Computer Science & Engineering

B.TECH | BRANCH CODE: 105 (CSE) | SEMESTER 1, 2, 3 CURRICULUM

Academic Authority: Bihar Engineering University (BEU Patna) | **Branch Code:** 105 (CSE)
Interactive Dashboard: beuvault.vercel.app/syllabus →

COURSE & CREDIT STRUCTURE OVERVIEW

#	Sem	Course Code	Course Title	Category	L-T-P-C
1	Sem 1	100110	Engineering Physics	Theory	3-0-0-3
2	Sem 1	100102	Engineering Mathematics–I	Theory	3-1-0-4
3	Sem 1	100111	Programming for Problem Solving	Theory	3-0-0-3
4	Sem 1	100113	IT Workshop	Theory	2-0-0-2
5	Sem 1	100114	Basic Electronics Engineering	Theory	3-0-0-3
6	Sem 1	100115P	Swachh Bharat Mission	Lab	0-0-2-1
7	Sem 1	100110P	Engineering Physics Lab	Lab	0-0-2-1
8	Sem 1	100111P	Programming for Problem Solving Lab	Lab	0-0-2-1
9	Sem 1	100113P	IT Workshop Lab	Lab	0-0-2-1
10	Sem 1	100114P	Basic Electronics Engineering Lab	Lab	0-0-2-1
11	Sem 2	100215	Engineering Chemistry	Theory	3-0-0-3
12	Sem 2	100202	Engineering Mathematics–II	Theory	3-1-0-4
13	Sem 2	100216	Communicative English	Theory	3-0-0-3
14	Sem 2	100218	Python Programming	Theory	2-0-0-2
15	Sem 2	100219	Introduction to Web Designing	Theory	3-0-0-3
16	Sem 2	100220P	Sports/Yoga/NCC/NSS	Lab	0-0-2-1
17	Sem 2	100215P	Engineering Chemistry Lab	Lab	0-0-2-1
18	Sem 2	100216P	Communicative English Lab	Lab	0-0-2-1
19	Sem 2	100218P	Python Programming Lab	Lab	0-0-2-1
20	Sem 2	100219P	Introduction to Web Designing Lab	Lab	0-0-2-1

21	Sem 3	105301	Digital Electronics	Theory	3-0-0-3
22	Sem 3	105302	Data Structure & Algorithms	Theory	3-0-0-3
23	Sem 3	105303	Object Oriented Programming Using Java	Theory	3-0-0-3
24	Sem 3	105304	Discrete Mathematics and Graph Theory	Theory	3-1-0-4
25	Sem 3	105305	Operating Systems	Theory	3-0-0-3
26	Sem 3	105306	Universal Human Values	Theory	3-0-0-3
27	Sem 3	105307	Indian Knowledge System	Theory	0-0-0-0
28	Sem 3	105301P	Digital Electronics Lab	Lab	0-0-2-1
29	Sem 3	105302P	Data Structure & Algorithms Lab	Lab	0-0-2-1
30	Sem 3	105303P	OOP Using JAVA Lab	Lab	0-0-2-1
31	Sem 3	105305P	Operating Systems Lab	Lab	0-0-2-1
32	Sem 3	105308	Internship I	Lab	0-0-4-2

Note: Visit **beuvault.vercel.app** → to access essential BEU college & academic tools — including interactive syllabus tracking, result analytics, UGEAC directory, and coding modules.

SEMESTER 1 — COMPUTER SCIENCE & ENGINEERING DETAILED SYLLABUS

100110 — Engineering Physics L-T-P-C: 3-0-0-3

• UNIT 1.0

1. Frame of Reference [2 Hours]

Non-Inertial frame of reference, rotating coordinate system, centripetal and Coriolis acceleration and its application in weather system.

2. Oscillations [3 Hours]

Harmonic Oscillator, Damped Harmonic motion – overdamped, critically Damped and lightly damped oscillators, Force Oscillators and Resonance.

• UNIT 2.0

1. Optics [4 Hours]

Huygens's Principle, Superposition of Waves and interference of Light by wave front- splitting and amplitude-splitting; Young's double slit experiment, Michelson interferometer, Fraunhofer diffraction from single slit and circular aperture, Diffraction Grating and their resolving power

2. LASER

Einstein's theory of matter-radiations interaction, Einstein's Coefficients (A and B), Amplification by population inversion, Different types of lasers – Gas Laser, Helium-Neon Laser, Solid State Laser (Ruby, Neodymium), Semiconductor Laser.

• UNIT 3.0

1. Quantum Mechanics [5 Hours]

Compton Effect, Photoelectric Effect, Wave Particle duality, de Broglie's hypothesis, Heisenberg's Uncertainty Principle, Wave function and wave packets, phase and group velocities, Schrodinger's Wave Equation, Normalization, Expectation values, Eigenvalues and Eigenfunction.

2. Applications in One dimensions [2 Hours]

Application of Schrodinger Wave Equation for particle in one dimensional box – its wavefunction and eigenvalue of energy and momentum.

• UNIT 4.0

1. Vector Calculus [2 Hours]

Gradient, Divergence and Curl, Line, Surface and Volume integrals, Gauss's Divergence theorem and Stokes' theorem in Cartesian Coordinate.

2. Electrostatics [4 Hours]

Gauss's Law and its applications, Divergence and Curl of Electrostatic fields, Electrostatic Potential, Boundary Conditions, Poisson's and Laplace's equations, Dielectrics, Polarization, Bound Charges, Electric displacement, Boundary Conditions in dielectrics.

• UNIT 5.0

1. Magnetostatics [4 Hours]

Lorentz force, Biot-Savart and Ampere's circuital laws and their applications, Divergence and Curl of Magneto static fields, Magnetic vector potential, Force and torque on a magnetic dipole, Magnetic Materials, Magnetization, Bound currents, Boundary conditions.

2. Electrodynamics and Electromagnetic Waves

Ohm's law, Motional EMF, Faraday's Law, Lenz's law, Self and mutual inductance, Energy stored in magnetic field, Maxwell's equations in vacuum and nonconducting medium, Continuity Equation, Poynting Theorem, Wave Equations: plain electromagnetic wave in vacuum and their transverse nature and Polarization.

• UNIT 6.0

1. Introduction to Solids and Semi-Conductors [3 Hours]

Free electron theory of metal, fermi level, Bloch's theorem for particle in a periodic Potential, Kroning-Penney model and origin of energy band.

2. Electronic Materials

Metals, semiconductors and insulators, intrinsic extrinsic semiconductors,Carriertransport, diffusion and drift, P-N junction.

■ LABORATORY SYLLABUS: 100110P — Engineering Physics Lab

	Perform any 10 Experiments
Exp 1:	Determination of the capacitance and permittivity of the given material.
Exp 2:	Determination of e/m of electron.
Exp 3:	Determination of Planck's constant and Photoelectric Work Function using Photoelectric cell.
Exp 4:	Verification of inverse square law using photocell.
Exp 5:	Determination of Wavelength of (He-Ne) LASER using Diffraction Grating Method.
Exp 6:	Calculation of Energy Band Gap of a semiconductor.
Exp 7:	Determination of Dielectric constant using resonance method.
Exp 8:	Determination of Wavelength of Sodium light by measuring the diameter of the Newton's Ring.
Exp 9:	Determination of curvature of convex surface of a lens by Newton's ring.
Exp 10:	Verification of existence of Bohr's Energy level with Frank-Hertz apparatus.
Exp 11:	Determination of the Earth's horizontal magnetic field intensity and magnetic Moment of a magnet by employing magnetometer.
Exp 12:	Verification of Faraday's Law and Lenz's Law of Electromagnetic Induction.

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, R. Eisberg R.
• Resnick, Wiley India Pvt. Ltd ISBN 978-81-265-0818-1
• 2. Theory of Vibration with Application, W.T. Thomson M. D. Dahleh, Pearson India
• ISBN 978-81-317-0482-0
• 3. Introduction to Electrodynamics, D.J. Griffiths, Pearson India, ISBN 978-93-325-
• 5044-5
• 4. Electromagnetism, I.S. Grant, W. R. Phillips, Wiley India Pvt. Ltd ISBN 978-04-
• 719-2712-9
• 5. The Feynman Lectures on Physics, R.P. Feynman R. B. Leighton, Pearson India
• ISBN 978-00-710-7458-2
• 6. Optics, Ajay Ghatak ,McGraw Hill ISBN 978-93-901-1359-0
• 7. Physics of Vibration and Waves, H. J. Pain, Wiley India Pvt. Ltd, ISBN 978-04-700-
• 1296-3
• 8. Concept of Modern Physics, Arthur Beiser, McGraw Hill ISBN 978-93-513-4185-7
• 9. Introduction to Solid State Physics, C. Kittle , Wiley India Pvt. Ltd, ISBN 978-81-
• 265-7843-6

100102 — Engineering Mathematics–I L-T-P-C: 3-1-0-4

• UNIT 1.0 Linear Algebra-I [7]

Elementary Row operations, Gauss -Jordan Method for finding the inverse of Matrix,

Complex Matrix : Hermitian , Skew Hermitian and Unitary Matrix, Vector space, Sub Spaces, Linear dependence and Independences of Vectors, Linear Span, Basis, Dimension, Extension of basis of subspace, The rank of a matrix, Row and column space, Solvability of system of linear equations.

• UNIT 2.0 Linear Algebra-II [7]

Linear Transformations, Kernel and Range of linear transformation, Matrix Representation

of a linear transformation, Rank-Nullity Theorem, Eigen Value and Eigen Vectors, Properties of Eigen vectors, Eigen Bases, Orthogonal Transformation, Similarity Transformation, Matrix Diagonalization, Cayley- Hamilton Theorem.

• UNIT 3.0 Calculus for single variable [7]

Inderminate form, L'Hospital Rule, Rolle's Theorem, Mean Value Theorem, Expansion of

function (single variable), Taylor and Maclaurin Series, Riemann Integration, Riemann Sum, Improper Integrals, Beta and Gamma function and their properties.

• UNIT 4.0 Multivariable Calculus (Differentiation) [7]

Function with two or more variable, Limit, continuity and Partial differentiation, Total

Differentiation Taylor's series and Maclaurin's series for function with two variable, Jacobian, Maxima and Minima, Method of Lagrange's multiplier.

• UNIT 5.0 Multivariable Calculus (Integration) [7]

Double Integral, change of order of integration, Triple integral, Change of Variable in a

Double and Triple Integrals, Change to polar coordinate, Change to cylindrical coordinate, Change to spherical polar coordinate, Application to area and volume using double and triple integral

• UNIT 6.0 Vector Calculus [7]

Scalar and vector fields, Gradient, Directional derivative, Divergence, Curl and their

properties, Line integral, Green's theorem in plane (without proof), Surface integral, Stoke's theorem (without proof), Volume Integral, Gauss-Divergence' theorem (without proof).

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. AICTE's Prescribed Textbook: Mathematics-I (Calculus & Linear Algebra),
• ReenaGarg, Khanna Book Publishing Co. ISBN-10 9391505171
• 2. Advanced Engineering Mathematics, Chandrika Prasad &ReenaGarg;, Khanna Book
• Publishing Co., 2021. ISBN 10: 9386173522 / ISBN 13: 9789386173522.
• 3. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw Hill New Delhi,
• 11th Reprint, 2010,ISBN-10 007063419X ISBN-13978- 0070634190.
• 4. Advanced Engineering Mathematics, SrkIyengarRk Jain,Narosa,5thEdition,ISBN-10
• 8184875606I
• SBN-13978-8184875607
• 5. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley &
• Sons, 2006.

100111 — Programming for Problem Solving L-T-P-C: 3-0-0-3

• UNIT 1.0

Introduction to Programming [6 Hours]

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/ Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

• UNIT 2.0

Operators, Conditional Branching and Loops [8 Hours]

Arithmetic expressions/arithmetic operators, relational operators, logical operators, bitwise operators and precedence.Writing and evaluation of conditionals and consequent branching, Iteration and loops.

• UNIT 3.0

Arrays and String [6 Hours]

Array declaration & initialization, bound checking arrays (1-d, 2-d), character arrays and strings.

• UNIT 4.0

Function, Recursion and Pointers [9 Hours]

Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Idea of pointers, Defining pointers, Use of Pointers in self- referential structures, idea of call by reference.

• UNIT 5.0

User defined Data Types and File handling [8 Hours]

Structure- defining, declaring, initializing; accessing structure members, processing of structure, array of structures, structures within structure, structure and function, type definition; Union— definition, declaration, accessing union members, initializing union. Introduction, file declaration, opening and closing a file, working with text and binary files, I/O operations on file, error handling, random access to files

• UNIT 6.0

Basic Algorithms [5 Hours]

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

■ LABORATORY SYLLABUS: 100111P — Programming for Problem Solving Lab

	Perform any 10 Experiments
Exp 1:	Tutorial 1: Problem solving using computers: Lab1: Familiarization with programming environment
Exp 2:	Tutorial 2: Variable types and type conversions: Lab 2: Simple computational problems using arithmetic expressions
Exp 3:	Tutorial 3: Branching and logical expressions: Lab 3: Problems involving if-then-else structures
Exp 4:	Tutorial 4: Loops, while and for loops: Lab 4: Iterative problems e.g., sum of series
Exp 5:	Tutorial 5: 1D Arrays: searching, sorting: Lab 5: 1D Array manipulation
Exp 6:	Tutorial 6: 2D arrays and Strings Lab 6: Matrix problems, String operations
Exp 7:	Tutorial 7: Functions, call by value: Lab 7: Simple functions
Exp 8:	Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration): Lab 8 and 9: Programming for solving Numerical methods problems

Exp 9:	Tutorial 10: Recursion, structure of recursive calls Lab 10: Recursive functions
Exp 10:	Tutorial 11: Pointers, structures and dynamic memory allocation Lab 11: Pointers and structures
Exp 11:	Tutorial 12: File handling: Lab 12: File operations

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. Programming in ANSI C 4th Ed,EBalagurusamy, McGraw Hill Education India
• Private Limited, ISBN-978-9339219666, 7th Edition
• 2. The C Programming Language 2e,W. Kernighan / Dennis Ritchie,Pearson Education
• India, 978-9332549449, 2nd Edition
• 3. Computer Fundamentals and Programming in C,ReemaThareja,Oxford University
• Press, ISBN- 978-9354977893, 3rd Edition

100113 — IT Workshop

L-T-P-C: 2-0-0-2

• UNIT 1.0

PC HARDWARE(6 lectures)

Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral. Functions of Motherboard. Assembling and Disassembling of PC. Installation of OS. Basic Linux commands.

• UNIT 2.0

INTERNET(4 lectures)

Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers.Antivirus types, Protection from various threats.

• UNIT 3.0

MICROSOFT WORD(4 lectures)

Overview of MS word features. Usage of Hyperlink, Symbols, Spell Check, Track Changes. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word. Using Word to create Project Certificate, Project Abstract, News Letter, Resume.

• UNIT 4.0

LaTeX(6 lectures)

Word Orientation: Overview of LaTeX and tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word. Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX. Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes. Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

• UNIT 5.0

MICROSOFT EXCEL(4 lectures)

Overview of Excel Features Excel formulae & Functions, conditional formatting, Charts, Hyper linking, Renaming and Inserting worksheets, Data Analysis functions. Creating a Scheduler (Features: - Gridlines, Format Cells, Summation, auto fill, Formatting) Calculating GPA (Features: - Cell Referencing, Formulae and functions in excel.

• UNIT 6.0

MICROSOFT POWER POINT(4 lectures)

Overview of PowerPoint features, Insertion of images, slide transition, Custom animation, Hyperlinks.

■ LABORATORY SYLLABUS: 100113P — IT Workshop Lab

Unit 1:	PC Hardware
Task 1:	Identify the peripherals of a computer, components in a CPU and its functions. Different types of printer.
Task 2:	Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC.
Unit 2:	Operating System Installation & Commands
Task 1:	Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.
Task 2:	Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva.
Task 3:	Different commands of DOS and Linux.
Unit 3:	Internet & World Wide Web
Task 1:	Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.
Task 2:	Web Browsers & Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
Task 3:	Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.
Task 4:	Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.
Unit 4:	LaTeX & Word Orientation
Task 1:	Word & LaTeX Overview: The mentor needs to give an overview of LaTeX and tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
Task 2:	Project Certificate Creation: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX.
Task 3:	Creating Project Abstract: Features to be covered:- Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4:	Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.
Unit 5:	Excel Orientation (Spreadsheet Tool)
Task 1:	Creating a Scheduler: Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text. Accessing, overview of toolbars, saving excel files, Using help and resources.
Task 2:	Calculating GPA: Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP.
Task 3:	Advanced Spreadsheet Utilities: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.
Unit 6:	PowerPoint Orientation (Presentation Tool)
Task 1:	Basic PowerPoint Utilities: Students will be working on basic power point utilities and tools which help them create basic powerpoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.
Task 2:	Interactive Presentations: Hyperlinks, Inserting – Images, Clip Art, Audio, Video, Objects, Tables and Charts.
Task 3:	Master Layouts & Views: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide sorter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. The Complete Computer upgrade and repair book, Cheryl A Schmidt, 3rd edition,
• WILEY Dream tech
• 2. Introduction to Information Technology,
• ITL
• Education
• Solutions
• limited,
• Pearson Education.
• 3. PC Hardware – A, Handbook – Kate J., Chase PHI
• 4. LaTeX Beginner's Guide, Stefan Kottwitz, Packt Publishing

100114 — Basic Electronics Engineering

L-T-P-C: 3-0-0-3

• UNIT 1.0

1. Frame of Reference [2 Hours]

Non-Inertial frame of reference, rotating coordinate system, centripetal and Coriolis acceleration and its application in weather system.

2. Oscillations [3 Hours]

Harmonic Oscillator, Damped Harmonic motion – overdamped, critically Damped and lightly damped oscillators, Force Oscillators and Resonance.

• UNIT 2.0

1. Optics [4 Hours]

Huygens's Principle, Superposition of Waves and interference of Light by wave front- splitting and amplitude-splitting; Young's double slit experiment, Michelson interferometer, Fraunhofer diffraction from single slit and circular aperture, Diffraction Grating and

their resolving power

2. LASER

Einstein's theory of matter-radiations interaction, Einstein's Coefficients (A and B), Amplification by population inversion, Different types of lasers – Gas Laser, Helium-Neon Laser, Solid State Laser (Ruby, Neodymium), Semiconductor Laser.

• UNIT 3.0

1. Quantum Mechanics [5 Hours]

Compton Effect, Photoelectric Effect, Wave Particle duality, de Broglie's hypothesis, Heisenberg's Uncertainty Principle, Wave function and wave packets, phase and group velocities, Schrodinger's Wave Equation, Normalization, Expectation values, Eigenvalues and Eigenfunction.

2. Applications in One dimensions [2 Hours]

Application of Schrodinger Wave Equation for particle in one dimensional box – its wavefunction and eigenvalue of energy and momentum.

• UNIT 4.0

1. Vector Calculus [3 Hours]

Gradient, Divergence and Curl, Line, Surface and Volume integrals, Gauss's Divergence theorem and Stokes' theorem in Cartesian Coordinate.

2. Electrostatics [4 Hours]

Gauss's Law and its applications, Divergence and Curl of Electrostatic fields, Electrostatic Potential, Boundary Conditions, Poisson's and Laplace's equations, Dielectrics, Polarization, Bound Charges, Electric displacement, Boundary Conditions in dielectrics.

• UNIT 5.0

1. Magnetostatics [4 Hours]

Lorentz force, Biot-Savart and Ampere's circuital laws and their applications, Divergence and Curl of Magneto static fields, Magnetic vector potential, Force and torque on a magnetic dipole, Magnetic Materials, Magnetization, Bound currents, Boundary conditions.

2. Electrodynamics and Electromagnetic Waves [6 Hours]

Ohm's law, Motional EMF, Faraday's Law, Lenz's law, Self and mutual inductance, Energy stored in magnetic field, Maxwell's equations in vacuum and nonconducting medium, Continuity Equation, Poynting Theorem, Wave Equations: plain electromagnetic wave in vacuum and their transverse nature and Polarization.

• UNIT 6.0

1. Introduction to Solids and Semi-Conductors [3 Hours]

Free electron theory of metal, fermi level, Bloch's theorem for particle in a periodic Potential, Kroning-Penney model and origin of energy band.

2. Electronic Materials

Metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, Carrier transport, diffusion and drift, P-N junction.

■ LABORATORY SYLLABUS: 100114P — Basic Electronics Engineering Lab

Note:	Perform any 10 Experiments
Exp 1:	Study of Cathode Ray Oscilloscope (CRO) — Measurement of amplitude, time period and frequency.
Exp 2:	Identification of active and passive components.
Exp 3:	Study the characteristics of P-N junction diode under (a) Forward bias, and (b) Reverse bias.
Exp 4:	Study of clipping circuits and clamping circuits.

Exp 5:	To recognize a half-wave rectifier and full-wave rectifier using sinusoidal voltage.
Exp 6:	Study of Full wave rectifier using Capacitor filter.
Exp 7:	To recognize voltage regulator using Zener diode.
Exp 8:	Study of the input and output characterization of common base (CB) bipolar junction transistor.
Exp 9:	Study the input and output characterization of common emitter (CE) bipolar junction transistor.
Exp 10:	Study the output and transfer characteristics of JFET (Junction field effect transistor).
Exp 11:	Study of operational amplifier as (i) Inverting (ii) Non-inverting amplifier.
Exp 12:	Study of operational amplifier as (i) Integrator (ii) Differentiator.
Exp 13:	Construction and verification of logic gates (AND, OR, NOT, XOR) using (a) NOR gates (b) NAND gates.

ADDITIONAL LABORATORY COURSES

100115P — Swachh Bharat Mission (Credit: 0-0-2-1)

Objectives	
Objective 1:	Understanding the importance of cleanliness and sanitation: The course could aim to create awareness about the significance of cleanliness and sanitation in maintaining personal health, environmental sustainability, and community well-being.
	It could cover topics such as waste management, sanitation practices, and the impact of poor sanitation on public health.
Objective 2:	Developing skills for effective waste management: The course could provide training on various waste management techniques, such as waste segregation, composting, recycling, and proper disposal of hazardous waste. It could also emphasize the importance of reducing waste generation and promoting sustainable waste management practices.
Objective 3:	Promoting behavioural change towards cleanliness: The course could focus on influencing positivebehavioural change among individuals and communities towards cleanliness.
	It could include modules on promoting good hygiene practices, creating awareness about the harmful effects of littering and open defecation, and encouraging responsible waste disposal habits.
Objective 4:	Creating awareness about Swachh Bharat Mission initiatives: The course could provide information about the Swachh Bharat Mission initiatives and campaigns launched by the Government of India to promote cleanliness and sanitation, such as SwachhSurvekshan, Swachh Bharat Abhiyan, and Clean India Campaign.
	It could also discuss the progress made, challenges faced, and future prospects of the Swachh Bharat Mission.
Objective 5:	Engaging in community participation and advocacy: The course could emphasize the importance of community participation in the Swachh Bharat Mission and provide tools and strategies for engaging with local communities to promote cleanliness and sanitation.
	It could also encourage advocacy for policy changes and innovations to address sanitation-related issues at the community, regional, and national levels.
Pre-requisite:	Nil
Course Outcome	

Outcome 1:	Increased awareness and knowledge about cleanliness and sanitation: Participants of the course may gain a deeper understanding of the importance of cleanliness and sanitation, including the impact on personal health, environmental sustainability, and community wellbeing.
	They may learn about various waste management techniques, hygiene practices, and the initiatives of the Swachh Bharat Mission.
Outcome 2:	Enhanced skills for effective waste management: Participants may acquire practical skills related to waste management, such as waste segregation, composting, recycling, and proper disposal of hazardous waste.
	They may also develop skills in reducing waste generation and promoting sustainable waste management practices in their communities or workplaces.
Outcome 3:	Positive behavioral change towards cleanliness: The course may influence participants to adopt positive behavioral changes towards cleanliness, such as avoiding littering, practicing good hygiene habits, and promoting responsible waste disposal.
	Participants may develop a sense of responsibility towards maintaining cleanliness in their surroundings and actively contribute towards creating a cleaner environment.
Outcome 4:	Increased community participation and advocacy: Participants may become actively engaged in community participation and advocacy efforts related to cleanliness and sanitation.
	They may collaborate with local communities, government bodies, and nongovernmental organizations (NGOs) to raise awareness, implement cleanliness initiatives, and advocate for policy changes or innovations to address sanitation-related issues.
Outcome 5:	Contribution towards Swachh Bharat Mission objectives: Participants may contribute towards the objectives of the Swachh Bharat Mission, such as promoting cleanliness, ensuring proper waste management, and eliminating open defecation.
	They may actively participate in Swachh Bharat Mission campaigns, initiatives, and activities, and make a positive impact on their communities and society at large.
List of Reports	
Report 1:	Any topics related to Swatch Bharat Mission

SEMESTER 2 — COMPUTER SCIENCE & ENGINEERING DETAILED SYLLABUS

100215 — Engineering Chemistry

L-T-P-C: 3-0-0-3

• UNIT 1.0 - Atomic and Molecular Structure [8]

Electromagnetic radiations, Dual nature of electron and Heisenberg uncertainty

Principle.Photoelectric effect, Planck\'s theory.Principles for the combination of atomic orbitals to form a molecular diagram of molecular orbitals.Bent\'s rule, VSEPR theory (typical example) co-ordination numbers and geometries. Isomerism in transition metal compounds. Metal Carbonyls; Synthesis and Structure.

• UNIT 2.0 - Spectroscopy [6]

Principle of rotational and vibrational spectroscopy, selection rule for application in

diatomic molecules, elementary idea of electronic spectroscopy, UV-VIS spectroscopy with related to rules and its applications. Basic Principle of nuclear Magnetic resonance spectroscopy with applications.

• UNIT 3.0 -Electrochemistry and Fuels [6]

Nernst equation, EMF and electrochemical cell, the introduction of corrosion, corrosion

mechanism, types of corrosion, water line corrosion, stress corrosion, pitting corrosion, Lead acid storage cell, leclanche cell. Calorific value of fuels, proximate and ultimate analysis of coals, fuel cells, Bio fuels.

• UNIT 4.0 - Water Chemistry [8]

Hardness of water, estimation of water hardness by EDTA and Alkalinity method.Removal of the hardness of water- soda lime process, zeolite process, Ion exchange process, Boiler problem, sludge, and scale formation, priming and foaming, Boiler corrosion, and Caustic embrittlement.

• UNIT 5.0 - Polymer and Plastics [8]

Polymerization techniques (free radical, ionic, and co-ordination mechanism)Preparation properties, and technical application of phenol-formaldehyde resins, elastomers, synthetic rubbers (Buna-S, Buna-N, neoprene). Inorganic polymers, Silicones, adhesives, epoxy resins. the structural difference between thermoplastic and thermosetting Plastics, the Importance of commercially important thermoplastics and thermosets; Poly ethylene, Polyvinyl chloride, Polystyrene.

• UNIT 6.0 - Organic Reactions and Synthesis of A Drug Molecul [6]

Introduction to intermediate and reaction involving Substitution, addition, elimination, oxidation-reduction. Diels Elder cyclization and epoxide ring opening reactions, synthesis of commonly used drug molecules like aspirin.

■ LABORATORY SYLLABUS: 100215P — Engineering Chemistry Lab

	Perform any 10 Experiments
Exp 1:	To estimate hardness of water by alkalinity method
Exp 2:	To estimate hardness of water by EDTA method
Exp 3:	To remove hardness of water by ion exchange method
Exp 4:	Determination of pH of a given acid solution using a standard sodium hydroxide solution
Exp 5:	Determination of surface tension and viscosity
Exp 6:	Chemical analysis of salt (Acid radical and basic radical)
Exp 7:	Adsorption of acetic acid by charcoal
Exp 8:	Test of adulteration of fat butter, sugar, turmeric powder, chilli powder and pepper
Exp 9:	Saponification/ acid value of an oil
Exp 10:	Identification of organic substances and their functional groups
Exp 11:	Potentiometric determination of redox potentials and emf
Exp 12:	Synthesis of drug/ polymer like ASPRIN/ Urea- formaldehyde resin
Exp 13:	Thin layer chromatography
Exp 14:	Analysis of flue gas by orsatapparatus

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. University Chemistry, B.H. Mahan,Pearson
• 2. Chemistry, principles and application, M.J. Sienko and R.A. Plane, McGraw Hill
• International
• 3. Fundamentals of molecular Spectroscopy, C.N. Banwell
• ,
• McGraw
• Hill
• International
• 4. Engineering Chemistry (NPTEL Web- Book), B.L. Tembe, Kamaluddin and M.S.
• Krishnan, NPTEL
• 5. Physical Chemistry, P.W. Atkins, Oxford University Press
• 6. A text book of engineering chemistry, S. Chawala, DhanpatRai Publication
• 7. General Chemistry Part 1, R. Sarkar, New Central Book agency

100202 — Engineering Mathematics–II

L-T-P-C: 3-1-0-4

• UNIT 1.0 Complex Analysis – I [6]

Functions of complex variable, limit, Continuity, Differentiability, Analytic function,

Cauchy-Riemann Equations in Cartesian and polar form, harmonic function and harmonic conjugate.

• UNIT 2.0 Complex Analysis – II [8]

Line Integral, contour integrals, Cauchy theorem, Cauchy's Integral formula(without proof),

Taylors series, zero of analytic functions, singularities, Laurent's series, residue, Cauchy residue theorem(without Proof) and its applications.

• UNIT 3.0 Ordinary Differential Equations [8]

Linear differential equations of nth Order with constant coefficients, solution of

Homogeneous and Non-Homogeneous Equations, Equations with variable coefficients, Cauchy- Euler Equations, Method of Variation of Parameters.

• UNIT 4.0 Sequence and Series [6]

Introduction of Sequence and Series, Nature of series Tests of convergence of Series

Comparison test, D'Alembert ratio test, Cauchy's Root test, Raabe's test, Logarithmic test, Cauchy's condensation test.

• UNIT 5.0 Laplace Transform [8]

Laplace Transform, Existence theorem, properties of Laplace Transform, Laplace

Transform of Periodic functions, Inverse Laplace Transform, convolution theorem. Application of Laplace Transform to solve Ordinary differential equations.

• UNIT 6.0 Fourier Series [6]

Fourier Series, Fourier Series for odd and even functions, Half range sine and cosine series,

Parseval's theorem.

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. Advanced Engineering Mathematics, Kreyszig Erwin, John Wiley and Sons,10th
• Edition,2020 ISBN:978-0470-45836-5
• 2. Advanced Engineering Mathematics, Dass H.K., S Chand and Company
• pvt.Ltd.,22nd Edition,2018 ISBN:978-93-5283-718-2
• 3. Higher
• Engineering
• Mathematics,
• Grewal
• B.S.,
• Khanna
• Publishers,44th
• Edition,2023 ISBN:9788174091154
• 4. Complex Variables (Theory and Applications), Kasana H.S., PHI,2nd Edition.2015
• ISBN:978-81-203-2641-5
• 5. A Text Book of Engineering Mathematics, Bali N.P., Goyal Manish Laxmi
• Publications,9th Edition,2014
• 6. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi,
• 11th Reprint, 2010, ISBN-10 007063419X ISBN-13 978- 0070634190
• 7. Differential Equations, Ross S.L.,Wiley Publications,3rd edition,2016 ISBN:978-81-
• 265—1537-0
• 8. Advanced Differential Equations, Raisinghania M.D., S.Chand and Company
• PVT.LTD.,18th Edition,2015 ISBN:978-81-219-0893-1
• 9. Schaum's Outlines Complex Variables, Spiegel Murray R, Lipschutz Seymour,
• Schiller J John and Spellman Dennis, MC Graw Hill Education Private Ltd.2nd
• Edition,2010 ISBN:978-0-07-008538-1

100216 — Communicative English

L-T-P-C: 3-0-0-3

• UNIT 1.0 Vocabulary Building [7]

Nature of Word Formation; Root Word and Morpheme; Prefix and Suffix; Foreign

Expressions in English; Synonym and Antonym; Homophone and Homograph; Abbreviation and Acronym.

• UNIT 2.0 Basic Writing Skills [7]

Parts of Speech: Types of Words; Structures of Sentence; Kind of Sentence; Phrase and

Clause; Punctuation Marks; Capitalization; Tenses: Present, Past and Future; Voices: Active and Passive; Formation of Questions using Primary Auxiliaries, Modals and Wh-Words.

• UNIT 3.0 Common Errors in English [7]

Articles; Prepositions; Modifiers; Subject-Verb Agreement; Noun-Pronoun agreement;

Redundancies; Cliches; Spelling Error.

• UNIT 4.0 Principles of Appropriate Writi [7]

Defining: Describing, Classifying and Exemplifying; Introduction, Body, and Conclusion;

References, Quotations and Illustrations; Organizing the Paragraphs in a Document; 7Cs of the Professional Writing: Clear, Concise, Concrete, Correct, Coherent, Complete and Courteous.

• UNIT 5.0 Practices of Formal Writing [7]

Formal Letter: Cover-Letter and Application; Resume Writing; Report Writing; Minutes of

Meeting; Memorandum; Notice; Essay Writing: Personal and Impersonal; Email Writing Etiquettes; Article Writing; Writing for Current Social Media.

• UNIT 6.0 Comprehension of Written English [7]

Of Studies (Essay) by Sir Francis Bacon; The Sun Rising (Poem) by John Donne; The Last
Leaf (Story) by O Henry; Unseen/Untaught Passage.

■ LABORATORY SYLLABUS: 100216P — Communicative English Lab

Note:	Perform any 10 Experiments (Language Lab activities include Listening, Speaking, Reading & Phonetics)
Exp 1:	Listening Comprehension and Speed (Software)
Exp 2:	Reading Comprehension and Speed (Software)
Exp 3:	Pronunciation: Learning and Test (Software)
Exp 4:	Self-Introduction: Social, Academic and Professional
Exp 5:	English Typing: Microsoft Word Document (MS Word), and Microsoft Power Point Presentation (PPT)
Exp 6:	Oral Presentation
Exp 7:	Interview: Online and Offline
Exp 8:	Just A Minute Technique (JAM) and Extempore
Exp 9:	Debate
Exp 10:	Group Discussion
Exp 11:	Activities: Role Play, Peer Activities, and Group Activities
Exp 12:	Anchoring and Addressing: an Assembly, a Meeting, a Seminar, a Party

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. English language and communication skills for engineers, Sanjay Kumar,Pushplata,
• Oxford university Press
• 2. Communicative English for Technical student, Dr. BijayBhadur Singh and Dr.
• KalpanaSinha, Foundation publishing House (FPM)
• 3. Communication Skill (As per VRV syllabus 2018),Sanjay Kumar and Pushplata,
• Oxford University Press
• 4. A course in Listening & Speaking, V. Sasi Kumar ,P. KiranmaiDutt and
• GeethaRajeevan, Foundation Books

100218 — Python Programming L-T-P-C: 2-0-0-2

• Unit Content

Module 1: Input and Output [5 Hours]

Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, The type() Function and Is Operator, Dynamic and Strongly Typed Language Module 2: Control Flow statements, Function and Loops Control Flow Statements, The if Decision Control Flow Statement, The if…else Decision Control Flow Statement, The if…elseif…else Decision Control Statement, Nested if Statement, Built-InFunctions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, The while Loop, The for Loop, The continue and break Statements. Module 3:Strings Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings. Module 4 : Lists Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, The del Statement. Module 5:Dictionaries, Tuples and Sets Creating Dictionary,

Accessing and Modifying key value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement, Tuples and Sets, Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Tuple Methods, Using zip() Function, Sets, Set Methods, Traversing of Sets, Frozen set. Module 6: Files Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, The Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

■ LABORATORY SYLLABUS: 100218P — Python Programming Lab

Exp 1:	Write a program to demonstrate different number data types in Python.
Exp 2:	Write a program to perform different Arithmetic Operations on numbers in Python.
Exp 3:	Write a program to create, concatenate and print a string and accessing sub-string from a given string.
Exp 4:	Create a variable "number" and assign an Integer to the number. Check the assigned Integer is "Positive" or "Negative".
Exp 5:	Write a program to find the largest element among three Numbers.
Exp 6:	Write a program to print the sum of all the even numbers in the range 1 - 50 and print the even sum.
Exp 7:	Write a Program to display all prime numbers within an interval of 20 and 50. Variables and Functions
Exp 8:	Write a program to swap two numbers without using a temporary variable.
Exp 9:	Write a program to define a function with multiple return values.
Exp 10:	Write a python program to find factorial of a number using Recursion.
Exp 11:	Write a python script to print the current date in the following format “WED 09 02:26:23 IST 2020”.
Exp 12:	Write a Python program to convert temperatures to and from Celsius, Fahrenheit [Formula: c/5 = f-32/9].
Exp 13:	Write a Python script that prints prime numbers less than 20. Loops and Conditionals
Exp 14:	Write a program to print the following patterns using loop: * ** *** ****
Exp 15:	Write a program to print multiplication tables of 8, 15, 69.
Exp 16:	Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use \'if-else-if\' ladder).
Exp 17:	Write a python Program to print the Fibonacci sequence using while loop. Strings
Exp 18:	Write a program to find the length of the string without using any library functions.
Exp 19:	Write a program to check if two strings are anagrams or not.
Exp 20:	Write a program to check if the substring is present in a given string or not. (use regular expressions) Lists
Exp 21:	Write a program to perform the given operations on a list: i. add ii. Insert iii. slicing
Exp 22:	Write a program to perform any 5 built-in functions by taking any list.
Exp 23:	Write a program to get a list of the even numbers from a given list of numbers.(use only comprehensions).
Exp 24:	Write a program to implement round robin.
Note:	This routine to take a variable number of sequences and return elements from them in round robin till each sequence is exhausted.
	If one of the input sequences is infinite, this is also infinite. e.g. if input is [1,2,3], (4,5) -> yield 1,4,2,5,3 one after the other.

	Use exception control and comprehensions to write elegant code.
Hint:	This requires you to understand variable arguments, lists, list copy, comprehensions, iterators, generators, exception handling, control flow etc.
	Tuples
Exp 25:	Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
Exp 26:	Write a program to return the top \'n\' most frequently occurring chars and their respective counts. e.g. aaaaabbbbcccc, 2 should return [(a 5) (b 4)] Sets
Exp 27:	Write a program to count the number of vowels in a string (No control flow allowed).
Exp 28:	Write a program that displays which letters are present in both strings.
Exp 29:	Write a program to sort given list of strings in the order of their vowel counts. Dictionaries
Exp 30:	Write a program to generate a dictionary that contains numbers (between 1 and n) in the form of (x, x*x).
Exp 31:	Write a program to check if a given key exists in a dictionary or not.
Exp 32:	Write a program to add a new key-value pair to an existing dictionary.
Exp 33:	Write a program to sum all the items in a given dictionary. Files
Exp 34:	Write a program to sort words in a file and put them in another file. The output file should have only lower case words, so any upper case words from source must be lowered. (Handle exceptions)
Exp 35:	Write a program to find the most frequent words in a text. (read from a text file). Additional Programs:
Exp 1:	Write a program to check whether a given number has an even number of 1\'s in its binary representation (No control flow allowed).
Exp 2:	Write a program to implement user defined map() function.
Exp 3:	Write a program to return a list in which duplicates are removed and the items are sorted from a given input list of strings.
Exp 4:	Write a program to implement left binary search.
Exp 5:	Write a program to change days to hours, hours to minutes and minutes to seconds using currying of composition of functions.
Exp 6:	Write a program to generate an infinite number of even numbers (Use generator)
Exp 7:	Write a program to convert a given iterable into a list. (Using iterator)
Exp 8:	Write a program that accepts a sequence of whitespace separated words as input and prints the words after removing all duplicate words and sorting them alphanumerically.

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. Introduction to Python Programming, Gowrishankar S, VeenaA ,1st Edition, CRC
• Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
• 2. Python Data Science Handbook: Essential Tools for Working with Data, Jake
• VanderPlas, 1st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
• 3. Core Python Applications Programming, Wesley J Chun, 3rd Edition, Pearson
• Education India, 2015. ISBN-13: 978-9332555365
• 4. Python Programming A Modular Approach, SheetalTaneja, Pearson Publications
• 5. Programming and Problem Solving with Python, Ashok NamdevKamathane and
• Amit Ashok Kamathane Tata McGraw Hill Education (India) Private Limited

100219 — Introduction to Web Designing L-T-P-C: 3-0-0-3

• UNIT 1.0

Fundamentals of Internet and Web Technologies Lecture [51 Web Basics and Overview

Introduction to Internet, World Wide Web, History of the web, Website, Homepage, Domain Narne, Web Brolvsers and Web server, Web Server Working, Client-Server Architecture, 3-Tier Web Architecture, Web hosting, URL, MIME, HTTP protocol, Web Programrners Toolbox.

• UNIT 2.0

Introduction to HTML: Elements and Structure Lecture [7] Introduction to html: Fundamentals of

HTML elements, History of HTML, Document body, Different tags, sections, text, heading, paragraphs, hyperlink, lists, tables, color coding and images, Div and Span Tags for grouping, character entities, URL Encoding, frames, and frame sets.

• UNIT 3.0

HTML Forms and Multimedia Integration Lecture [51 HTML form, Form Elements, Form

Attributes, HTML canvas, embedding audio and video in a webpage, HTML Vs XHTML.

• UNIT 4.0

Introduction to CSS: Styling and Layouts Lecture [8] Need for CSS, introduction to CSS, basic

syntax and structure, External Style Sheets, Internal Style Sheets, lnline Style, CSS Selectors, div & span tag, CSS Color, CSS Backgrounds, Borders, Margins, Padding. Box Model, Heightiwidth, outline, Text, Font, Tables, CSS Buttons, CSS Display, CSS Float & Clear, CSS Overflow.

• UNIT 5.0

JavaScript Basics: Scripting and Control Lecture [8] Java Script: [ntroduction to Client-side

Scripting, w-hat can JavaScript Do, Need of JavaScript, Enhancing HTML Documents with JavaScript; the Building Blocks: Data types, variables, Types of Operators, Operator Precedetrce, Type conversion; Conditional statement irr .lavaScript: if else, and else il, Switch statement; Loops in JavaScript: for, while, do/while, break, continue.

• UNIT 6.0

Advanced JavaScript: Objects and Events Lecture [9] Advanced JavaScript: Objects in JavaScript

(array, number, string. Boolean); event handling (e.g., onclick, onsubniit); error liandling: JavaScript scope; responsive modal forrns; form validation.

■ LABORATORY SYLLABUS: 100219P — Introduction to Web Designing Lab

Exp 1:	Design a home page which displays information about your college department using heading, HTML entities and paragraphs. Implement diffbrent types of list tags in the college department home page. Create a webpage for any clinic using marquee and HTML formatting ta-es. Create an image(s) and iframe in a webpage.
Exp 2:	Create a Hyperlink in home page connecting it to 3 different pages.
	Design a webpage using HTML that includes an image map, and embeds audio and video.
	Design a time-table and display it in a tabular format. iv.
	Design an admission form for any course in your college with text, password fields, drop-down list, check-boxes, radio button, submit, and reset button.

Exp 3:	Design a static webpage using HTML to co-2, co-3 create a frameset with header, navigation, and content sections.
Create a webpage with a frameset divided into 3 frames:	20oh on the left for page contents, 60% tt the center for the main body, and 20o/o on the right for remarks.
	Create a web page multiple types of style sheet used in a single page
Exp 4:	Create a catalogue for an online shopping company that sells electronic items using CSS.
	Design a webpage of your horne town with an attractive background color, text font, and an image using inline CSS formatting Create a student web form for enterning student information.
	Design a library webpage using different CSS border styles and the CSS box model.
Exp 5:	Write a JavaScript program: Find the largest among three numbers. Calculate the factorial of a number. Check whether a given number is an Armstrong number. Find the sum of natural numbers using recursion. v. Check whether a string is a palindrome. Convert a decimal number to binary.
Exp 6:	Write a JavaScript program: To design a scientific calculator with event handling for each button. To compute the squares and cubes of numbers ffom 0 to 10, and display the results in an HTML table format.
Exp 7:	Write JavaScript to validate the following fields of the registration page: Name: Must contain only alphabets and be at least 6 characters long. Password: Must be at least 6 characters long. E-mail ID: Must follow the standard pattern name@domain.com and not contain inval id characters. Phone Number: Must contain exactly l0 digits

■ RECOMMENDED TEXTBOOKS & REFERENCES:

• 1. Beginning Web Prograrnming with HTML, XHTML, and CSS., Jon Duckett, Publisher(s):
• WROX ISBN:9780470259313
• 2. JavaScript: The Definitive Guide, 6th Edition, David Flanagan, Publisher(s): O'Reilly
• Media, Inc. ISBN: 978059680552
• 3. Internet& World Wide Web: How to Program, Fourth Edition, H. M. Deitel- Deitel&
• Associates, Inc., P. J. Deitel - Deitel& Associates, Inc, Publisher(s): Pearson ISBN: 9780 I
• 36085645
• 4. Internet and Web Technologies, Kamal Raj, Publisher: McGraw Hill Education India ISBN:
• 9780070472969, 9180070472969

ADDITIONAL LABORATORY COURSES

100220P — Sports/Yoga/NCC/NSS (Credit: 0-0-2-1)

Course Objectives:	Fostering creativity, innovation, teamwork, and leadership among engineering undergraduates.
Pre-requisite:	Nil
Course Outcome	
Outcome 1:	Developed innovative projects: Students may have successfully developed innovative projects that demonstrate their creativity, problem-solving skills, and technical competence.
	These projects could be prototypes, models, simulations, or practical solutions to real-world problems, showcasing their ability to apply engineering concepts in a creative and innovative manner.
Outcome 2:	Improved critical thinking and problem-solving skills: Students may have honed their critical thinking and problem-solving skills through various course activities, such as brainstorming, design thinking, and project development.

	They may have learned to analyse complex problems, identify viable solutions, and make informed decisions based on technical, economic, and social considerations.
Outcome 3:	Enhanced project management and teamwork skills: Students may have gained practical experience in managing projects, including planning, scheduling, budgeting, and risk management. They may have learned how to work effectively in a team, collaborate with diverse team members, and communicate project progress and results professionally.
Outcome 4:	Increased interdisciplinary knowledge and collaboration: Students may have gained exposure to interdisciplinary concepts and collaborated with peers from different engineering disciplines.
	They may have learned to appreciate diverse perspectives, leverage interdisciplinary knowledge, and work collaboratively to develop innovative solutions that integrate multiple domains of engineering.
Outcome 5:	Cultivated a mindset of innovation and entrepreneurship: Students may have developed a mindset of innovation and entrepreneurship, recognizing the importance of creativity, adaptability, and continuous improvement in engineering practice.
	They may have learned to identify opportunities, think critically, and take risks to develop and implement innovative projects with commercial or societal potential.
List of Reports:	Any topics related to innovative project.

SEMESTER 3 — COMPUTER SCIENCE & ENGINEERING DETAILED SYLLABUS

105301 — Digital Electronics L-T-P-C: 3-0-0-3

• UNIT 1 Fundamentals of Digital Systems and Logic Families [7]

Digital signals and digital circuits

AND, OR, NOT, NAND, NOR and Exclusive-OR operations Boolean algebra Number systems: binary, signed binary, octal, hexadecimal Binary arithmetic: one\'s and two\'s complements arithmetic Codes: error detecting and correcting codes Characteristics of digital ICs Digital logic families: TTL, Schottky TTL, CMOS logic Interfacing CMOS and TTL Tri-state logic

• UNIT 2 Combinational Digital Circuits [7]

Standard representation for logic functions: K-map

Simplification of logic functions using K-map Minimization of logical functions, Don\'t care conditions Multiplexer and DeMultiplexer/Decoders Adders and Subtractors BCD arithmetic and carry look ahead adder Serial adder and ALU design Popular MSI chips, digital comparator Parity checker/generator, code converters, priority encoders Decoders/drivers for display devices Q-M method of function realization

• UNIT 3 Sequential Circuits and Systems [7]

A 1-bit memory and bistable latch

Clocked SR flip flop J-K, T and D type flip flops Applications of flip flops Shift registers and their applications Serial to parallel / parallel to serial converters Ring counter and sequence generator Ripple (Asynchronous) counters Synchronous counters, counter design using flip flops Special counter ICs, asynchronous sequential counters

• UNIT 4 A/D and D/A Converters [7]

Digital to analog converters: weighted resistor, R-2R Ladder

Specifications for D/A converters, examples of D/A ICs Sample and hold circuit Analog to digital converters: quantization and encoding Parallel comparator A/D converter Successive approximation A/D converter Counting A/D converter Dual slope A/D converter A/D converter using voltage to frequency/time conversion Specifications and examples of A/D converter ICs

• UNIT 5 Semiconductor Memories [7]

Memory organization and operation, expanding memory size

Classification and characteristics of memories Sequential memory Read Only Memory (ROM) Read and Write Memory (RAM) Content Addressable Memory (CAM) Charge Coupled Device Memory (CCD) Commonly used memory chips ROM as a PLD

• UNIT 6 Programmable Logic Devices [7]

Programmable Logic Array (PLA)

Programmable Array Logic (PAL) Complex Programmable Logic Devices (CPLDs) Field Programmable Gate Array (FPGA)

■ LABORATORY SYLLABUS: 105301P — Digital Electronics Lab

	Universal Gates Code Converter & Parity Generator/Checker Adder, Subtractor & Magnitude Comparator Decoder, MUX & DMUX Latches and Flip Flops Shift Registers Synchronous & Asynchronous Counters 4-bit Sequence Generator Digital to Analog Converter (DAC) Analog to Digital Converter (ADC) Multisim Familiarization

105302 — Data Structure & Algorithms L-T-P-C: 3-0-0-3

• UNIT 1 Introduction [7]

Basic Terminologies: Elementary Data Organizations

Data Structure Operations: insertion, deletion, traversal etc. Analysis of an Algorithm Asymptotic Notations Time-Space trade off

• UNIT 2 Stacks and Queues [7]

ADT Stack and its operations: Algorithms and complexity

Applications of Stacks: Expression Conversion and evaluation ADT queue Types of Queue: Simple, Circular, Priority Operations on each type and their analysis

• UNIT 3 Linked Lists [7]

Singly linked lists: representation in memory

Algorithms: Traversing, Searching, Insertion, Deletion Linked representation of Stack and Queue, Header nodes Doubly linked list: operations and algorithmic analysis Circular Linked Lists: operations and complexity analysis

• UNIT 4 Searching, Sorting and Hashing [7]

Linear Search and Binary Search: complexity analysis

Selection Sort, Bubble Sort, Insertion Sort Quick Sort, Merge Sort, Heap Sort Performance and Comparison among all methods Hashing

• UNIT 5 Trees [7]

Basic Tree Terminologies

Binary Tree, Threaded Binary Tree Binary Search Tree, AVL Tree Tree operations, algorithms with complexity analysis Applications of Binary Trees B Tree, B+ Tree: definitions, algorithms and analysis

• UNIT 6 Graph [7]

Basic Terminologies and Representations

Graph search and traversal algorithms Complexity analysis

■ LABORATORY SYLLABUS: 105302P — Data Structure & Algorithms Lab

Linear list in array Binary Search Stack using array Stack using linked list Infix to Postfix Queue using array Circular Queue Queue using Linked List SLL:	Create, Count, Traverse SLL: Insert at beginning/position SLL: Delete & Reverse DLL: Insert operations DLL: Delete operations Circular Linked Lists Tree Traversals

105303 — Object Oriented Programming Using Java

L-T-P-C: 3-0-0-3

• UNIT 1 OOP Concepts and Java Programming [5]

Introduction to Java: History, buzzwords, basics

Difference between procedural and OOP paradigm Need for OOPs, OOP features and advantages JDK, JRE and JVM Data types, variables, operators Control structures: selection, looping Java methods, compilation and execution

• UNIT 2 Objects, Classes, and Constructors in Java [7]

Objects and Classes basics, declaring objects, new keyword

Defining and calling methods, Array of Objects Constructors and different types Overloading Methods and Constructors Method Binding, Overriding and Exceptions Passing/returning Object as parameters Static members, Access Modifiers (Public, Private, Protected, Default) this Keyword, garbage Collection, finalize() Nested and Inner Classes, String class

• UNIT 3 Inheritance, Interfaces and Packages [9]

Inheritance hierarchies, benefits, member access rules

super keyword, final classes and methods Object class and its methods Dynamic binding, method overriding, abstract classes Interfaces vs Abstract classes Defining, implementing, extending interfaces Packages: defining, creating, accessing, CLASSPATH

• UNIT 4 Exception Handling [6]

Error vs Exception, exception hierarchy

Checked and unchecked exceptions try, catch, throw, throws and finally Multiple catch clauses, nested try Rethrowing exceptions Creating own exception subclasses

• UNIT 5 Introduction to Multithreading [7]

Multiple processes vs multiple threads

Thread states, creating threads, interrupting threads Thread priorities Synchronizing threads Inter-thread communication

• UNIT 6 Files, Collections Framework and Connecting To Database [8]

Streams: byte streams, character stream

Text I/O, binary I/O, random access file File management using File class Collections Framework (java.util): overview and hierarchy ArrayList, LinkedList, HashSet, TreeSet, PriorityQueue, ArrayDeque Connecting to database, querying, processing results with JDBC Updating data with JDBC

105304 — Discrete Mathematics and Graph Theory

L-T-P-C: 3-1-0-4

• UNIT 1 Sets, Relation and Function [6]

Operations and Laws of Sets, Cartesian Products

Binary Relation, Partial Ordering, Equivalence Relation Image of a Set, Sum and Product of Functions Bijective, Inverse and Composite Functions Finite and infinite Sets, Countable and uncountable Sets Cantor\'s diagonal argument, Power Set theorem

Schroeder-Bernstein theorem

• UNIT 2 Principles of Mathematical Induction [8]

Well-Ordering Principle, Recursive definition

Division algorithm, Prime Numbers GCD: Euclidean Algorithm Fundamental Theorem of Arithmetic Inclusion and exclusion principle Pigeon-hole principle Permutation and Combination

• UNIT 3 Propositional Logic [6]

Syntax, Semantics, Validity and Satisfiability

Basic Connectives and Truth Tables Logical Equivalence: Laws of Logic Logical Implication Rules of Inference Use of Quantifiers

• UNIT 4 Proof Techniques [4]

Some Terminology

Forward Proof Proof by Contradiction Proof by Contraposition Proof of Necessity and Sufficiency

• UNIT 5 Algebraic Structures and Morphism [8]

Semi Groups, Monoids, Groups

Congruence Relation and Quotient Structures Free and Cyclic Monoids and Groups Permutation Groups, Substructures, Normal Subgroups Rings, Integral Domain and Fields Boolean Algebra and Boolean Ring Identities of Boolean Algebra, Duality Representation of Boolean Function Disjunctive and Conjunctive Normal Form

• UNIT 6 Graphs and Trees [10]

Graphs and their properties: Degree, Connectivity, Path, Cycle

Sub Graph, Isomorphism Eulerian and Hamiltonian Walks Graph Coloring: maps, vertices, edges, list coloring, perfect graph Rooted trees and sorting Weighted trees and prefix codes Bi-connected component and Articulation Points Shortest distances

105305 — Operating Systems L-T-P-C: 3-0-0-3

• UNIT 1 Introduction [7]

Concept, Generations, Types of Operating Systems

OS Services, System Calls Structure: Layered, Monolithic, Microkernel Concept of Virtual Machine Case study: UNIX and Windows

• UNIT 2 Processes [8]

Definition, Relationship, States, State transitions

Process Control Block (PCB), Context switching Threads: definition, states, benefits, types Process Scheduling: objectives, criteria Scheduling algorithms: FCFS, SJF, RR Multiprocessor scheduling, Real Time: RM and EDF

• UNIT 3 Inter-process Communication [8]

Critical Section, Race Conditions, Mutual Exclusion

Hardware Solution, Strict Alternation, Peterson\'s Solution Producer-Consumer Problem Semaphores, Event Counters, Monitors Message Passing, Shared Memory Classical IPC: Reader\'s & Writer, Dining Philosopher

• UNIT 4 Deadlocks [5]

Definition, Necessary and sufficient conditions

Deadlock Prevention Deadlock Avoidance: Banker\'s algorithm Deadlock Detection and Recovery

• UNIT 5 Memory Management [7]

Logical and Physical address map

Contiguous Memory: Fixed/Variable partition, Fragmentation Paging: Principle, Hardware support, Protection, Sharing Segmentation: Principle, Advantages, Disadvantages Virtual Memory: Basics, Locality of reference, Page fault, Working Set Page Replacement: Optimal, FIFO, SC, NRU, LRU

• UNIT 6 File Management [7]

File concept, Access methods, Types, Operations, Directory structure

Allocation: contiguous, linked, indexed Free-space management, Directory implementation Disk scheduling: FCFS, SSTF, SCAN, C-SCAN Disk reliability, formatting, Boot-block, Bad blocks I/O Hardware and Software principles

■ LABORATORY SYLLABUS: 105305P — Operating Systems Lab

	FCFS Scheduling SJF Scheduling Priority Scheduling Round Robin Banker's Algorithm Device Driver Disk Scheduling Dining Philosopher Problem Producer Consumer Problem LRU Page Replacement

105306 — Universal Human Values L-T-P-C: 3-0-0-3

• UNIT 1 Introduction to Value Education [5]

Right Understanding, Relationship and Physical Facility

Understanding Value Education, Self-exploration Continuous Happiness and Prosperity Exploring Human Consciousness Method to Fulfil Basic Human Aspirations

• UNIT 2 Harmony in the Human Being [4]

Co-existence of the Self and the Body

Needs of the Self vs the Body The Body as Instrument of the Self Understanding Harmony in the Self Harmony of the Self with the Body Self-regulation and Health

• UNIT 3 Harmony in the Family and Society [5]

Family as Basic Unit of Human Interaction

Trust as Foundational Value Respect as Right Evaluation Justice in Human-to-Human Relationship Understanding Harmony in Society Vision for Universal Human Order

• UNIT 4 Harmony in Nature/Existence [6]

Understanding Harmony in Nature

Interconnectedness, self-regulation, Mutual Fulfilment Four Orders of Nature Co-existence at All Levels Holistic Perception of Harmony

• UNIT 5 Implications of Holistic Understanding [5]

Natural Acceptance of Human Values

Definitiveness of Ethical Human Conduct Basis for Humanistic Education Humanistic Constitution and Universal Human Order Competence in Professional Ethics Holistic Technologies, Production Systems, Case Studies

• UNIT 6 Professional Ethics & Transition [3]

Competence in Professional Ethics

Holistic Technologies, Production Systems, Management Models Case Studies Strategies for Value-based Life and Profession

105307 — Indian Knowledge System L-T-P-C: 0-0-0-0

• UNIT 1 Introduction to Indian Knowledge Systems [7]

Overview of IKS

Organization of IKS Conception and constitution of knowledge in Indian tradition The oral tradition Models and Strategies of IKS

• UNIT 2 Overview of IKS Domains [5]

The Vedas as the basis of IKS

Overview of all the six Vedangas

• UNIT 3 Relevance in Current Technical Education System I [8]

Arthashastra (Indian economics and political systems)

Ganita and Jyamiti (Indian mathematics, astronomy, geometry) Rasayana (Indian chemical sciences)

• UNIT 4 Relevance in Current Technical Education System II [8]

Ayurveda (Indian biological sciences / diet & nutrition)

Jyotish Vidya (observational astronomy and calendar systems) Prakriti Vidya (ecology and atmospheric sciences)

• UNIT 5 Relevance in Current Technical Education System III [7]

Vastu Vidya (architecture and built environment)

Nyaya Shastra (social ethics, logic and law)

• UNIT 6 Shilpa, Natya, Sankhya & Yoga [7]

Shilpa and Natya Shastra (Indian classical arts)

Sankhya and Yoga Darshana (psychology, yoga, consciousness) Vrikshayurveda (plant science, sustainable agriculture)

ADDITIONAL LABORATORY COURSES

105303P — OOP Using JAVA Lab (Credit: 0-0-2-1)

Basic Java Syntax and Control Structures Classes, Objects, Methods, Constructors Overloading Inheritance and super Keyword Method Overriding and Runtime Polymorphism Abstract Class and Interface User-Defined Exceptions Multithreading with Synchronization File Handling:	Byte & Character Stream Collections Framework & JDBC

105308 — Internship I (Credit: 0-0-4-2)

Internship Requirement:	Minimum 4 weeks industrial training at a recognized organization.
Assessment:	Evaluation based on Internship Report submission and Viva-Voce examination.

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