SEMESTER I

Problem Solving Using C			
Course Code:	**CS101**	**Course Credits:**	**3**
Course Category:	**PCC1**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**1U**
No. of Lectures + Tutorials (Hrs/Week):	**03 + 00**	**Mid Sem. Exam Hours:**	**1.5**
Total No. of Lectures (L + T):	**45**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1. To provide knowledge of primary and derived data types used in C
2. To make them understand basic conditional and break statements used in C
3. To provide a basic understanding of pointers and pointers arithmetic
4. To enable the students to explore how pre-defined functions are used and also created in a program
5. Learn the difference between static and dynamic memory allocation methods and also learn various dynamic memory allocation methods.

COURSE OUTCOMES
At the end of the course the students should be able to:
1. Understand the basic building blocks of C language like tokens, identifiers, constants and variables.
2. Acquire knowledge of various conditional and loop statements
3. Judge which data structure to use among arrays, struct and union depending on the application
4. Use pointers and tell the difference between call by value and call by reference.
5. Use dynamic memory allocation to create arrays, structures and union and also perform various operations on them.

UNIT I INTRODUCTION TO COMPUTER AND PROGRAMMING CONCEPTS

Definition, characteristic, generation of computers, basic components of a computer system, memory, input, output and storage units, high level language and low-level language, Soft- ware: system software, application software, hardware, firmware, Operating System, compiler, interpreter and assembler, linker, loader, debugger, IDE. Introduction to algorithm and flowchart; representation of algorithm using flowchart symbol, pseudo code, basic algorithm de- sign, characteristics of good algorithm, development of algorithm.

UNIT II INTRODUCTION TO C PROGRAMMING LANGUAGE

Introduction to C programming language, declaring variables, preprocessor statements, arithmetic operators, programming style, keyboard input, relational operators, introduction, feature of C language, concepts, uses, basic program structure, simple data types, variables, constants, operators, comments, control flow statement: if, while, for, do-while, switch.

UNIT III DATA TYPES AND STRUCTURES

bitwise operators, Predefined and User defined data types, arrays, declaration and operations on arrays, searching and sorting on arrays, types of sorting, 2D arrays, passing 2D arrays to functions, structure, member accessing, structure and union, array of structures, functions, declaration and use of functions, parameter passing, recursion.

UNIT IV FUNDAMENTALS OF POINTERS

Introduction to pointers, pointer notations in C, Declaration and usages of pointers, operations that can be performed on computers, use of pointers in programming exercises, parameter passing in pointers, call by value, call by references, array and characters using pointers, dynamic memory allocation

UNIT V FILE HANDLING IN C AND ENUM

Introduction to file handling, file operations in C, defining and opening in file, reading a file, closing a file, input output operations on file, counting: characters, tabs, spaces, file opening modes, error handling in input/output operations, Enumerated data types, use of Enum, declaration of Enum.

Text Books:

1. **Herbert Schildt**, *C: The Complete Reference*, McGraw Hill Education, Latest Edition.
2. **Brian W. Kernighan and Dennis M. Ritchie**, *The C Programming Language* (2nd Edition), Pearson Education, 1988.
3. **E. Balagurusamy**, *Programming in ANSI C*, Tata McGraw Hill Education, Latest Edition.
4. **Alan R. Feuer**, *The C Puzzle Book: Puzzles for the C Programming Language*, Prentice Hall, 1982.
5. **Peter Van Der Linden**, *Expert C Programming: Deep C Secrets*, Dorling Kindersley (India), Latest Edition.

Electronics and Electrical Engineering			
Course Code:	ICT01	Course Credits:	4
Course Category:	ESC1	Course (U / P)	U
Course Year (U / P):	1U	Course Semester (U / P):	1 U
No. of Lectures + Tutorials (Hrs/Week):	03 + 01	Mid Sem. Exam Hours:	1.5
Total No. of Lectures (L + T):	45 + 15	End Sem. Exam Hours:	3

COURSE OBJECTIVES
1. To equip students with foundational knowledge of electrical laws and circuit theorems for analysing and designing resistive and reactive networks under DC and AC conditions.
2. To introduce key concepts of electromechanical energy conversion and guide learners in understanding the operation, characteristics, and industrial applications of electrical machines and systems.
3 To develop conceptual clarity on semiconductor materials, doping mechanisms, and PN junction behaviour to support deeper engagement with device-level electronics.
4 To enable students to apply diode properties in designing circuits for signal processing, rectification, and voltage control, integrating theoretical knowledge with practical implementation.
5 To empower learners with the analytical skills to assess and optimize the performance of BJTs, MOSFETs, and Op-Amps in amplifier and feedback configurations within electronic systems.
COURSE OUTCOMES
At the end of the course the students should be able to:
1 Apply core electrical laws and theorems to analyze and design DC and AC circuits.
2 Interpret the principles and performance characteristics of electrical machines and power systems, including transformers, motors, and generators.
3 Demonstrate understanding of semiconductor physics including carrier movement, doping, and PN junction behaviour.
4 Design and evaluate diode-based circuits for signal conditioning, rectification, and voltage regulation.
5 Analyse advanced semiconductor devices such as BJTs, MOSFETs, and Op-Amps in various amplifier configurations and control systems.

Unit I: Fundamentals of Electrical Engineering (Core Concepts & Circuits)

Basics of Charge, Current, Voltage, Power, Energy& Efficiency, Ohm's Law: Practical Relevance & Limitations, Kirchhoff's Laws (KCL & KVL): Network Solving Techniques, Superposition, Thevenin, Norton, and Maximum Power Transfer Theorems.

Unit II: AC Circuits, Power Systems & Electrical Machines

Sinusoidal AC Signals – Representation and Properties (RMS, Average, Peak Values, Form Factor); Introduction to Single-phase and Three-phase Systems, Power Calculation: Active, Reactive, Apparent Power, Phase Angle, Power Factor and its Improvement Techniques; Transformers: Construction, EMF Equation, Efficiency, Applications; Introduction to Electrical Machines: DC (series and shunt) and AC Machines (single phase &3 phase induction motor, synchronous generator).

Unit III: Basic Semiconductor Electronics

Metals, Insulators and Semiconductor materials, Intrinsic and Extrinsic Semiconductors, Doping, Mobility, Drift Current and Diffusion Current, Current conduction in Semiconductors.

P-N Junction diode, Characteristics and its operation, P-N Junction resistances and capacitances (depletion and diffusion), Breakdowns in PN junction diodes.

Unit IV: Diode Applications

Clipping and clamping circuits, Rectifier circuits, Zener diode, Zener diode as voltage regulators, voltage multipliers, switching behaviour of P-N diode. Tunnel Diodes, Varactor Diode, Light Emitting Diode.

Unit V: Semiconductor Devices

Bipolar junction transistor (BJT): Introduction and types, construction, and characteristics in CB, CE & CC mode.

Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Introduction and types, construction, input and transfer characteristics.

Operational Amplifiers (Op-Amps): Op-Amp, Practical Op-Amp, Open loop and closed loop configurations, Applications of Op-Amps as inverting and non-inverting amplifier.

Text Books:

1. P.V. Prasad, S.Sivanagaraju, "Electrical Engineering: Concepts and Applications," Cengage,
2. 2018.
3. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw-Hill, 2010.
4. Robert L. Boylestad / Louis Nashelsky, "Electronic Devices and Circuit Theory", Pearson
5. Education.
6. George Kennedy, "Electronic Communication Systems", McGraw-Hill Publication.
7. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
8. V. D. Toro, "Electrical Engineering Fundamentals", Pearson India, 1989.
9. David A. Bell, "Electronic Devices and Circuits", Oxford University Press.
10. Jacob Millman, C.C. Halkias, StayabrataJit, "Electronic Devices and Circuits", McGraw-Hill.

Engineering Physics			
Course Code:	PH102	Course Credits:	4
Course Category:	BSC5	Course (U / P)	U
Course Year (U / P):	1U	Course Semester (U / P):	2U
No. of Lectures + Tutorials (Hrs/Week):	03 + 01	Mid Sem. Exam Hours:	1.5
Total No. of Lectures (L + T):	45 + 15	End Sem. Exam Hours:	3

Module I: Optics Interference: Coherent sources; Conditions for interference; Division of wavefront: Young's double-slit experiment, Fresnel's bi-prism; Division of amplitude: Uniform and wedge-shaped films; Newton's rings method **Diffraction:** Difference between interference and diffraction; Fresnel and Fraunhofer diffractions; Fraunhofer diffraction by single slit and double slit; Diffraction grating and Resolving power. **Polarization:** Polarization of light: Brewster's law and Malus law; Concept of double refraction by uni-axial crystals; Polariods; Nicol prism; Quarter and half wave plate.

Module II: Electromagnetic (EM) Theory: Vector algebra; Coordinate systems, Gauss divergence theorem, Stokes theorem; Maxwell's equations: EM wave equations in differential and integral forms; Transverse nature and speed of EM waves; EM energy density and Poynting vector.

Module III: Relativity: Frame of reference; Special theory of relativity; Lorentz transformation; Length contraction and time dilation; Twin paradox; Doppler's effect; Mass and energy equivalence; Massless particles.

Module IV: Quantum Mechanics: Origin of quantum theory; Photo-electric effect; Compton Effect; Dual nature of light; de-Broglie waves; Davisson Germer experiment; Phase and group velocities; Uncertainty principle; Quantum mechanical wave function; Schrodinger wave equation; Particle in a box (1D); Tunnel effect (Qualitative).

Module V: Solid State Physics: Brief discussion of solids, Crystals, and bonds; Band theory of solids; X-ray diffraction (Bragg's law). **Lasers:** Introduction to Laser (He-Ne laser and Ruby laser) **Nanotechnology:** Properties of nanoparticles; Carbon nanotubes; Applications.

Text Books:

1. H. K. Malik & A. K. Singh, Engineering Physics, Tata McGraw Hill Education Pvt. Ltd.
2. Satya Prakash & V. Saluja, Engineering Physics, Pragati Prakashan.
3. D. J. Griffiths, Introduction to Electrodynamics, PHI Learning Pvt. Ltd.
4. Arthur Beiser, Concepts of Modern Physics, Tata McGraw-Hill Edition.
5. G. Aruldhas, Engineering Physics, PHI Learning Pvt. Ltd.
6. Halliday and Resnick's, Principles of Physics, Wiley.

Applied Mathematics-I			
Course Code:	MA111	Course Credits:	4
Course Category:	BSC1	Course (U / P)	U
Course Year (U / P):	1U	Course Semester (U / P):	1U
No. of Lectures + Tutorials (Hrs/Week):	03 + 01	Mid Sem. Exam Hours:	1.5
Total No. of Lectures (L + T):	45 + 15	End Sem. Exam Hours:	3

UNIT I: Elementary transformations, linear dependence and independence of vectors, rank of a matrix (echelon & normal form), inverse of a matrix by elementary operations; solution of non-homogeneous and homogeneous systems of linear equations.

UNIT II: Linear transformations; eigenvalues and eigenvectors, diagonalization of a matrix; Cayley-Hamilton's theorem (without proof) and its applications.

UNIT III: Successive differentiation, Leibnitz theorem; functions of several variables: limits, continuity and differentiability, partial differentiation; Euler's Theorem for homogeneous functions; composite functions, total derivatives, change of variables; Taylor's and Maclaurin's Series; maxima and minima of functions of two variables.

UNIT IV: Double integration in cartesian and polar coordinates; evaluation of double integrals by substitution and changing the order of integration; triple integral; applications of multiple integrals to find area as double integral, volume as triple integral and surface area.

Text Books:

1. Jain R. K. and Iyengar S. R. K., "Advanced Engineering Mathematics", 5th Edition, Narosa Publishing House Pvt. Ltd. 2016.
2. Kreyszig E., "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons, 2010.
3. Greenberg M., "Advanced Engineering Mathematics", 2nd Edition, Pearson Education, 1998.
4. Thomas, G. B., Weir, M. D., & Hass, J. (2018). Thomas' calculus: Multivariable (14th ed.). Pearson.
5. Apostol, T. M. (1969). Calculus, Volume II: Multi-variable calculus and linear algebra, with applications to differential equations and probability (2nd ed.). John Wiley & Sons.

Engineering Physics Lab			
Course Code:	**PH104**	**Course Credits:**	**1**
Course Category:	**LC4**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**2U**
No. of Labs (Hrs/Week):	**1 (2 HRS)**	**Mid Sem. Exam Hours:**	
Total No. of Labs:	**10**	**End Sem. Exam Hours:**	**3**

List of Experiments

1. Measurement of basic constants: Length, Weight & Time.
2. To Study of force acting on a current carrying conductor in a magnetic field and verify the Lorentz force F = ILB Sin Θ
3. To study the magnetic field variation of paired coils in a Helmholtz arrangement.
4. To study Interference and diffraction of Light using slits.
5. To calculate the wavelength of sodium light using Fresnel's Bi-prism.
6. To study the interference of light by Fresnel's Bi-prism and find the fringe width. (using laser source)
7. To determine the wavelength of sodium light by Newton's Rings.
8. To determine the Cauchy's constants using Prism and Spectrometer.
9. To find wavelength of Mercury light source by using Plane Transmission Diffraction Grating.
10. To study the Polarization of light and verify Malus's Law.
11. Study of Photoelectric effect and calculation of Planck's Constant.
12. To determine the energy band gap of a given semiconductor material using four Probe method.
13. To find the e/m ratio of electron by Thomson's method.
14. To determine the fill factor of Solar Cell.
15. To determine the specific rotation of sugar using half shade polarimeter.
16. Study of Coupled Pendulum.

ICT Workshop I			
Course Code:	**ICT81**	**Course Credits:**	**1**
Course Category:	**ESC2**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**1U**
No. of Labs (Hrs/Week):	**1(2hrs)**	**Mid Sem. Exam Hours:**	
End Sem. Exam Hours:3			

COURSE OBJECTIVES
1. Enable students to apply the Design Thinking methodology—empathy, ideation, prototyping, and testing—to real-world challenges, with a focus on customer-centric solutions for digital technology and smart systems.
2. Cultivate students' ability to think critically and analytically by identifying barriers to effective problem solving, recognizing the human factors influencing decisions, and evaluating arguments using logic and evidence-based reasoning.
3. Encourage students to explore and utilize open-source and freeware tools in CAD, circuit design, programming, and embedded systems via DIY projects, fostering hands-on innovation and real-life application of Engineering skills.
COURSE OUTCOMES
I: At the end of the course the students should have understood and should be able to apply their learned knowledge in real life applications.
2: Identify common obstacles to effective problem solving and decision making and recognize the human variable M problem solving and decision making.
3: Apply concepts to enhancing personal development and organizational performance and explain the key elements of problem solving and decision making, and the barriers associated with them

In today's increasing complexity of digital technology and modem business, customers am increasingly choosing products and services based on the quality of the experiences they have w. them. To help meet these challenges, an approach known as "Design Thinking, playing a great role in finding meaningful pathways - its process and tools arc increasingly being adopted in Lean Six Sigma processes and in organizational innovation initiatives. Design thinking is a human-centered, iterative problem-solving process of discovery, ideation, and experimentation that employs various design-based techniques to gain insight and yield innovative solutions for virtually any type of organizational or business challenge. A Design Thinking mindset is essential for development of Internet of Things (AT) platform, smart products, and Smart Cities. Industry practitioners of Design Thinking include Apple, Google, Samsung, Libor, Airbnb, IDEO, Nike, Procter 8: Gamble, Singapore Airlines, DBS Bank to name a few.

In this action-oriented workshop-oriented course, students will work in teams (5.6), guided by a facilitator to experience a customer-centric approach A problem solving through re-imagination of the end-to-end customer experience journey. Students will develop skills such as ethnographers, visual thinkers, strategists, and storytellers through a hybrid of workshop discussions and activities. It covers building empathy through ethnographic research, generating ideas, prototyping, and testing new

concepts. The goal of this course is that students acquire Design Thinking skills. This is an experiential teaming course where students learn by doing. Nowadays, Design Thinking and its tools are used by product and industrial design firms to ideate products. It is also used to solve so-called "wicked problems" — problems for which neither question nor the answer is well defined. In addition, students are expected to sharpen their Critical Reasoning and problem-solving skills through an online MOOC on Courses & Critical reasoning is a methodology for using objective and evidence-(rased analysis for evaluation of statements and arguments. It also helps understand the fallacies and barriers that prevent reaching conclusions in a logical and cohesive manner.

Students are encouraged to explore by any Open-Source Software or Freeware software's related to (But not limited to) CAD (Computer-Aided Design), Circuit Design, PCB Design, Programming language, Robotics, Embedded System Development, Documentation) through (do-it-yourself) DIY projects.

List of Experiments:

1. To Understand the basic of computer architecture and organization
2. To Understand basic of Network Topologies
3. To Understand and discuss Open-source Embedded board Development and Working
4. To Understand and discuss different Sensors
5. To Understand the Spice/Circuit Software

Textbook:

Tim Browm Change by Design; Harper Collins (2009)

Problem Solving Using C Lab			
Course Code:	**CS183**	**Course Credits:**	**1**
Course Category:	**LC1**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**1U**
No. of Labs (Hrs/Week):	**1 (2 HRS)**	**Mid Sem. Exam Hours:**	
Total No. of Labs:	**10**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1. To introduce students to the basic knowledge of programming fundamentals of C language.
2. To impart writing skill of C programming to the students and solving problems.
3 To impart the concepts like looping, array, functions, pointers, file, structure.
4 Write programs to print output on the screen as well as in the files.
5 Apply all the concepts that have been covered in the theory course.
COURSE OUTCOMES
At the end of the course the students should be able to:
1 Recognize and understand the syntax and construction of C programming code
2 Able to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
3 Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures.
4 Students must be able to define union and enumeration user defined data types.
5 Develop confidence for self-education and ability for life-long learning needed for Computer language.

LIST OF EXPERIMENTS:

1. Write a C program to print your name, age, and address using basic I/O functions.
2. Write a program to perform arithmetic operations (addition, subtraction, multiplication, division, modulus) on two integers entered by the user.
3. Implement a program to check whether a given number is prime or not using if-else.
4. Write a program using a loop to print the factorial of a number.
5. Write a program to create a simple calculator using switch-case.
6. Use nested for loops to display a multiplication table up to 10x10.
7. Write a C program to add two 3x3 matrices and display the result.
8. Define a structure for student (roll, name, marks) and write a program to accept and display data for 5 students.
9. Write a function to calculate the average marks using structures and functions.
10. Use malloc() and free() to dynamically allocate memory for storing n integers and compute their sum.
11. Write a program to read a text file and count the number of characters, spaces, tabs, and lines.

Electronics and Electrical Engineering Lab			
Course Code:	ICT85	Course Credits:	1
Course Category:	LC2	Course (U / P)	U
Course Year (U / P):	1U	Course Semester (U / P):	1U
No. of Labs (Hrs/Week):	1 (2 HRS)	Mid Sem. Exam Hours:	
Total No. of Labs:	10	End Sem. Exam Hours:	3

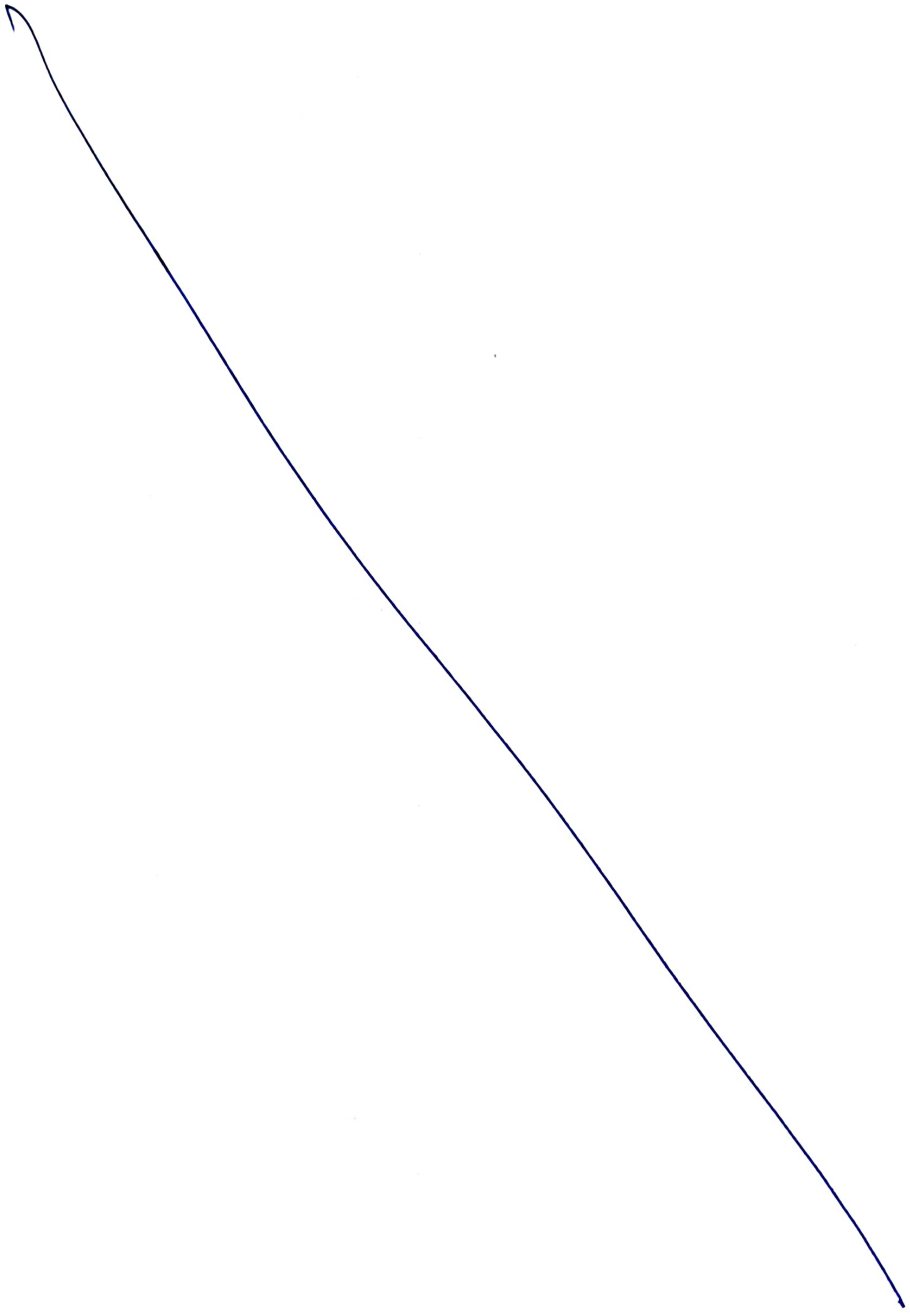
COURSE OBJECTIVES
1. Familiarize themselves with electronic lab instrumentation, such as CROs, multimeters, function generators, and power supplies.
2. Apply fundamental electrical principles to verify circuit laws and theorems through hands-on experiments.
3. Analyze and interpret behaviors of AC circuits, including resonance and power measurements in three-phase systems.
4. Explore semiconductor device characteristics, including diodes, transistors, and rectifiers, under various biasing conditions.
5. Implement analog circuit configurations using operational amplifiers for arithmetic operations and transistor configurations for amplification modes.

COURSE OUTCOMES
At the end of the course the students should be able to:
1. Demonstrate effective use of laboratory instruments (CRO, multimeter, function generator, power supply) and identify active/passive components for circuit analysis.
2. Verify foundational electrical theorems and laws such as KCL, KVL, and Thevenin's Theorem through experimental setups.
3. Analyze the resonance behavior of RLC circuits and measure relevant parameters, including resonance frequency and quality factor.
4. Examine diode-based circuits, including PN junction and Zener characteristics, and determine rectifier performance metrics (Vrms, Vdc, ripple factor).
5. Explore operational amplifier configurations and transistor characteristics in CB, CE, and CC modes to understand analog signal processing.

List of experiments:

1. Study of Lab Equipment and Components: CRO, Multi-meter, Function Generator, Power Supply; Active, Passive Components, and Bread Board.
2. Study and verify Kirchhoff's Current Law (KCL) and Krichoff's Voltage Law (KVL).
3. Study and verify Thevenin's Theorem.
4. Study and verify Resonance in series and parallel R-L-C series circuit, and measurement of resonance frequencies.
5. Measurement of power in 3- three-phase circuit by the two-wattmeter method and determination of its power factor for star as well as delta-connected loads.
6. Study the PN junction diode characteristics under Forward & Reverse bias conditions and determine the static and dynamic resistance.
7. Study the Half & Full wave rectifier circuit and determine: V_{dc}, V_{ac}, and ripple factor.
8. Study and plot the characteristics of a Zener diode and its breakdown voltage.
9. Study the applications of Operational Amplifier (LM741) as an Adder and a Subtractor.

10. Study and plot the input and output transistor characteristics in Common Base (CB), Common Emitter (CE), and Common Collector (CC) configurations.



	Career Skills		
Course Code:	**ICTV1**	**Course Credits:**	**2**
Course Category:	**VAC1**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**1U**
No. of Lectures + Tutorials (Hrs/Week):	**02 + 00**	**Mid Sem. Exam Hours:**	**1.5**
Total No. of Lectures (L + T):	**30**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1 To assess a student's overall cognitive ability.
2. Evaluating their capacity to learn, reason logically.
3 Solve problems across various domains.

COURSE OUTCOMES
At the end of the course the students should be able to:
1. Improved problem-solving skills.
2. Enhanced critical thinking abilities.
3. Better analytical skills.
4. Better decision-making under pressure.

UNIT I – Number System and Work Efficiency

Number System: Divisibility Rules, Remainder Theorem, Unit Digit, Series, Number of Factors, Simplification, LCM and HCF.

Time and Work: Efficiency, Ratio of Work Done, Work Done in Given Time, Combined Work of Multiple People, Individual Work Rates, and Problems Involving Days and Hours.

UNIT II – Time and Distance

Basic Concepts, Average Speed, Relative Speed, Time and Distance Conversions, Problems Involving Uniform Motion, and Different Scenarios like Trains Crossing Each Other or a Man Walking on a Moving Train.

UNIT III – Percentage, Profit & Loss, Interest

Percentage: Basic Percentage Calculations, Percentage Increase and Decrease, Finding Given Percentage of a Number, Percentage Relationship Between Two Numbers.

Profit and Loss: Cost Price, Selling Price, Marked Price, Profit Percentage, Loss Percentage, and Calculation of Profit or Loss.

Simple Interest: Calculating the Interest Earned on a Principal Amount at a Fixed Rate Over a Specific Period of Time, Understanding the Formula, Converting Time Units, Calculating Simple Interest, Finding the Principal Amount.

Compound Interest: Basic Formula, Different Compounding Frequencies, Comparison with Simple Interest.

UNIT IV – Logical and Analytical Reasoning

Number Series, Alphabet Series, Analogy and Classification, Blood Relations, Direction Sense, Coding-Decoding, Ranking and Order, Syllogisms, Puzzles (Seating Arrangement and Scheduling), Statement and Conclusion, Cause and Effect, and Data Sufficiency.

Text Books:

1. Magical Book on Quicker Maths by M. Tyra
2. Quantitative Aptitude for Competitive Examinations by R.S. Aggarwal
3. A Modern Approach to Logical Reasoning by R.S. Aggarwal
4. Advance Maths by Rakesh Yadav
5. SSC Elementary and Advanced Maths BY Kiran

SEMESTER II

Python Programming			
Course Code:	**AI 102**	**Course Credits:**	3
Course Category:	**PCC2**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**2U**
No. of Lectures + Tutorials (Hrs/Week):	**03 + 00**	**Mid Sem. Exam Hours:**	**1.5**
Total No. of Lectures (L + T):	**45**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1. Master the fundamentals of writing Python scripts.
2. Learn core Python scripting elements such as variables and flow control structures.
3. Discover how to work with lists and sequence data.
4. Write Python functions to facilitate code reuse.
5. Use Python to read and write files.
COURSE OUTCOMES
At the end of the course the students should be able to:
1. Problem solving and programming capability.
2. Explain basic principles of Python programming language
3. Implement database and GUI applications.
4. Implement object oriented concepts
5. Define and demonstrate the use of built-in data structures "lists" and "dictionary"

UNIT I PYTHON BASSICS, CONDITIONAL &LOOPS

Installation of Python and python Notebook, Python Objects, Number & Booleans, Strings,Container objects, Mutability of objects, Operators - Arithmetic, Bitwise, comparison andAssignment operators, Operators Precedence and associativity. Conditions (If else, if-elif-else), Loops (While ,for), Break and Continue statements, Range Functions.

UNIT II STRING OBJECTS AND LIST OBJECTS

String object basics, String methods, Splitting and Joining Strings, String format functions,list object basics, list methods, List as stack and Queues, List comprehensions,

UNIT III TUPLES, SET, DICTIONARIES & FUNCTIONS

Tuples, Sets, Dictionary Object basics, Dictionary Object methods, Dictionary View Objects.Functions basics, Parameter passing, Iterators, Generator functions, Lambda functions, Map,Reduce, filter functions.

UNIT IV OOPS CONCEPTS & WORKING WITH FILES

OOPS basic concepts, creating classes and Objects, Inheritance, Multiple Inheritance,working with files, Reading and writing files, Buffered read and write, Other File methods B.TechCSE(Artificial Intelligence) Effective.

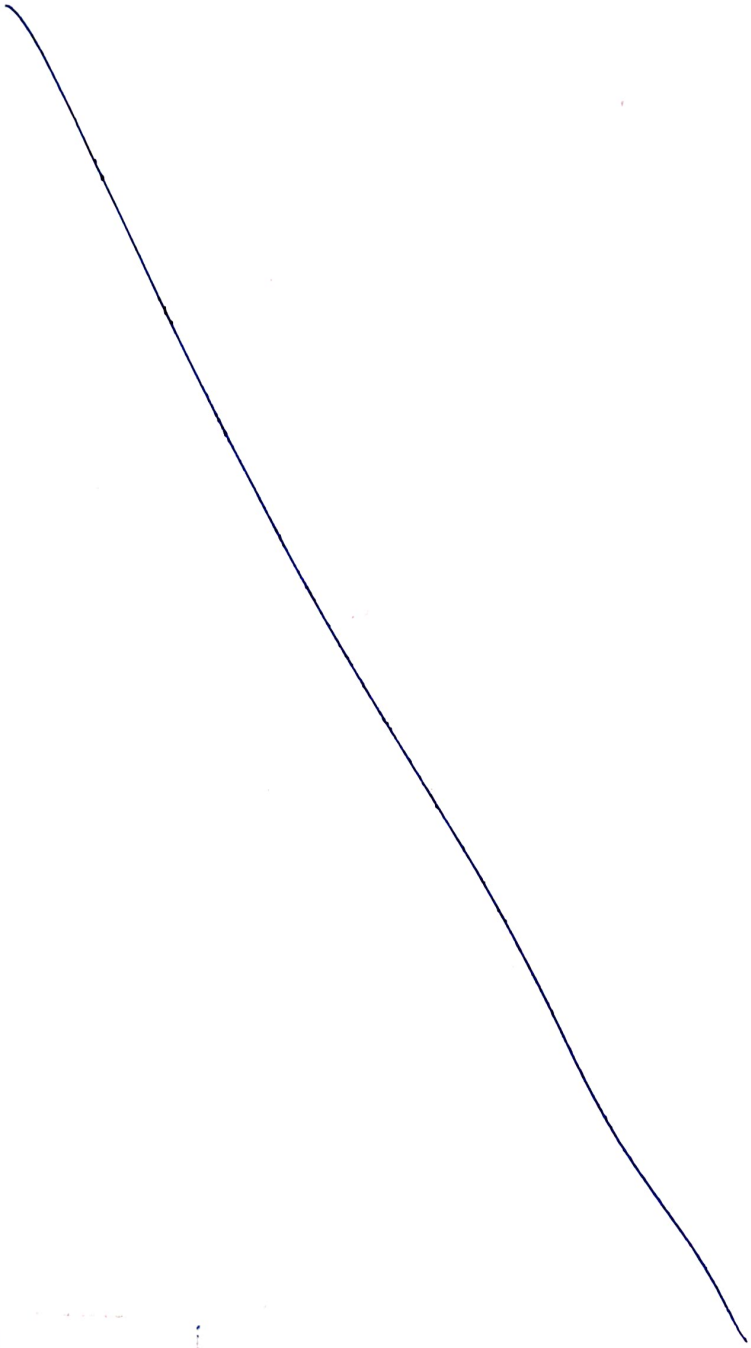
UNIT V MODULES, EXCEPTION HANDLING & DATABASE PROGRAMMING

Using Standard Module, Creating new modules, Exceptions Handling with Try-except,Creating, inserting and retrieving Table, Updating and deleting the data. Data Analysis-Numpy variable, Numpy manipulation, Skippy, Pandas intro. Descriptive analysis, PandasInput-output, Pandas manipulation, Pandas group by

Text Books:

1. Head First Python 2e: A Brain-Friendly Guide Paperback – Illustrated, 16 by Paul
2. Barry, Oreilly
3. Python: The Complete Reference Paperback – 20 March 2018 by Martin C. Brown
4. (Author), TMH Publication
5. Let Us Python by YashavantKanetkar , 1 January 2019, BPB publication

6. Python Programming, A modular approach , First Edition, By Pearson Publication by
7. Taneja Sheetal and Kumar Naveen , 26 September 2017



Applied Mathematics II			
Course Code:	**MA112**	**Course Credits:**	**4**
Course Category:	**BCS3**	**Course (U/ P)**	**U**
Course Year (U/ P):	**1U**	**Course Semester (U/ P):**	**2U**
No. of Lectures + Tutorials (Hrs/Week):	**03+01**	**Mid Sem. Exam Hours:**	**1.5**
Total No. of Lectures (L +T):	**45+15**	**End Sem. Exam Hours:**	**3**

UNIT I: Concept of probability, additive and multiplicative law of probability, total and conditional probabilities, Baye's theorem. Definition and properties of random variables, discrete and continuous random variables, probability mass and density functions, distribution functions.

UNIT II: Concepts of bi-variate random variables-Joint, marginal and conditional distributions. Transformations of one and two-dimensional random variables. Mathematical expectation-Definition and its properties. Variance, standard deviation, Covariance. Moment generating function- Definition and their properties.

UNIT III: Discrete distributions-Binomial, Poisson and geometric distributions with their properties. Continuous distributions- Uniform, Exponential and Normal distributions with their properties.

UNIT IV: Linear Correlation, Correlation Coefficient, Rank Correlation Coefficient, Regression. Central limit theorem.

Text Books:

1. Montgomery, Douglas C., and George C. Runger. "Applied Statistics and Probability for Engineers", Seventh Edition. John Wiley & Sons, 2018.
2. Sheldon Ross M., "Introduction to Probability and Statistics for Engineers and Scientists", Academic Press, 6thEdtion, 2020.
3. Devore, Jay L. "Probability and Statistics for Engineering and the Sciences", 8th Edition, Cengage, 2010.
4. Scheaffer, Richard, Madhuri Mulekar, and James McClave. "Probability and Statistics for Engineers". Nelson Education, 2010.
5. A. M. Mood, Graybill and Boes, "Introduction to the Theory of Statistics". McGraw Hill, 3rd edition.

Introduction to Artificial Intelligence			
Course Code:	AI104	Course Credits:	2
Course Category:	ESC3	Course (U / P)	U
Course Year (U / P):	1U	Course Semester (U / P):	2U
No. of Lectures + Tutorials (Hrs/Week):	02 + 00	Mid Sem. Exam Hours:	1.5
Total No. of Lectures (L + T):	30	End Sem. Exam Hours:	3

COURSE OBJECTIVES
1.Provide a strong foundation of fundamental concepts in Artificial Intelligence
2.Enable the student to apply these techniques in applications which involve perception, reasoning and learning
3.Provide a basic exposition to the goals and methods of Artificial Intelligence
4.Explain the role of agents and how it is related to environment and the way of evaluating it and how agents can act by establishing goals.
5.Learn the different machine learning techniques to design AI machine and enveloping applications for real world problems.
COURSE OUTCOMES
At the end of the course the students should be able to:
1.Understand the various searching techniques, constraint satisfaction problem and example problems- game playing techniques.
2. Apply these techniques in applications which involve perception, reasoning and learning
3.Acquire the knowledge of real world Knowledge representation
4.Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
5.To enable the student to apply these techniques in applications which involve perception, reasoning and learning

UNIT 1 Introduction

Introduction to AI, Components of AI, Goals of AI, Types of AI, History of AI, Turing Test in AI, Intelligence, Advantages and Disadvantages of AI, Intelligent System, Role of IS, Comparison of various IS, Weak and strong AI, Mind-Body Problem in AI, Chinese Room Experiment in AI, Parallel and Distributed AI.

UNIT 2 Agents in AI

Intelligent Agents, Types of Agents: Simple Reflex Agent, Model-based reflex agent, Goal-based agents, Utility-based agent, Learning agent, Structure of Agents, Agent Environment in AI, Examples of Agents, Knowledge Engineering, Knowledge Based System, Knowledge Engineering Techniques, Knowledge Engineering Principle, Knowledge Engineering Methodologies.

UNIT 3 Searching Techniques and AI Problems

Searching in AI, Search Algorithm terminology, Properties of Search Algorithm, Breadth First Search, Depth First Search, Best First Search, Tic-Tac-Toe problem, Water-Jug Problem, Chess Problem, Tower of Hanoi Problem, Travelling Salesperson Problems, Monkey and Banana Problem, Magic Square.

UNIT 4 Knowledge Representation

Knowledge Representation definition, Declarative knowledge, Procedural Knowledge, Meta knowledge,

Heuristic Knowledge, Structural knowledge, Inheritable Knowledge, Inferential Knowledge, Relational Knowledge, Explicit Knowledge, Tacit Knowledge, Uncertain Knowledge, Knowledge Storage, Relation between Knowledge and Intelligence, AI knowledge Cycle.

UNIT 5 AI Techniques and Applications

Introduction of Machine learning, Introduction of Deep Learning, Introduction to Expert system, Introduction to Natural Language Process, AI in future, AI in social media, AI in Entertainment and Education, AI in Drones, AI in Automated customer support, AI in Personalized shopping Experience, AI in Finance, AI in Smart cars, AI in Travel and Navigation, AI in Smart home Devices, AI in Security and Surveillance, AI in Education, AI in Health Care, AI in E-Commerce.

Reference Books:

Artificial Intelligence, Elanie Reich: Tata McGraw-Hill Publishing House, 2008.

1. Artificial Intelligence, Ela Kumar, IK Publishing.
2. Artificial intelligence, Peterson, Tata McGraw-Hill, 2008.
3. Artificial Intelligence, Russel and Norvig, Pearson Prentice Hall Publication, 2006.
4. Artificial Intelligence, Winston, PHI publication, 2006.
5. Artificial Intelligence – A Modern Approach (3rd Edition) By Stuart Russell & Peter Norvig 7. Artificial Intelligence: The Basics By Kevin Warwick

Discrete Mathematics			
Course Code:	**ICT06**	**Course Credits:**	**3**
Course Category:	**BSC4**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**2U**
No. of Lectures + Tutorials (Hrs/Week):	**03 + 00**	**Mid Sem. Exam Hours:**	**1.5**
Total No. of Lectures (L + T):	**45 + 00**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
2. Express a logic sentence in terms of predicates, quantifiers, and logical connectives
3. Apply the operations of sets and use Venn diagrams to solve applied problems; solve problems using the principle of inclusion-exclusion.
4. Determine the domain and range of a discrete or non-discrete function, graph functions, identify one-to-one functions, perform the composition of functions, find and/or graph the inverse of a function, and apply the properties of functions to application problems.
5. Apply rules of inference, tests for validity, proof by contradiction, proof by cases, and mathematical induction and write proofs using symbolic logic and Boolean Algebra.

COURSE OUTCOMES
At the end of the course the students should be able to:
1. Students will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives
2. Students will be able to apply the rules of inference, proof by contradiction, and mathematical induction
3. Students will be able to evaluate Boolean functions and simplify expressions using the properties of Boolean algebra
4. Students will be able to learn about predicates, quantifiers, and logical connectives
5. Student will be able to use tree and graph algorithms to solve problems

UNIT I MATHEMATICAL LOGICS

Statements and notations, connectives, well-formed formulas, truth tables, tautology, equivalence implication, normal forms, predicates: predicative logic, free & bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving, Boolean Algebra: Introduction, Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions. Simplification of Boolean Functions.

UNIT II SET THEORY

Set Theory: Introduction, Combination of sets, Multi sets, ordered pairs, Set Identities, Properties of binary relations, equivalence relation, compatibility and partial ordering relations, Hasse diagram. functions: definition, types of function, inverse function, lattice and its properties, algebraic structures, semi groups, monads, groups, sub groups" homomorphism, isomorphism.

UNIT III ELEMENTARY COMBINATORICS

Basis of counting, combinations & permutations, with repetitions, constrained repetitions, binomial coefficients, multinomial theorem, the principles of inclusion – exclusion, pigeon hole principles and it's application.

UNIT IV RECURRENCE RELATION

Generating functions, function of sequences calculating coefficient of generating function, recurrence relations, solving recurrence relation by substitution and generating funds, characteristics roots solution of in homogeneous recurrence relation.

UNIT V GRAPH THEORY

Graph theory and its applications, representation of graph (adjacency matrix and adjacency list), types of graphs, degree sequence of graph,Trees: Definition, Binary tree, spanning trees, planar graphs, bipartite graph, basic concepts isomorphism, multi graphs, euler graph and hamiltonian graph, chromatic numbers.

Text Books:

1. Discrete and Combinational Mathematics- An Applied Introduction-5th Edition Ralph. P.Grimaldi, Pearson Education
2. Discrete Mathematical Structures with applications to computer science Trembly J.P. & Manohar.P, TMH
3. Discrete Mathematics and its Applications, Kenneth H. Rosen, Fifth Edition.TMH.
4. Discrete Mathematical structures Theory and application-Malik & Sen
5. Discrete Mathematics for Computer science, Garry Haggard and others, Thomson.
6. Logic and Discrete Mathematics, Grass Man & Trembley, Person Education

Environmental Studies			
Course Code:	ES101	Course Credits:	4
Course Category:	BSC2	Course (U / P)	U
Course Year (U / P):	1U	Course Semester (U / P):	1U
No. of Lectures + Tutorials (Hrs/Week):	03 + 01	Mid Sem. Exam Hours:	1.5
Total No. of Lectures (L + T):	45 + 15	End Sem. Exam Hours:	3

COURSE OBJECTIVE

To impart knowledge on environment and environmental issues and challenges of local, national and global significance for achieving environmental security and sustainable living

COURSE OUTCOME

To knowledge and awareness so generated will enhance ability of the learners for conservation of environment and natural resources for a healthy planet Earth, and happy living of the present and future generations.

Unit 1 : Introduction to Environmental Studies (2 lectures)

- Multidisciplinary nature of environmental studies; components of the Earth's environment- atmosphere, hydrosphere, lithosphere and biosphere
- Scope and importance; Concept of sustainability and sustainable development

Unit 2 : Ecosystems (6 lectures)

- What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems:
  - **a)** Forest ecosystem
  - **b)** Grassland ecosystem
  - **c)** Desert ecosystem
  - **d)** Aquatic ecosystems (pond, stream, lake, river, ocean, estuary)

Unit 3 : Natural Resources : Renewable and Non--renewable Resources (8 lectures)

- Land resources and land-use changes; Land degradation, soil erosion and desertification
- Deforestation: Causes and impacts due to mining and dam building on environment, forest, biodiversity and tribal population
- Water : Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international and inter-state)
- Heating of Earth and circulation of air; air mass formation and precipitation
- Energy resources: Renewable and non-renewable energy resources, use of alternate energy sources, growing energy needs, case studies

Unit 4 : Biodiversity and Conservation (8 lectures)

- Levels of biological diversity : genetic, species and ecosystem diversity; Bio-geographic zones of India; Biodiversity patterns and global biodiversity hot spots

- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: Habitat loss, poaching of wildlife, human-wildlife conflicts, biological invasion; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value

Unit 5 : Environmental Pollution (8 lectures)

- Environmental pollution : Types, causes, effects and control; Air, water, soil and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial wastes
- Pollution-related case studies

Unit 6 : Environmental Policies and Practices (7 lectures)

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture
- Environment Laws: Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and Control of Pollution) Act; Wildlife (Protection) Act; Forest (Conservation) Act; International agreements: Montreal and Kyoto protocols, and Convention on Biological Diversity (CBD)
- Nature reserves, tribal population and rights and human-wildlife conflicts in Indian context

Unit 7 : Human Communities and the Environment (6 lectures)

- Human population growth: Impacts on environment, human health and welfare, Carbon foot print
- Resettlement and rehabilitation of project-affected persons; case studies
- Disaster management : Floods, earthquakes, cyclones and landslides
- Environmental movements : Chipko, Silent valley, Bishnois of Rajasthan
- Environmental ethics: Role of Indian and other religions and cultures in environmental
- conservation
- Environmental communication and public awareness, case studies (e.g.,CNG vehicles in Delhi)

Unit 8 : Field Work (Equal to 5 lectures)

- Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc.
- Visit to a local polluted site--Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds and basic principles of identification
- Study of simple ecosystems--pond, river, Delhi Ridge, etc.

Text Books:

1. Carson, R., 2002, Silent Spring, Houghton Mifflin Harcourt, Boston.
2. Gadgil, M., and Guha, R. 1993. This Fissured Land: An Ecological History of India, University California Press, California.

3. Gleeson, B. and Low, N. (Eds.) 1999. Global Ethics and Environment, Routledge, London.

4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Development, Environment and Security. Stockholm Environmental Institute, Oxford University Press, Oxford.

5. Groom, M.J., Meffe, G.K. and Carroll, C.R. 2002 Principles of Conservation Biology, Sinauer Associates, Sunderland.

6. Grumbine, R. E., and Pandit, M.K., 2013. Threats from India's Himalayan dams, Science 339: 36-37.

7. McCully, P.,1996. Rivers No More: The Environmental Effects of Dams, Zed Books, London.

8. McNeill, J. R, 2000. Something New Under the Sun: An Environmental History of the Twentieth Century, Norton, New York.

9. Odum, E.P., Odum, H.T. and Andrews, J., 1971, Fundamentals of Ecology, Saunders, Philadelphia.

10. Pepper, I.L., Gerba, C.P. and Brusseau, M.L. 2011, Environmental and Pollution Science, Academic Press, New York.

11. Rao, M.N. and Datta, A.K., 1987. Waste Water Treatment, Oxford and IBH Publishing Co. Pvt. Ltd, New Delhi.

12. Raven, P.H., Hassenzahl, D.M. and Berg, L.R., 2012. Environment, 8th Edition, John Wiley and Sons, New York.

13. Rosencranz, A., Divan, S., and Noble, M. L. 2001. Environmental Law and Policy in India, Oxford University Press, New Delhi.

14. Sengupta, R., 2003. Ecology and Economics: An Approach to Sustainable Development, Oxford University Press, New Delhi.

ICT Workshop II			
Course Code:	**ICT82**	**Course Credits:**	**1**
Course Category:	**ESC4**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**2U**
No. of Labs (Hrs/Week):	**1 (2 HRS)**	**Mid Sem. Exam Hours:**	
Total No. of Labs:	**10**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1. Enable students to bridge the gap between theory and practice by designing, implementing, and troubleshooting real-world projects that reinforce and expand on classroom concepts.
2. Encourage students to engage in creative exploration and iterative learning, fostering deeper analytical skills and the ability to independently address complex technical challenges.
3. Promote teamwork, initiative, and effective time management through collaborative project work, while cultivating the autonomy and confidence needed for research, industry roles, or entrepreneurial ventures.

COURSE OUTCOMES
1. Students will be able to integrate and apply scientific or engineering principles to design, build, and test a functional DIY project that addresses a specific problem or objective.
2. Students will develop the ability to identify challenges during the project development process, analyze root causes, and implement effective solutions using appropriate tools and techniques.
3. Students will demonstrate the ability to work collaboratively in teams, document their project development process, and present their findings and results clearly through written reports and oral presentations.

This course encourages students to undertake DIY **(Do-It-Yourself)** projects offers a hands-on approach to learning that significantly enhances their understanding of theoretical concepts. Unlike traditional lectures, DIY projects compel students to actively engage with materials, tools, and techniques, allowing them to directly apply the principles they've learned in class. This experiential learning fosters deeper comprehension, critical thinking, and creative problem-solving—skills that are essential in both academic and professional settings. Through trial and error, students gain a practical appreciation for the intricacies of design, implementation, and troubleshooting, which are often underemphasized in purely theoretical coursework.

Moreover, DIY lab projects cultivate a sense of ownership and initiative in students, motivating them to explore beyond standard curricular boundaries. When students are given the freedom to design and execute their own ideas, they develop a stronger sense of confidence, autonomy, and innovation. These projects also simulate real-world engineering or scientific challenges, encouraging collaboration, project planning, and time management. By bridging the gap between abstract knowledge and tangible outcomes, DIY-focused lab courses prepare students more effectively for research, industry, or entrepreneurship, making them better equipped for success in a rapidly evolving technological landscape.

List of Experiments:

1. Develop a digital resume or portfolio website hosted on GitHub Pages or designed using Canva.
2. create or refine their LinkedIn profile with a professional photo, academic background, projects, skills, and certifications.
3. Students will create a GitHub account, design a professional README for their profile, and upload at least one basic project.
4. Set up a NodeMCU board, connect to Wi-Fi, and send sensor data to a web interface.

5. Record a small demo or presentation of their DIY/academic project and upload it to YouTube or SlideShare with proper description and tags.

Textbook:

1. "Make It: The Engineering & Design Thinking Guide for Teens" by Emily Pilloton
2. "Designing for Growth: A Design Thinking Toolkit for Managers" by Jeanne Liedtka and Tim Ogilvie

English Proficiency			
Course Code:	**EN101**	**Course Credits:**	**2**
Course Category:	**HSMC**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**1U**
No. of Lectures + Tutorials (Hrs/Week):	**02 + 00**	**Mid Sem. Exam Hours:**	**1.5**
Total No. of Lectures (L + T):	**30**	**End Sem. Exam Hours:**	**3**

Unit 1 Functional Grammar: Form and Functions; Sentences: Simple, Complex, and Compound, Tense, Mood, an Aspect; Sub-Verb Agreement and Concord; Common Errors Vocabulary Building Inflection and Derivation, Conversions, Idioms and Phrases, Words in Context

Unit 2 Language Skills (LSRW): Listening Skills Activity-based. Speaking Skills: Activity-based, Introduction to IPA, Use of Dictionary, Word stress, Reading Skills: Skimming and Scanning, Reading Comprehension, Writing Skills: Paragraph, Précis and Compositions, Note Making and Note Taking, Logical Ordering of Ideas and Contents, Figures of Speech

Unit 3 Learning through thematic texts

- *My Visions for India* — Dr. Abdul Kalam
- *From In an Antique Land* — Amitav Ghosh
- *The Gift of Magi* — O' Henry
- *Master and Man* — Leo N. Tolstoy
- *If* — Rudyard Kipling
- *The Solitary Reaper* — William Wordsworth

Text Books:

1. *Word for Word*, Pointon & Clark, Oxford University Press
2. Carter. Ronald: McCarthy, Michael (2006). *Cambridge Grammar of English. A Comprehensive Guide*. Cambridge University Press.
3. *An English Pronouncing Dictionary,* London. Dent, rpt in facsimile in Jones (2002). 17th edn, P. Roach. Hartman and J. Setter (eds), Cambridge: CUP, 2006.

Redman, Stuart. 2011 English Vocabulary 1 Use: Pre-intermediate and intermediate Cambridge CUP
Cambridge Phrasal Verbs Dictionary Second edition, Cambridge University Press

Python Programming Lab			
Course Code:	**AI 181**	**Course Credits:**	**1**
Course Category:	**LC3**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**2U**
No. of Labs (Hrs/Week):	**4**	**Mid Sem. Exam Hours:**	
Total No. of Labs:	**10**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1. To introduce students to use of Python programming to solve data analytics problems
2. To elaborate students to statistical analysis using Python programming
3. To describe various libraries required for data analytics
4. To elaborate statistical analysis using Python
5. To study special libraries in Python such as Numpy and Scipy
COURSE OUTCOMES
At the end of the course the students should be able to:
1. Improve problem solving and programming capability
2. Learn data analytics through python programming
3. Underline the use of package
4. Write simple Python programs for solving problems.
5. Decompose a Python program into functions, lists etc.

List of Experiments:

1. Implement a program to calculate the remainder of two numbers using the modulo operator.
2. Write a program that takes two lists and returns True if they have at least one common member.
3. Write a Python script to sort (ascending and descending) a dictionary by value.
4. Write Python programs to demonstrate the following: i) input( ) ii) print( ) iii) 'sep' attribute iv) 'end' attribute v) replacement Operator ({ })
5. Python program that accepts a string and calculates the number of digits and Letters.
6. Write a Python program to get a substring from a given string starting from the 3rd character to the 5th character.
7. Write a Python program to remove a key-value pair from a dictionary.
8 Write a Python program to read and write to a binary file using random access methods.
9. Write a Python program to handle the exception that occurs when trying to open a non-existing file.
10. Write a Python program to handle the exception that occurs when accessing an index out of range in a list.
11. Create a Python class Student with attributes name and grade. Use the__str__ and __len__ in-built functions to customize the string representation and length of the object.
12. Create a base class Animal with a method sound. Create a derived class Dog that overrides the sound method to print " Woof ". Create an object of the Dog class and call its sound method.
13. Create a Python class named Car with attributes brand and model. Create an object of this class and print its attributes.
14. Write a Python function that takes a list as an argument and returns the sum of all the elements in the list. Test this function with a sample list.
15. Write a Python function named operate that takes two numbers and an operation as arguments. The operation can be add, subtract, multiply, or divide. Use lambda functions to perform the respective operations.
16. Use Matplotlib to plot a sine wave from 0 to 2π.

17. Create a NumPy array containing numbers from 1 to 10. Calculate its mean, median, and standard deviation.
18. Create a basic Flask application with a route that returns "Hello, Flask!". Create a Tkinter window with an entry field. When a button is clicked, display the entered text in a message box.
19. Create a Tkinter window with an entry field. When a button is clicked, display the entered text in a message box.
20. Install PyTorch. Create atensor withrandom valuesand perform basic operations like addition and multiplication.

Career Skills Lab			
Course Code:	**ICTV2**	**Course Credits:**	**1**
Course Category:	**VACH**	**Course (U / P)**	**U**
Course Year (U / P):	**1U**	**Course Semester (U / P):**	**2U**
No. of Labs (Hrs/Week):	**1 (2 HRS)**	**Mid Sem. Exam Hours:**	
Total No. of Labs:	**10**	**End Sem. Exam Hours:**	**3**

COURSE OBJECTIVES
1. To improve students' communication, presentation, and interpersonal skills.
2. To develop critical thinking, leadership, and team collaboration through interactive sessions.
3. To expose students to entrepreneurial thinking and startup ecosystems.
4. To enhance self-awareness, confidence, and time management skills.
5. To prepare students for interviews, group discussions, and real-world workplace challenges.

COURSE OUTCOMES
At the end of the course the students should be able to:
1. Communicate effectively in group discussions and public speaking settings.
2. Demonstrate improved soft skills including confidence, articulation, and critical thinking.
3. Exhibit professional behavior in mock interviews and workplace simulations.
4. To enhance self-awareness, confidence, and time management skills.
5. To prepare students for interviews, group discussions, and real-world workplace challenges.

List of Experiments:

1. Conduct a group discussion session on a general or technical topic to assess communication clarity, confidence, and listening skills.
2. Organize an extempore round where each student speaks for one minute on a surprise topic to improve spontaneous thinking.
3. Conduct a mock HR interview round simulating campus recruitment conditions with personalized verbal feedback.
4. Arrange a session on body language, posture, and presentation skills using mirror practice and peer review.
5. Provide hands-on guidance to create and refine professional resumes and LinkedIn profiles.
6. Conduct a team-building exercise such as a task-based game to encourage leadership, coordination, and time management.
7. Introduce students to startup culture through a short seminar or documentary on entrepreneurship and innovation.
8. Facilitate an elevator pitch activity where each student presents a business idea in under two minutes.
9. Conduct a second round of mock interviews combining technical and HR questions based on student resumes.
10. Organize a second group discussion round to evaluate growth in communication, confidence, and articulation, followed by a detailed feedback session.
11. Conduct a professional email writing and formal communication workshop using real-life workplace scenarios.
12. Arrange a debate session on a trending topic to develop logical reasoning, articulation, and critical thinking.