storage, National climate action plan and Intended Nationally Determined Contributions (INDCs) and climate justice. **Environmental Treaties and Legislation: General** and brief introduction to**:** The Water (Prevention and Control of Pollution) Act, 1974, The Forest (Conservation) Act, 1980, The Air (Prevention and Control of Pollution) Act, 1981, The Environment (Protection) Act, 1986, Noise Pollution (Regulation and Control) Rules, 2000, Industry-specific environmental standards, Waste management rules. **Case Studies and Field Work:** Discussion on one National and one international case study related to the environment and sustainable development, Participation in plantation drive and nature camps. Documentation of campus biodiversity, Campus environmental management activities such as solid waste disposal, water management and sanitation, and sewage treatment.	**10**
	Total Theory:	**45**

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	3	2	2	2	2	2	1
CO2	2	3	3	2	2	2	3	2
CO3	2	2	2	1	3	2	2	2
CO4	3	3	3	2	3	3	3	3

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. Headrick, Daniel R., "Humans versus Nature - A Global Environmental History", Oxford University Press,2020.
2. Benny Joseph, "Environmental Studies", 3rd Addition, McGraw Hill Education (India), Pvt. Ltd., 2018.
3. Anubha Kaushik, C.P. Kaushik, "Environmental Science", New Age International, Pvt. Ltd., 2011.
4. Reach Bharucha, "Environmental Studies", 2004.

Reference Books:

1. K. Sharma, "Environmental Chemistry", 2007.
2. V. K. Ahluwalia, "Green Chemistry", 2013.
3. N. E. Carpenter, "Chemistry of Sustainable Energy", CRC, 2014.
4. Kanchi Kohli and Manju Menon, "Development of Environment Laws in India", Cambridge University Press, 2021.

B.Tech. CSE **Semester-I** **Batch: 2025-29**

Course Code: HUM101 **L-T-P: 2-0-1** **Credit: 3**

Course Title: Communication Skills

Course Objectives:

1. Understand the principles of effective communication in professional settings, including verbal, non-verbal, and written communication.
2. Develop proficiency in conveying ideas, information, and messages clearly, concisely, and appropriately in diverse workplace scenarios.
3. Cultivate interpersonal skills necessary for building and maintaining professional relationships, including teamwork, collaboration, and conflict resolution.
4. Explore the role of technology and digital platforms in modern professional communication and develop proficiency in utilizing them effectively.

Course Outcomes:

Some of the course learning outcomes that students of this course are required to demonstrate runs thus:

CO1: To improve the communicative competence of the students.

CO2: To enable the students to converse in their life situations.

CO3: To train the students to use English for practical purposes.

CO4: To enable the students to acquire phonetic skills required for oral skills.

Unit	Course Content	No. of Lectures
Unit– I	**Communication:** Communication, Importance and Purpose of Communication, Types of Communication, Process of Communication, Strategies for Effective Communication, Barriers to Communication, Essentials of Good Communication.	**7**
Unit– II	**Listening:** Significance of Body Language in Communication, The Process of Listening, Barriers to Listening, Types of Listening, Strategies for Active Listening, Listening and Self Awareness, Shades of Meaning.	**8**
Unit– III	**Reading Skills:** Purpose, Process, Methodologies. Description and Articulation of English Speech Sounds, Syllables, and Stress, Accent and Voice Modulation.	**7**
Unit- IV	**Presentation Skills:** Structure of a presentation, Major Techniques of delivery, Public Speaking, Preparing the Speech, Special Occasion Speeches. Interviews, Types of Interviews, Most Common Interview Questions; Best Practices Before the Job Interview, Group Discussions.	**8**
	Practicals:	**30**
	Total Theory+Practicals:	**45+30=75**

Total Hours for Practicals: 15 X 2
List of Lab Manuals

1. **LISTENING & VIEWING:** Listening and note-taking – Listening to telephonic conversations – Ted talks – Inspiring Speeches – Watching documentaries on personalities, places, socio-cultural events, TV news programmes and discussions to answer different kinds of questions, viz., identifying key ideas and comprehension questions.
2. **SPEAKING:** Conversation practice, Interview, Group Discussion, Introducing oneself and others Role play, Debate, Presentation, Panel discussion, Neutral accent.
3. **READING:** Different genres of text (literature, media, technical) for comprehension Reading strategies like note-making, reading graphs, charts and graphic organizer, Sequencing sentences reading online sources like e-books, e-journals and e-newspapers.
4. **WRITING:** Blogs – Tweets – Online resume, emails, SMS and Online texting, Report writing, describing charts and tables, Writing for media on current events.

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	2	2	1	2	3	1	1	1
CO2	1	2	2	1	3	2	2	1
CO3	1	1	1	2	3	1	2	2
CO4	2	1	1	2	3	1	1	1

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. “Business Communication: Building Critical Skills" Authors: Kitty O. Locker and Stephen Kyo Kaczmarek.
2. "Business Communication Essentials" Authors: Courtland L. Bovee and John V. Thill.
3. "Excellence in Business Communication" Authors: John V. Thill and Courtland L. Bovee.

Reference Books:

1. S. Ravindranathan, R. Perumalsamy, S. Shanmugiah, "English for Effective Oral Communication, Emerald Publishers.
2. Barun K. Mitra, (2016). "Personality Development and Soft Skills". Oxford University Press. 3. KCVerma, "The Art of Communication", Kalpaz Publications, 2013
3. Rob Biesenbach, Unleash the Power of Storytelling, Eastlawn Media (February 13, 2018) ISBN-10: 0991081420

B.Tech. CSE	**Semester-I**	**Batch: 2025-29**
Course Code: CSL102	**L-T-P: 0-0-1**	**Credit: 1**
Course Title: IT Workshop		

Total Hours for Practicals: 15 X 1
List of Experiments:

Formatting, Installation process, booting process, IDE connector & Master/Slave Settings, SATA connector, Parallel Port & Serial Port, different types of connectors available in Power supplies.
ESD tools, Hand tools, cleaning tools, Diagnostic tools working & uses like digital multimeter, Disk Management Tools like FDISK, Disk Management Tool, Formatting, Installing the Drivers, System File Checker (SFC), Defrag & Disk Cleanup. Understanding SMPS & its various types & uses of AT and ATX SMPS, Motherboard, FDD, HDD, CD/DVD and add on cards installation & hands on practice.
Printer, scanner & Operating System Installation and Servicing and troubleshooting. Install and Configure Dual OS Installation.
Assembling and Disassembling of Laptop to identify the parts and to install OS and configuration updates like RAM, ROM, Chipsets, BIOS Setup Utility and Common TroubleShooting understanding. Protection Software Tools: Window Firewall, Antispyware program, Antivirus program, Windows/Unix Action Center.
Wireless access points, Wi-Fi LAN Cards, Working of LED Monitors & major types of keyboards technologies & their identifications.
Assignment for every individual student: Building and Assembling a Desktop PC: Market survey for latest price, configuration & building of individual machine & presentation by students & declared best student award to Value for money configuration machine.

B.Tech. CSE **Semester-II** **Batch: 2025-29**
Course Code: MATH102 **L-T-P: 3-1-0** **Credit: 4**

Course Title: Probability and Statistics

Course Objectives:

1. Understand Basic Probability Concepts: To introduce students to the fundamental concepts of probability and counting techniques.
2. Learn Discrete and Continuous Distributions: To familiarize students with various probability distributions and their properties.
3. Develop Statistical Inference Skills: To enable students to perform point estimation, construct confidence intervals, and conduct hypothesis testing.
4. Apply Regression and Correlation Analysis: To teach students how to apply regression and correlation methods in analyzing and interpreting data.

Course Outcomes:

CO1: Basic Probability Application: Students will be able to apply basic probability principles to solve real-world problems.
CO2: Distribution Analysis: Students will understand and utilize discrete and continuous probability distributions in various scenarios.
CO3: Inference Techniques: Students will demonstrate the ability to perform statistical inference, including estimation and hypothesis testing.
CO4: Data Analysis Proficiency: Students will be capable of conducting regression and correlation analyses to draw meaningful conclusions from data.

Unit	Course Outline	No. of Lectures
Unit-I	**Introduction to Probability:-** **Basic Concepts of Probability:** Definition of Probability, Sample Space and Events, Axioms of Probability, Conditional Probability, Independence of Events Counting Techniques: Permutations and Combinations, Binomial Coefficient	**16**
Unit-II	**Discrete and Continuous Distributions:-** **Discrete Distributions:** Binomial Distribution, Poisson Distribution, Geometric Distribution **Continuous Distributions:** Uniform Distribution, Normal Distribution, Exponential Distribution **Properties and Applications of Common Distributions**	**17**
Unit-III	**Statistical Inference:-** **Point Estimation:** Method of Moments, Maximum Likelihood Estimation (MLE) **Confidence Intervals:** Mean (Known and Unknown Variance), Proportion	**13**

	Hypothesis Testing: Null and Alternative Hypotheses, Type I and Type II Errors, p-Value, Tests for Means and Proportions	
Unit-IV	**Regression and Correlation:-** **Simple Linear Regression:** Assumptions, Least Squares Estimation, Inference in Linear Regression, Coefficient of Determination (R^2) **Multiple Linear Regression:** Model Building, Interpretation of Regression Coefficients, Model Diagnostics **Correlation:** Pearson Correlation Coefficient, Spearman Rank Correlation **Applications in Computer Science:** Application of Regression and Correlation in Machine Learning, Case Studies and Practical Examples	**14**
	Total Theory:	**60**

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	2	3	1
CO2	3	3	2	1	2	2	3	2
CO3	3	3	3	2	1	2	3	2
CO4	3	2	3	1	1	2	3	2

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. "Probability and Statistics for Engineers and Scientists" by Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying E. Ye
2. "Introduction to Probability and Statistics for Engineers and Scientists" by Sheldon M. Ross

Reference Books:

1. "Probability and Statistics with Reliability, Queuing, and Computer Science Applications" by Kishor S. Trivedi
2. "Schaum's Outline of Probability and Statistics" by Murray R. Spiegel, John Schiller, and R. Alu Srinivasan

B.Tech. CSE **Semester-II** **Batch: 2025-29**

Course Code: CSE103 **L-T-P: 3-0-1** **Credit: 4**

Course Title: Introduction to Python

Course Objectives:

1. Enhance the knowledge on basic principles of python.
2. Enhance the knowledge on functions and strings in python.
3. Acquire the knowledge on data structures in python.
4. Enable students to write simple object-oriented programming in python.
5. Understand the exception handling and modules.

Course Outcomes:

CO1: Understand the basic principles and foundational knowledge of Python programming, including syntax, variables, and control flow.
CO2: Apply Python functions, strings, and object-oriented programming concepts to solve computational problems.
CO3: Analyze built-in data structures such as lists, tuples, dictionaries, and sets to manage and manipulate data effectively.
CO4: Evaluate data handling techniques using file operations, modules, and libraries to build modular and reusable Python programs.

Unit	Course Outline	No. of Lectures
Unit-I	Introduction to Python, Python Features, Operators, Variables, **Computational Thinking and Problem-Solving**: Identification of Computational Problems - Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).	**10**
Unit-II	**Conditional Statements** - Boolean expressions - If/Else statement - Other Conditional Expressions, Iteration – Loops, Using Functions - Introduction to Using Functions - Functions and Modules, Exceptions -try, except, else, pass, raise. **Functions** - Function Basics - Parameter Passing - Custom Functions vs Standard Functions – Refactoring, Writing Functions -2 - Global Variables - Making Functions Reusable - Functions as Data, Objects - Using Objects -String, File Objects.	**12**
Unit-III	**Lists, Tuples, Dictionaries:** Lists - list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples - tuple assignment, tuple as a return value; Dictionaries - operations and methods; advanced list processing, list comprehension. Using Lists - Building Lists - List Traversal, Tuples, Dictionaries, and Sets - Storing Aggregate Data - Enumerating the Elements of a Data Structure.	**11**

Unit-IV	**Files, Modules, Packages:** Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages. **Object Oriented Programming:** Object, Define Class, Constructor, Methods in Python, Inheritance, Abstraction, Polymorphism. Exception Handling and Modules: Exception, Syntax errors, Runtime Errors, Module - Math Module, Creating Modules.	**12**
	Practicals:	**30**
	Total Theory+Practicals:	**45+30=75**

Total Hours for Practicals: 15 X 2

List of Experiments:

1. Exploring Python basics and setting up the development environment
2. Implementing basic Python programs for demonstrating the concepts of python data types, operators and different data structures e.g. find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.
3. Implement programs using expressions and statements e.g. exchange the values of two variables, circulate the values of n variables, distance between two points.
4. Implementing functions in Python and using inbuilt modules
5. Creating and importing user-defined modules in Python
6. Writing python programs for showing the use of anonymous and inner functions.
7. Develop programs using modular programming e.g. square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.
8. Design and implement programs using basic data structures e.g. simple sorting, histogram, Students marks statement, Retail bill preparation.
9. Data manipulation using Pandas library: Reading and writing data, manipulating data using various operations
10. Data handling using files: word count, copy file, Voter's age validation, Marks range validation (0 - 100)

COs	PO 1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	**3**	**3**	**1**	**1**	**2**	**3**	**3**	**1**
CO2	**3**	**3**	**3**	**2**	**1**	**3**	**3**	**2**
CO3	**3**	**2**	**2**	**2**	**1**	**3**	**3**	**2**
CO4	**3**	**2**	**3**	**3**	**1**	**3**	**3**	**3**

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. Python for Programmers, Paul Deitel and Harvey Deitel, Pearson Education, 1st Edition, 2021
2. Python Programming: An Introduction to Computer Science, 3/e, John M Zelle, Franklin Beedle, Independent Publishers, 2020

B. Tech CSE **Sem: II** **Batch: 2025-29**

Course Code: CSE104 **LTP: 3-0-0** **Credit: 3**

Course Title: Discrete Structure

Objectives

1. Understand fundamental concepts in discrete mathematics.
2. Apply discrete mathematical principles to problem-solving in computer science and related fields.
3. Develop logical reasoning and proof-writing skills.
4. Gain proficiency in discrete structures such as sets, relations, functions, and graphs.
5. Explore combinatorial techniques for counting and enumeration.
6. Study basic principles of formal logic and propositional calculus.
7. Introduce principles of probability theory and its applications in discrete scenarios.
8. Understand the significance of discrete mathematics in cryptography, algorithms, and computer science theory.

Course Outcomes:

CO1: Employing the basics of logics, set theory, functions and relations to solve real life mathematical problems.

CO2: Solve different mathematical problems using the concept of POSETs and Lattices.

CO3: Analyze different real life graphs problems and implement various solutions to solve them.

CO4: Evaluate algebraic structures to prove many mathematical problems.

Unit	Course Outline	No. of Lectures
Unit-I	**Propositional Logic:** Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers. **Set Theory:** Basics of set theory, Cartesian Product of Sets, Partition of Sets, Concept of Relation & Properties of Relations, Different types of Relations, Tabular and Matrix Representation of Relations, Relations and Diagraphs, Composition of Relations, Functions and their different mappings, Composition of Function, Recursion and Recurrence Relations.	**12**
Unit-II	**Posets, Hasse Diagram and Lattices:** Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. **Mathematical Logic:** Statement & Notations, connectives, Normal forms, Theory of inference for the statement calculus, Predicate calculus.	**11**
Unit-III	**Combinatorics & Graphs:** Recurrence Relation, generating function, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.	**11**

Unit-IV	**Algebraic Structures**: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, **Rings and Fields:** definition and standard results.	**11**
	Total Theory:	**45**

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	**3**	**3**	**2**	**1**	**1**	**3**	**3**	**1**
CO2	**3**	**3**	**2**	**1**	**2**	**3**	**3**	**2**
CO3	**3**	**3**	**3**	**2**	**1**	**3**	**3**	**2**
CO4	**3**	**3**	**3**	**2**	**1**	**3**	**3**	**3**

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. Rosen Kenneth and Krithivasan Kamala, Discrete Mathematics and its Applications, 8th edition, MC Graw Hill, July 2021.
2. Lipschutz Seymour and Lipson Marc and Patil Varsha, Discrete Mathematics (Schaum's outlines), revised 3rd edition, MC Graw Hill, July 2017.
3. Tremblay Jean-Paul and Manohar R, Discrete Mathematical Structures with Applications to Computer Science, MC Graw Hill, July 2017.

Reference Books:

1. Erciyes K., Discrete Mathematics and Graph Theory a concise study companion and guide, Springer, 2021.
2. Balakrishnan R. and Sridharan Sriraman, Discrete Mathematics Graph Algorithms, Algebraic Structures, Coding Theory, and Cryptography, CRC press, July 2019.

B. Tech CSE **Sem: II** **Batch: 2025-29**

Course Code: CSE105 **L-T-P: 3-0-2** **Credit: 5**

Course Title: Digital Circuits and Logic Design

Course Objectives:

1. Introduce students to the fundamental concepts of digital electronics, including binary number systems, Boolean algebra, logic gates, and basic digital circuit components.
2. Teach students how to design and analyze combinational logic circuits using Boolean algebra and truth tables. This includes the design of logic gates, multiplexers, decoders, encoders, and other combinational circuits.
3. Cover sequential logic circuits, including flip-flops, registers, counters, and sequential state machines. Students should learn how to design and analyze sequential circuits using state diagrams, state tables, and timing diagrams.

Course Outcomes:

CO1: Analyze the combinational systems using standard gates and minimization methods such as Boolean algebra, Karnaugh maps.

CO2: Design, simulate, built and debug combinational circuits based on an abstract functional specification.

CO3: Apply and design of various sequential circuits viz. Registers and Counters using flip-flops.

CO4: Understand Asynchronous Sequential Logic, programmable logic devices and different types of ROM.

Unit	Course Outline	No. of Lectures
Unit-I	**Fundamentals:** Number Systems, Logic Gates, Boolean Algebra. Gate – Level Minimization: The map method, Four-variable map, Five-Variable map, product of sums, sum of product, simplification Don't-care conditions, NAND and NOR implementation, other Two-level implementations, Ex-OR function, Hardware Description language (HDL).	**12**
Unit-II	**Combinational Logic:** Combinational Circuits, Analysis procedure Design procedure, Half and Full Adders, Subtractor, Decimal Adder, Binary multiplier, magnitude comparator, Decoder, Encoder, Multiplexer, Demultiplexer	**10**
Unit-III	**Synchronous Sequential Logic:** Sequential circuits, latches, Flip-Flops: SR flip-flop, D flip-flop, JK flip-flop, T flip-flop, Analysis of clocked sequential circuits: Design Procedure, State Reduction and Assignment. **Registers and Counters:** Registers, shift Registers, Ripple counters synchronous counters, other counters.	**11**

Unit-IV	**Memory:** Introduction, Random-Access Memory, Memory Decoding, Error Detection and correction Read-only memory, Programmable logic Array programmable Array logic, Sequential Programmable Devices. **Asynchronous Sequential Logic:** Introduction, Analysis Procedure, Circuits with Latches, Design Procedure, Reduction of state and Flow Tables, Race-Free state Assignment Hazards, Design Example.	**12**
	Practicals:	**60**
	Total Theory+Practicals:	**45+60=105**

Total Hours for Practicals: 15 X 4
List of Experiments:

1. Verification of Truth Tables of Logic gates.
2. Implementation of Basic gates using Universal Gates.
3. Implementation of the given Boolean functions using logic gates.
4. Simplification of the given Boolean functions using K-map and implementation using logic gates.
5. Realization and verification of Full adder and Full Subtractor using logic gates.
6. Implementation of 2x4 Decoder and 4x1 Multiplexer using Logic Gates.
7. Implementation of the given function using decoder and logic gates.
8. Implementation of the given function using Multiplexer.
9. Verification of State Tables of SR, D, JK and T-Flip-Flops.
10. Design and verify the operation of 3-bit Ripple Counters using JK flip-flops.

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO 2	PSO3
CO1	3	3	2	1	1	3	3	2
CO2	3	3	3	2	1	3	3	2
CO3	3	3	3	2	1	3	3	2
CO4	3	3	2	2	1	3	2	2

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks

1. M. Morris Mano, DIGITAL DESIGN – Third Edition , Pearson Education/PHI, 2013.
2. John F Wakerly, Digital Design Principles and Practices 4/e", Pearson Education, 2008

Reference Books:

1. Charles H. Roth, Jr. Fundamentals of logic design, 7th ed., Cengage Learning, New Delhi, 20135.
2. Balakrishnan R. and Sridharan Sriraman, Discrete Mathematics Graph Algorithms, Algebraic Structures, Coding Theory, and Cryptography, CRC press, July 2019.

B.Tech. CSE **Semester-II** **Batch: 2025-29**

Course Code: HUM102 **L-T-P: 3-0-0** **Credit: 3**

Course Title: Indian Constitutional Values

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them to learn the following:

1. Understand the theme of management and its organizational significance.
2. Identify general and task environmental factors.
3. Analyze organizational adaptation to environmental changes.
4. Develop and execute organizational plans.
5. Organize vertical structures and coordinate horizontally.
6. Understand citizenship, fundamental rights, and duties.
7. Examine the roles of executive, legislature, and judiciary.

Course Outcomes:

After completing this course students will be able to

CO1: Assess the business environment that will influence the management of the organizations.

CO2: Establish most effective actions in specific contexts while maintaining ethical standards.

CO3: Execute different management functions individually as well as a team player under challenging circumstances.

CO4: Infuse core constitutional values.

Unit	Course Outline	No. of Lectures
Unit-I	**Introduction to Indian Constitution:** The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution	**11**
Unit-II	**FR's, FD's and DPSP's:** Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building.	**12**
Unit-III	**Union Executive :** Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.	**10**
Unit-IV	**State Executive & Elections, Amendments and Emergency Provisions:** State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (How and Why) and Important Constitutional Amendments till today. Emergency Provisions.	**12**
	Total Theory:	**45**

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	3	2	2	1	1	2	2	1
CO2	2	3	2	1	2	2	2	1
CO3	3	2	3	2	2	3	2	1
CO4	2	2	2	1	2	2	2	2

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna publishers, 42nd edition, 2013.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, 2013

Reference Books:

1. Harold Koontz, Heinz Weihrich and Mark V. Cannice, Essentials of Management: An International Perspective, New Delhi, McGraw-Hill, 2020.
2. Stephen P Robbins, Mary Coulter, David De Cenzo, Fundamentals of Management, New Delhi, Pearson 9th Ed, 2016.
3. Richard L Daft, Management, 20th Ed, Cengage Learning.

B. Tech CSE **Sem: II** **Batch: 2025-29**

Course Code: EDU101 **LTP: 3-0-0** **Credit: 3**

Course Title: Human Values and Professional Ethics

Course Objectives:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Outcomes:

CO1: Demonstrate enhanced ethical awareness and sound decision-making skills in personal and professional contexts.
CO2: Exhibit integrity, respect for diversity, and a strong sense of social responsibility and professionalism.
CO3: Apply leadership and conflict resolution skills effectively in team-based and multicultural environments.
CO4: Commit to continuous learning and uphold ethical standards throughout their professional journey.

Unit	Course Outline	No. of Lectures
Unit-I	**Introduction to Ethics:** Definition of Ethics, Personal Ethics, Professional Ethics, Difference between Ethics, Values, and Morals. Ethics and Human Interface: Essence, Determinants and Consequences of Ethics in - Human Actions; Dimensions of Ethics; Types of Ethics; Ethics - in Private and Public Relationships. Human Values- Lessons from the Lives and Teachings of Great Reformers and Behaviorists; Role of Family Society and Educational Institutions in Inculcating Values	**12**
Unit-II	**Theories of Ethics:** Normative theories, Psychological Egoism, Utilitarianism, Kant‘s Social Contract theory, Stakeholder theory, Stockholder theory, Gandhi‘s Trusteeship theory; Forsyth‘s Taxonomy of Ethical Ideologies; Kohlberg‘s Model of Cognitive Moral Development; Piaget theory of moral development, Need for developing an Industry-wide Code of Ethics: Inclusive and Accountable Industry, Transparent Standards, Fair competition, Equal Opportunity Employer, Health Safety and Environment, Conflict of Interest.	**10**

Unit-III	**Ethics & Emotional Intelligence:** Emotional Intelligence: Concepts, and their Utilities and Application in Administration and Industry. Ethics, Metacognition & Mindfulness. Ethics, Corporate social responsibility & Consumer protection. **Environmental Ethics:** Role of Industry in Environmental Management, India's Environmental Policies, ISO 14000family; Behavioral ethical issues in areas like Discrimination, Privacy, Recruitment & Selection, Electronic surveillance, Health & Safety, Performance appraisals. Role of Human relation approach in Ethical Industry and Life Skills.	**12**
Unit-IV	**Ethical Decision Making & Mindfulness:** Attitude: Content, Structure, Function; its Influence and Relation with Thought and Behavior; Attribution theory; Ethics and Attitudes; Social Influence and Persuasion. Ethical Decision- making Virtue and common good approach; Influence of Ethical Decision Making: Personal Values and Ethical Decision making, Trustworthiness, Respect, Responsibility, Fairness, Integrity, Caring, Citizenship and Fundamental Duties and Directive Principles in India.	**11**
	Total Theory	**45**

COs	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3
CO1	**2**	**1**	**2**	**1**	**2**	**2**	**1**	**1**
CO2	**2**	**2**	**2**	**1**	**2**	**2**	**1**	**2**
CO3	**1**	**2**	**2**	**2**	**2**	**1**	**2**	**2**
CO4	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**2**

1: Weak Correlation, 2: Moderate Correlation; 3: Strong Correlation

Textbooks:

2. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
3. A.N. Tripathy, 2003, Human Values, New Age International Publishers.