First Year Curriculum

Admission Year 2026-27

Bachelor of Technology
Artificial Intelligence and Data Science

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Course: BTech

Prerequisite: Basic computer skills, problem-solving mindset. **Semester: 1**

Rationale : Basic computer skills, HTML, CSS, problem-solving, debugging, interactivity, performance optimization, and user experience are essential for web development.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	-	2	-	4	40	20	20	60	30	150

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Introduction to HTML & CSS Introduction to HTML (History, evolution, What is HTML? Why it is use?)HTML Page Structure with basic HTML tag (Html, Title, Link, Head, Body) Introduction to CSS (What is CSS, Why it is use? , Syntax)Types of CSS (Inline, Internal, External)	11	6
2	HTML Elements & Forms Headings, Paragraphs, Lists (ordered , unordered, descriptive), and Tables (table, <tr>, <td>, <th> ,<thead>,<tbody>,<tfoot>) Forms and Input Fields (input, label, button, click events, methods, prompt, alert, confirm, radio button , checkbox, text-area, date, select, option, text, email, password, number) HTML5 Semantic Elements (header, footer, navigation, section, article, container, div, aside) Multimedia Elements (Images, Audio, Video)	26	12
3	CSS Basics & Styling Selectors and Properties (elements, class, id, hover, active) Box Model & Layout Techniques (content, padding, margin, border, height, width, display, visibility, overflow) Colors, Fonts, and Backgrounds (font-family, font-style, font-size, font-weight) CSS Flexbox and Grid (justify-content, align-items, flex-wrap, flex-direction, grid-template- rows, grid-template columns, gap) CSS positions and indexes (fixed, absolute, relative, static, z-index)	26	12
4	Responsive Web Design & Advanced CSS Media Queries for Responsive Design . CSS Transitions and Animations (transition property, duration, timing-function, delay, animation-name, iteration-count, direction).CSS Variables & Advanced Styling (shadow, gradient, border-radius).Templates (Pre-defined template, How to use it?)	26	12
5	Introduction to Web Deployment (Theory Only) What is Web Hosting? Domain Names & Hosting Services .Overview of Deployment Methods . How websites are published online. Students learn about web hosting, domain names, DNS, and different deployment methods using platforms like GitHub Pages or Netlify. Basic version control and SEO considerations are also introduced	11	6
	Total	100	48

Reference Books	
1.	"HTML and CSS: Design and Build Websites" by Jon Duckett
2.	JavaScript and JQuery: Interactive Front-End Web Development – Jon Duckett
3.	Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics By Jennifer Niederst Robbins
4.	Responsive Web Design with HTML5 and CSS – Ben Frain
5.	Web Design with HTML, CSS, JavaScript and jQuery Set – Jon Duckett
6.	HTML5 and CSS3 All-in-One For Dummies – Andy Harris

Course Outcome
After Learning the Course the students shall be able to:
After Learning the Course the students shall be able to: 1. Create simple web pages using HTML and CSS. 2. Design web forms with different input fields. 3. Apply CSS for styling and layout using Flexbox and Grid. 4. Build responsive web pages with media queries and animations. 5. Understand web hosting, domain names, and website deployment.

List of Practical	
1.	1. Create a simple webpage using headings and paragraphs 2. Use to for heading 3. Write at least 3 meaningful paragraphs using the tag
2.	1. Add links and images to a webpage 2. Use the tag to add hyperlinks (external and internal). 3. Use the tag to display an image from your computer or a URL.
3.	1. Make lists and tables in HTML 2. Create an ordered list and an unordered list. 3. Design a table with rows and columns using , , , .
4.	1. Create a registration form

	2. Include fields like Name, Email, Gender, Date of Birth, and Submit button. 3. Use appropriate form elements: , , , etc.
5.	1. Use semantic HTML elements 2. Build a layout using , , , , and .
6.	1. Apply CSS styles to HTML elements 2. Use tag, class (className), and ID (#idName) selectors. 3. Change text color, background color, margins, and padding.
7.	1. Understand and use the box model 2. Apply padding, borders, and margins to elements. 3. Use width and height properties to control size.
8.	1. Create a navigation bar using Flexbox 2. Use CSS Flexbox to arrange menu items horizontally. 3. Add hover effects and spacing between items.
9.	1. Make a responsive layout using CSS Grid 2. Use grid to create a two-column layout. 3. Adjust grid layout for different screen sizes using media queries.
10.	1. Make your webpage work on all screen sizes 2. Use responsive units like %, vw, vh, em, and rem. 3. Use media queries to adapt layout for mobile, tablet, and desktop.
11.	1. Add hover effects and simple animations 2. Use the :hover pseudo-class to style elements on mouse-over. 3. Create a simple animation using @keyframes and transition.
12.	1. Create a simple webpage with internal and external CSS 2. Write internal CSS in
13.	1. Add audio and video to a webpage 2. Use and tags with controls, autoplay, and loop.
14.	1. Build a simple personal portfolio website 2. Include sections like About Me, Skills, Projects, and Contact. 3. Add navigation and media (images, links, icons).

Course: BTech

Prerequisite: Basic concepts of Calculus **Semester: 1**

Rationale : Calculus is the branch of mathematics that deals with continuous change. Calculus is also called infinitesimal calculus or “the calculus of infinitesimals”. The meaning of classical calculus is the study of continuous change of functions. Most of these quantities are the functions of time such as velocity is equal to change in distance with respect to time.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
4	-	-	-	4	40	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Application of Functions of One VariableReview of the function of one variable, limit, continuity, and differentiability, mean value theorems and applications, Riemann integration, fundamental theorem of calculus, application to length, area, volume, and surface area of revolution.	25	15
2	Multivariate Calculus Functions of several variables, limit and continuity, partial derivatives and differentiability, composite functions, chain rule, implicit functions, Euler’s theorem, Taylor’s expansion, Jacobian, maxima and minima, method of Lagrange multipliers.	25	15
3	Multiple Integration Double integration, change of order, change into polar form, application to area and volume.	20	12
4	Vector Calculus Vector-valued function, velocity and acceleration, the gradient of a scalar function, directional derivatives, divergence and curl of a vector-valued function. Parameterization of curves and surfaces, vector fields, line integrals, Green’s theorem, surface integrals, Gauss divergence theorem and Stokes’ theorems with applications.	30	18
	Total	100	60

Reference Books

1.	Calculus and Analytic Geometry, (TextBook) By G. B. Thomas, Jr. and R. L. Finney, | Pearson India.
2.	Calculus, By Ron Larson, Bruce Edwards, | Cengage Learning.
3.	Calculus: Early Transcendentals, By James Stewart, | Brooks/Cole.
4.	Calculus, By Tom M Apostol, | Wiley Publication.

Course Outcome
After Learning the Course the students shall be able to:
1. Understand the consequences of various mean value theorems for differentiable functions. 2. Apply the concept of Multivariate calculus in optimization problems. 3. Apply the concept of multiple integration in problems. 4. Analyze Inter-relationship amongst the line integral, double and triple integral formulations. 5. Realize importance of Green, Gauss and Stokes' theorems in other branches of mathematics.

Parul University

Subject Syllabus

03010501ES01 - Programming for Problem Solving

Course: BTech

Prerequisite: Requires Basic Knowledge of Computer **Semester: 1**

Rationale : This course is design to provide basic ideas of computer programming. This course also makes help to understand programming language. It will help to develop their logical abilities

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	-	2	-	4	40	20	20	60	30	150

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Introduction to 'C' Programming What is C language, History of C language, Application areas of C, Features of C language, structure of C Program, execution flow of program, reading a character, writing a character, formatted input, formatted output functions.	10	8
2	Constants, Variables, Data Types, Operators and Expressions Constants, Variables, Data Types: Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, Assigning values to variables, typedef, and Defining symbolic constants. Operators and Expression: Introduction to Operators and its types, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associativity.	15	5
3	Control structures in C Decision Making & branching: Decision making with If &If .. Else statements, If .. Else statements (Nested …. Ladder), The Switch,The break statement & goto statements, The ternary (?:) Operator Looping: The while statement, & The Do.. While loop, The FOR loop, Jump within loops – Programs	15	4
4	Arrays and StringsArrays: Introduction, One-dimensional array, Two-dimensional array, Concept of Multidimensional arrays. Strings: String declaration, storage, Built-in-string functions.	20	7
5	User-Defined Functions, Structure and Unions User-Defined Functions: Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function, Macros, Pre-processing. Structure and Unions: Introduction, Structure definition, declaring and initializing Structure variables, Accessing Structure members, Copying & Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions	20	10
6	Pointers, Dynamic memory allocation and File Management in C Pointers: Basics of pointers, pointer to pointer, pointer and array, Pointer to array, array of pointers , functions returning pointers Dynamic memory allocation: Introduction to Dynamic memory allocation, malloc(), calloc(), free(), realloc(). File Management in C: Introduction and standard file handling functions.	20	8
	Total	100	42

Reference Books

1.	Programming in ANSI C (TextBook) By E. Balaguruswamy | Tata McGraw-Hill
2.	C Programming: Test Your Skills By Ashok Kamthane
3.	Computer Fundamentals By P.K.Sinha and Priti Sinha | BPB Publications | 4th Edition
4.	Star C Programming STAR Certification | C Certification Exam
5.	Programming with C By Byron Gottfried | Tata McGraw Hill Education
6.	C The Complete Reference By Herbert Schildt
7.	Let Us C By Yeshavant Kanetkar | BPB Publications

Course Outcome

After Learning the Course the students shall be able to:

After Learning the course the students shall be able to

1. Recognize the computer's basic principles and organizations.
2. Understand Concepts of Computer Programming Language.
3. Develop the algorithm for solving basic Engineering Problems.
4. Write, Compile and debug program with C Programming.
5. Analyse the Solved, Complex Computational Program written in C.
6. Develop simple projects using C Language.

List of Practical

1.	Practical Set 1 (Basics) 1. Write a program to print HELLO FRIENDS! 2. Write a program that reads two nos. from key board and gives their addition, subtraction, multiplication, division and modulo. 3. Write a program to calculate area of circle,use Ω as symbolic constants. 4. Write a program to convert days into months and days. 5. Write a program which calculates the summation of three digits from the given 3 digit number. 6. Write a program to demonstrate enumerates data type. 7. Write a program to compute Fahrenheit from centigrade. 8. Write a program to calculate simple interest. 9. Read the price of item in decimal form e.g. 12.50 and separate Rs and Paise from the given value e.g. 12 rupees and 50 paise.
2.	Practical Set 2 (Control Structures) 1. Write a program to find the largest of the three nos. using Nested-If-Else statement. 2. Write a C program to enter a character and to check whether it is a small letter or it is a capital letter or it is a digit or it is a special symbol. 3. Write a program to read marks from keyboard and your program should display equivalent grade according to following table. Marks Grade 100-80 Dist 60-79 First Class 35-59 Second Class 0-34 Fail 1. Write a program to read marks of a student from keyboard whether the student id pass (if).

	2. Write a program to find the sum of first N odd numbers. 3. Write a program using while loop construct which finds the factorial of a given integer number. 4. Write a C program using do…while and for loop constructs to reverse the digits of the number. 5. Write a program to demonstrate use of Switch- Break Statement. 6. Write a program to find out all the numbers divisible by 5 and 7 between 1 to 100. Check for Armstrong number. A number is Armstrong if sum of cube of every digit is same as the original number. E.g. 153=13+53+33=153 1. Write a program to print the output of bellow series. 1!+2!+3!+4!+ ..... n! 2. Write a program to print the following outputs using for Loop. (a) 1 (b) * 12 ** 123 *** 1. Write a program to print the following outputs using for Loop. (a) 1 (b) 321 21 21 321 1
3.	Practical Set 3 (Array & Strings) 1. Write a program which sorts 10 numbers into ascending order. 2. Write a program to find maximum element from 1-D array. 3. Write a program to find number of odd and even elements from the 1-D array. 4. Write a program add two 2x2 matrices. 5. Write a program to count number of positive, negative and zero elements from 3x3 matrix. 6. Write a function for the following operations on string: Copy one string to another Comparing two strings Adding a string to the end of another. 1. Write a program to count vowels from a entered String. 2. Write a program which finds whether a string is a palindrome or not.
4.	Practical Set 4 (Functions) 1. Write a program to find factorial of a number using recursion. 2. Write a program that used user defined function Swap ( ) and interchange the value of two variable. 3. Write a function to return 1 if the number is prime otherwise return 0.
5.	Practical Set 5 (Structures) 1. Define a structure type, personal that would contain person name, date of joining and salary. 2. Define a structure called cricket that will describe the following information: Player name Team name Batting average
6.	Practical Set 6 (Pointers) 1. Write a program to add two numbers using pointers. 2. Write a program to swap two numbers using pointer
7.	Practical Set 7 (File Management) 1. Write a program to illustrate reading files contents. 2. Write a program to illustrate the use of fgets( ).

Subject Syllabus
Prompt Engineering

Course: Btech – CSE(AI) Course Code: 03014601ES01 **Semester: 1**

Prerequisite: Basic computer literacy; familiarity with any programming language

Rationale: This course introduces students to the principles and practices of Prompt Engineering for Large Language Models (LLMs) and Generative AI systems. Students will learn how to design, refine, and evaluate prompts to achieve desired outputs across various domains including code generation, education, data analysis, and content creation. The course combines theoretical understanding with extensive hands-on practice through laboratory sessions.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
					Internal Marks			External Marks		
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	T	CE	P	T	P	
2	-	2	-	3	20	20	20	60	30	150

SEE- Semester End Examination, CIA- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) ,T - Teaching hours

Sr.	Topics	W	T
1	Foundations of AI & Prompt Engineering Introduction to AI, LLMs, and Generative AI - Overview of artificial intelligence, introduction to large language models, and understanding generative AI systems at a high level. Evolution of Language Models - Historical progression from rule-based systems to modern transformer-based models like GPT. What is Prompt Engineering - Definition, importance, and real-world applications of prompt engineering across industries. Anatomy of a Prompt - Understanding prompt components: instruction, context, input data, and output format specifications. Types of Prompts - Classification of prompts: open-ended, instructional, conversational, and role-based prompts. How LLMs Generate Responses - Technical overview of tokens, temperature, top-p sampling, and other generation parameters.	20	6

2	Core Prompting Techniques Zero-Shot Prompting - Techniques for asking questions without providing examples. One-Shot and Few-Shot Prompting - Guiding model behavior through strategic use of examples. Chain-of-Thought (CoT) Prompting - Eliciting step-by-step reasoning from language models. Instruction-Based Prompting - Imperative framing techniques and achieving clarity in instructions. Role Prompting - Assigning personas and roles to models for context-appropriate responses. Contextual Prompting - Providing background information for enhanced output quality. Negative Prompting - Specifying what the model should avoid in its responses. Iterative Prompting - Refining outputs through systematic follow-up instructions.	27	8
3	Prompt Design Principles Clarity and Specificity - Understanding why vague prompts fail and techniques for precise prompt construction. Constraints and Format Control - Requesting specific output formats: JSON, bullet points, tables, word limits. Decomposing Complex Tasks - Breaking large requests into manageable sub-prompts for better results. Prompt Chaining - Sequential prompting where output from one prompt feeds into the next. Managing Hallucinations - Detection strategies and mitigation techniques for factual inaccuracies. Bias in LLM Outputs - Recognizing and reducing unintended bias in model responses.	20	6
4	Advanced Prompting Strategies Tree of Thoughts (ToT) Prompting - Exploring multiple reasoning paths for complex problem-solving. ReAct Prompting - Combining reasoning and action steps in prompt design. Self-Consistency Prompting - Sampling multiple outputs and selecting optimal responses. System Prompts and Meta-Prompting - Configuring model behavior at a higher architectural level. Retrieval-Augmented Generation (RAG) Concepts - Introduction to combining prompts with external knowledge sources.	17	5
5	Domain-Specific Applications Prompt Engineering for Code Generation - GitHub Copilot-style prompting techniques and AI-assisted debugging. Prompt Engineering for Education - Quiz generation, lesson planning, and educational explanation prompts. Prompt Engineering for Data Analysis - Using LLMs for data interpretation, SQL generation, and chart creation. Prompt Engineering for Content Creation - Professional writing: blogs, emails, summarization, and translation tasks.	13	4

6	Evaluation, Ethics & Capstone Evaluation, Ethics, and Responsible AI - Metrics for prompt quality assessment (accuracy, relevance, coherence); prompt versioning and documentation; ethical considerations including prompt injection risks.	3	1

Reference Books

1.	Alto, V. (2024). *Building LLM Apps.* Packt Publishing. Useful for advanced modules on RAG and chaining techniques.
2.	Foster, D. (2023). *Generative Deep Learning* (2nd ed.). O'Reilly Media. Provides strong theoretical background on how LLMs work
3.	Taulli, T. (2024). *AI-Assisted Programming.* O'Reilly Media. Excellent companion for code generation practical labs.
4.	Hunter, N. (2023). *The Art of Prompt Engineering with ChatGPT.* Clear, accessible introduction suitable for both technical and non-technical learners.
5	Phoenix, J., & Taylor, M. (2024). *Prompt Engineering for Generative AI.* O'Reilly Media. Best beginner- friendly textbook covering all core techniques with practical examples.

Sr. NO.	Experiment List
1	Interface Exploration Lab Hands-on exploration of ChatGPT/Gemini interfaces; experimentation with different prompt types and observation of output variations by changing temperature and phrasing.
2	Zero-Shot vs Few-Shot Comparison Lab Comparative analysis of same tasks using different prompting strategies; evaluation of output quality across approaches.
3	Chain-of-Thought Lab Application of CoT prompting to mathematical problems, logical puzzles, and step-by-step reasoning tasks.
4	Role Prompting Lab Development of specialized agents: customer support bot, educational tutor, and code reviewer using role-based prompts.
5	Format Control Lab Generation of outputs in multiple structured formats: JSON, Markdown, HTML, and tabular representations.
6	Prompt Chaining Lab Building a 3-step pipeline: outline generation → draft creation → summarization for a research topic.
7	Hallucination Detection Lab Identification of factual errors in LLM responses and crafting prompts that minimize hallucinations.

8	ToT and Self-Consistency Lab Complex decision-making scenarios with multiple solution paths and consistency verification
9	System Prompt Design Lab Building a domain-specific assistant (e.g., coding tutor) using system-level instructions.
10	Code Generation Lab Writing Python functions, debugging code, and generating unit tests using prompt engineering.
11	Education Content Lab Generation of multiple-choice questions, lesson plans, and concept explanations for computer science topics.
12	Data Analysis Lab Using LLMs to write SQL queries and interpret dataset descriptions.
13	Content Creation Lab Drafting professional emails, blog posts, and summaries using prompt templates.
14	Prompt Evaluation Lab Creation of scoring rubrics and comparison of five different prompting strategies on identical tasks.
15	Capstone Project End-to-end project where students design a prompt-based application (e.g., interview prep bot, course assistant, code reviewer), document design decisions, and present results.

Course Outcome

After Learning the Course the students shall be able to:

1. Demonstrate proficiency in designing effective prompts for various LLM applications
2. Apply appropriate prompting techniques based on task requirements
3. Evaluate and iterate on prompt designs to improve output quality
4. Understand the ethical implications and limitations of generative AI
5. Build practical applications leveraging prompt engineering principles

Course: BTech

Prerequisite: **Semester: 1**

Rationale : The main objective of this subject is introductory treatment of the field of Electrical and Electronics Engineering to the students of various branches of engineering

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	-	2	-	4	40	20	20	60	30	150

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	DC Circuits Concepts of Electrical Current, Voltage, Power and Energy. Electrical circuit elements (R, L and C), voltage and current sources, - Ohm's Law and Kirchhoff"s Laws, simplifications of networks using series and parallel resistance circuits and its examples, star-delta conversions. Superposition, Thevenin's and Norton Theorems.	20	10
2	AC Circuits Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak (maximum), average and R.M.S. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors, examples based on theory. Analysis with phasor diagrams of R, L, C, R-L, R-C and R-L-C series circuits and it's example. study of parallel R-L, R-C and R-L-C circuit, concept of impedance , admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, Resonance in series and parallel circuits. Q-factor. concept of active, reactive and apparent power and power factor. Concept of three-phase supply and phase sequence. Voltages, currents and power relations in three-phase balanced star-connected loads and delta-connected loads along with phasor diagrams with examples.	30	13
3	Diode and Transistors Introduction to Ideal Diode, Effect of temperature Ideal diodes, unbiased diode and Forward and reverse bias of Diode. PIV, surge current, Diode as Uncontrolled switch. Rectifiers: Half wave, Full wave, and bridge wave. Ripple factor, PIV rating. Choke and Capacitor input filter rectifiers, Clipper and Clamper circuits, Construction and working of BJT, Characteristics & specifications of BJT (PNP & NPN transistors), Biased and unbiased BJT, Configuration of the transistor, the concept of gain & BW, Operation of BJT in the cut-off, saturation & active regions (DC analysis), BJT as a switch, Transistor as an amplifier, Voltage divider bias and analysis, VDB load line and Q point.	30	12
4	Voltage Regulators and Transducers Basic series and shunt regulator, Types of voltage regulator IC: Fixed and adjustable positive and negative linear voltage regulator, IC linear fixed voltage regulator (78XX, 79XX,) Linear Adjustable Regulator, DC Regulated Power supply.Introduction of Transducers. Types of Transducers and its applications	20	10
	Total	100	45

Reference Books	
1.	A textbook of Electrical technology Vol2 by B.L.Theraja | S. Chand Publication (TextBook) By B.L.Theraja | S. Chand Publication
2.	Electrical Engineering Fundamentals (Text Book) By V. D. Toro | Prentice Hall India | 2, Pub. Year 198 By V. D. Toro | Prentice Hall India
3.	Electrical and Electronics Technology by E. Hughes | Pearson | 10, Pub. Year 2010 By E. Hughes | Pearson
4.	Basic Electrical Engineering by D. P. Kothari and I. J. Nagrath, | Tata McGraw Hill | 3, Pub. Year 2010 (TextBook) By D. P. Kothari and I. J. Nagrath | Tata McGraw Hill
5.	Basic Electrical Engineering by D. C. Kulshreshtha | McGraw Hill | 1, Pub. Year 2009 By D. C. Kulshreshtha | McGraw Hill
6.	Introduction to Electrical Engineering by M.S Sarma, Oxford university press 2001 By M.S Sarma | Oxford university press 2001

Course Outcome
After Learning the Course the students shall be able to:
Apply fundamental electrical laws and circuit theorems to electrical circuits. Analyse single-phase and three phase AC circuits Evaluate the operating regions of BJTs through DC analysis and Q-points using load line analysis Design DC-regulated power supplies using voltage regulators and introduce various transducers with operation.

List of Practical	
1.	To study about various electrical and electronics symbols and demonstrate various measuring instruments used in electrical & electronics laboratories.
2.	Verification of superposition theorem with DC source.
3.	Verification of Thevenin's theorem with DC source.
4.	To experimentally investigate the behaviour of a series RLC circuit under AC excitation.
5.	Verification of current and voltage relations in three-phase balanced star and delta-connected loads
6.	To plot V-I characteristics of the P-N junction diode.
7.	To perform half wave rectifier with and without filter.
8.	To perform full wave rectifier with and without filter
9.	To plot and study input-output characteristics of the Common Emitter (CE) configuration of the transistor
10.	To perform and observe the response of voltage regulator IC 7805

Course: BTech

Prerequisite: Knowledge of English Language studied till 12th standard

Rationale : Basic Communication Skills are essential for all Engineers **Semester: 1**

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
-	-	2	-	1	-	-	20	-	30	50

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Parts of Speech, Punctuation Overview of 8 parts of speech Basic punctuation marks and their usage Importance of grammar in writing	10	4
2	TensesTypes: Present, Past, Future Forms and correct usage Common tense errors	8	2
3	Phrase and Clauses; Types of Sentences (Structure Wise)Difference between phrases and clauses Classification of Simple, Compound & Complex Interchange of Simple to Compound, Simple to Complex, Compound to Complex	10	4
4	Picture PerceptionObserving and interpreting images Building a short story or description Improving vocabulary and creativity	15	4
5	Paragraph DevelopmentStructure: topic sentence, development, conclusion	8	2
6	Meeting and Greeting (Initiating a conversation)Basic conversation skills Formal and informal greetings Common phrases for starting interactions	7	2
7	Reading Comprehension (Basic Level)Types – Skimming & Scanning Reading short passages Identifying main ideas and details Answering basic questions	12	4
8	Listening Comprehension (Basic Level)Listening to short audios/Conversation Understanding and responding to key information	8	2
9	Extempore SpeechSpeaking on random topics Organizing thoughts quickly Improving fluency and confidence	15	4
10	Goal Setting and TrackingSetting SMART goals Planning and tracking progress Self-assessment and reflection	7	2
	Total	100	30

Reference Books	
1.	English Grammar in Use (TextBook) By Murphy, Raymond | Cambridge University Press, Pub. Year 2019
2.	A Practical English Grammar (TextBook) By Thomson & Martinet | Oxford University Press, Pub. Year 1986
3.	The St. Martin's Guide to Writing By Rise B. Axelrod & Charles R. | Cooper, Bedford/St. Martin's, Pub. Year 2021
4.	Tactics for Listening (Basic) By Jack C. Richards | Oxford University Press, Pub. Year 2011
5.	Active Skills for Reading: Book 1 By Neil J. Anderson | Cengage Learning, Pub. Year 2013
6.	Speak with Impact By Allison Shapira | HarperCollins Leadership, Pub. Year 2018

Course Outcome
After Learning the Course the students shall be able to:
1. Enable students to apply essential grammar rules for accurate and effective communication. 2. Develop ability to construct clear and coherent sentences and paragraphs using varied sentence structures. 3. Enhance reading and listening comprehension through identification of main ideas, details, and contextual meanings. 4. Build s confidence in everyday communication using appropriate greetings, expressions, and speaking skills. 5. Encourage creative and logical thinking through picture perception and extempore activities. 6. Help students set and track realistic personal and academic goals for continuous self-improvement.

Course: BTech

Prerequisite:

Rationale : -

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
12	-	-	-	0	50	50	-	-	-	50

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Activities in Mathematics Exploring 3D Shapes (Cylinder, Cone, Cube, Cuboid) The Geometry of Conic Sections: Properties and Applications Measuring the Height of a Tree or Building Using Trigonometry Techniques for Measuring Top and Bottom Angle Reflections Fundamental Elements of Set Theory Set Theory Tools for Probability Analysis Key Concepts in Combinatorial Mathematics Probability Fundamentals: Key Ideas and Concepts Foundations of Statistical Theory: Key Concepts Explained Principles of Geometric Progressions and Series Matrix Application in Cryptography An experimental approach to measure velocity and acceleration Analysing Rate of Change and Optimisation Utilising Integration for Problem Solving A B C of Tangrams	25	12
2	Activities in Communication SkillsPhase-1: Part of Speech, Articles, Tenses, Basic Sentence Formation Phase-2: Verb, Subject Verb Agreement, Active Passive Voice, Idioms and Phrases Phase-3: Introduction to IKS, Indian ways of Speaking and Listening, Healthy Daily Life: The Indian Way, Indian Achievers and Inovations	25	12
3	Activities in Computer Science Computer Basic Architecture: Introduction to Computer Systems, Von Neumann Architecture, Components of a Computer: CPU, Memory, I/O devices, Data Representation and Number Systems, Registers, ALU, Control Unit, Memory Hierarchy: Cache, RAM, ROM, Secondary Storage Indian Knowledge System in Context of Computing: Historical Contributions of Indian Scholars to Mathematics and Computing, Algorithms in Ancient Indian Texts, Concept of Zero and Decimal Number System, Indian Logic and Computation Models, Sanskrit Computational Models and Grammar, Traditional Indian Computing Tools and Techniques, Integration of Traditional Knowledge with Modern Computing Emerging Technologies in Computer Engineering: Introduction to Artificial Intelligence and Machine Learning, Internet of Things (IoT), Blockchain Technology, Quantum Computing Basics, Edge Computing and Cloud Computing Advances, Cybersecurity Trends and Challenges, 5G and Networking Innovations, Bioinformatics and Computational Biology, Robotics and Automation in Computing.	25	12
4	Activities of Physics Measurement, Electrostatics, Electromegnetics, Optics, Leaser and Fiber Optics, Vedic Physics and Cosmology	25	12
	Total	100	48

Course: BTech

Prerequisite: Data Structures and Algorithms, Good working knowledge of C, and Fundamentals of Computer Systems.

Rationale : This course is an introduction to the theory and practice behind modern computer operating systems. Topics will include what an operating system does (and doesn't) do, system calls and interfaces, processes, concurrent programming, resource scheduling and management, virtual memory, deadlocks, and algorithms, programming, and security. We will approach the subject from both a theoretical perspective as well as a practical one.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	2	-	4	40	20	20	60	30	150

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	System Software Operating system, I/O manager, Assembler, Compile, Linker, Loader	5	2
2	Fundamentals of Operating System: OS services and Components, Multitasking, Multiprogramming, Timesharing, Buffering, Spooling, Distributed OS, Real-time OS	10	4
3	Process and Thread Management Concept of process and threads, Process states, Process management, Context switching, CPU Scheduling Algorithms, Interaction between processes and OS, Multithreading.	10	5
4	Concurrency Control: Concurrency and Race Conditions, Mutual exclusion requirements, Software and hardware solutions, Semaphores, Monitors, Classical IPC problems and solutions, Deadlock: Characterization, Prevention, Detection, Avoidance and Recovery.	20	12
5	Memory Management: Memory partitioning, Swapping, Paging, Segmentation, Virtual Memory Overlays, Demand paging, Performance of Demand paging, Virtual memory concepts, Page replacement algorithms, Allocation algorithms.	15	8
6	I/O Systems: Principles of I/O Hardware: I/O devices, Device controllers, And Direct memory access, Principles of I/O Software: Goals o Interrupt handlers, Device drivers, Device independent I/O software, Secondary Storage Structure: Disk structure, Disk scheduling, Disk management, Swap-space management, Disk reliability, Stable storage implementation, introduction to Clock: Clock hardware, Clock software.	15	6
7	File Systems: File concept, File support, Access methods, Allocation methods, Directory systems, File protection, Free space management.	15	6
8	Protection & Security: Goals of protection, Domain of protection, Access matrix ,Implementation of access matrix ,Revocation of access rights ,The security problem, Authentication, One-Time passwords, Program threats, System threats, Threat monitoring ,Encryption ,Computer-security classifications	10	5
	Total	100	48

Reference Books	
1.	Operating System Concepts By Abraham Siberschatz | Wiley | Fifth
2.	Operating Systems By Stalling W, | Prentice Hall India | Seventh Edition
3.	Operating Systems Design & implementation By Andrew S.Tanenbam, Albert S. Woodhull | Pearson
4.	Modern Operating Systems By Tanenbaum A.S | PHI | Third Edition
5.	UNIX By Sumitabha Das
6.	Unix Shell Programming By Yashwant Kanetkar | BPB publications

Course Outcome
After Learning the Course the students shall be able to:
After learning the course the students shall be able to: 1. Distinguish different styles of operating system design. 2. Understand device and I/O management functions in operating systems as part of a uniform device abstraction. 3. Have an understanding of disk organisation and file system structure 4. Give the rationale for virtual memory abstractions in operating systems. 5. Understand the main principles and techniques used to implement processes and threads as well as the different algorithms for process scheduling. 6. Understand the main mechanisms used for inter-process communication. 7. Understand the main problems related to concurrency and the different synchronization mechanisms available. 8. Have the ability to evaluate security risks in operating systems and understand the role operating systems can and should play in establishing security.

List of Practical	
1.	Study of Basic commands of Linux.
2.	Write a Shell script to print given numbers sum of all digits
3.	Write a shell script to validate the entered date. (eg. Date format is: dd-mm-yyyy)
4.	Write a shell script to check entered string is palindrome or not.
5.	Write a Shell script to say Good morning/Afternoon/Evening as you log in to system.
6.	Write a C program to create a child process
7.	Finding out biggest number from given three numbers supplied as command line arguments
8.	Printing the patterns using for loop.
9.	Shell script to determine whether given file exist or not.
10.	Write a program for process creation using C. (Use of gcc compiler).
11.	Implementation of FCFS Algorithm.
12.	Implementation of Round Robin Algorithm.
13.	Implementation of Banker's Algorithm.

Course: BTech Semester: 2

Prerequisite: Data Structures and Algorithms, Good working knowledge of C, and Fundamentals of Computer Systems.

Rationale : This course is an introduction to the theory and practice behind modern computer operating systems. Topics will include what an operating system does (and doesn't) do, system calls and interfaces, processes, concurrent programming, resource scheduling and management, virtual memory, deadlocks, and algorithms, programming, and security. We will approach the subject from both a theoretical perspective as well as a practical one

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	0	1	-	-	20	-	30	50

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Outcome

After Learning the Course the students shall be able to:
1. Experiment with Linux commands and shell programming. 2. Able to build shell program for process and file system management with system calls. 3. Able to implement and analyse the performance of CPU scheduling algorithm. 4. Able to implement and analyse the performance of page replacement algorithms. 5. Able to implement and analyse the performance of deadlock avoidance and detection algorithm.

List of Practical

1.	Study of Basic commands of Linux.
2.	Study the basics of shell programming.
3.	Write a Shell script to print given numbers sum of all digits.
4.	Write a shell script to validate the entered date. (eg. Date format is: dd-mm-yyyy).
5.	Write a shell script to check entered string is palindrome or not.
6.	Write a Shell script to say Good morning/Afternoon/Evening as you log in to system.
7.	Write a C program to create a child process.
8.	Finding out biggest number from given three numbers supplied as command line arguments.
9.	Printing the patterns using for loop.
10.	Shell script to determine whether given file exist or not.
11.	Write a program for process creation using C. (Use of gcc compiler.
12.	Implementation of FCFS &Round Robin Algorithm.
13.	Implementation of Banker's Algorithm.

Course: BTech

Prerequisite: Basic Knowledge of Matrix and Determinants **Semester: 2**

Rationale : To attain the knowledge of Matrices and apply to the engineering field to check the consistency of the system. The concept of vector space helps to understand programming in field of computer engg.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
4	-	-	-	4	40	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Matrices Introduction, System of linear equations (Homogeneous and Nonhomogeneous systems) by Gauss Elimination, and LU Decomposition Method, Rank, Eigenvalues and Eigenvectors, Algebraic and Geometric Multiplicity, Diagonalization, Cayley-Hamilton theorem and Applications-coding-decoding, Principal Component Analysis (PCA).	35	21
2	Vector Space Vector spaces over the field of real numbers, Elementary Properties of Vector Spaces, Subspaces, Spanning set, Linear independence and dependence, Basis and Dimension.	20	12
3	Linear Transformation Definition of Linear Transformation from R^n to R^m Some Standard Linear Transformation, The Null Space & Column Space, The Rank-Nullity Theorem, Matrix of Linear Transformation.	25	15
4	Inner Product Spaces Inner-product spaces, norm and its properties, angle between two vectors, orthogonal vectors, orthonormal vector, Gram-Schmidt process, orthonormal basis.	20	12
	Total	100	60

Reference Books

1.	Elementary Linear Algebra with Applications, (TextBook) By H. Anton | John Wiley
2.	Linear Algebra and Its Applications By G. Strang | Brooks/Cole India
3.	Advanced Engineering Mathematics By Erwin Kreyszig | Willey India Education
4.	Linear Algebra, By K. Hoffman and R. Kunze, | Prentice Hall
5.	Calculus By T.M. Apostol | John Wiley Publication | Vol. II
6.	Linear Algebra: A Modern Introduction, By D. Poole, | 2nd Edition, Brooks/Cole

Course Outcome
After Learning the Course the students shall be able to:
1. Understand system of linear algebraic equation and solution techniques using matrix. 2. Exhibit the understanding of vector space and subspace and solve related problems. 3. Compute eigenvalues and eigenvectors and diagonalize the matrix 4. Create orthogonal and orthonormal bases: Gram-Schmidt process and use bases and orthonormal bases to solve application problem.

Course: BTech Semester: 1

Prerequisite: Knowledge of Physics and some basic concepts in Mathematics like differentiation, integration, limit, differential equation, vector calculus up to 12thscience level.

Rationale : Knowledge of physics is essential for all Engineering branch because physics is the foundation subject of all the branches of engineering and it develops scientific temperament and analytical capability of engineering students. Comprehension of basic physics concepts enables the students to solve engineering problem logically and develop scientific approach.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	-	2	0	4	40	20	20	60	30	150

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Band theory& Semiconductors Band structure of solid materials, E-k diagram, Direct and Indirect band gap, Effective mass, Concept of Fermi Energy, Density of state, Fermi Level in Intrinsic and Extrinsic Semiconductors, Ohmic and Schottky Junction	25	11
2	Optoelectronics Interaction of radiation with Matter, Absorption, Spontaneous and Stimulated emission, Characteristics of Lasers, Diode Laser, LED, Photodiode and their applications. Principle and Structure of Optical Fiber, Numerical Aperture of fiber, Types of Optical Fibers, Attenuation in Optical Fibers, Applications of Optical Fibers.	25	11
3	Quantum Mechanics & Quantum ComputingQuantum postulates, wave function, Schrodinger's equation time dependent, independent (No derivation), One dimensional potential well, quantum tunneling and its application in soft computing Key Principles of Quantum Computing, Difference between classical and quantum computing, Quantum Computing advantages Challenges and Application.	30	13
4	Low Dimensional Materials Basic characteristic including synthesis, properties, quantum confinement, classification: Quantum Dot, Quantum well , Quantum Wire and their applications, Novel Materials and their applications	20	10
	Total	100	45

Reference Books

1.	Physics of Semiconductor Devices (TextBook) By S. M. Sze and K. N. Kwok | John Wiley & Sons
2.	Semiconductor Optoelectronic Devices By P. Bhattacharya | Prentice Hall of India, Pub. Year 1997
3.	Engineering Physics (TextBook) By B.K.Pandey S Chaturvedi and M. Venkanna | - Cengage Publication
4.	Semiconductor Optoelectronics (TextBook) By J. Singh | McGraw-Hill Inc, Pub. Year 1995

Course Outcome

After Learning the Course the students shall be able to:

- To conceptualize semiconducting materials on the basis of band theory.
- To get familiar with optical fibres and semiconductor based optoelectronic devices useful in fibre optic system.
- To conceptualize the foundational principles of quantum Physics and their role in quantum computing.
- Formulate and conceptualize various theoretical aspects and the physical phenomena at Low dimensional level (nano)

List of Practical	
1.	I-V characteristics of light emitting diode in forward bias.
2.	I-V characteristics of Zener diode in reverse bias.
3.	Determination of Velocity of ultrasonic waves in water.
4.	Determination of Dielectric constants of Dielectric samples.
5.	Measurement of Band gap of semiconductor material.
6.	Measurement of Hall coefficient and carrier concentration in semiconductor material.
7.	Measurement of Planck’s constant using LED.
8.	Measurement of wavelength of laser light using diffraction grating.
9.	Measurement of Numerical aperture of an optical Fiber.
10.	Determination of the size of lycopodium powder particles.
11.	Measurement of power loss in an optical fibre.
12.	Moment of Inertia of a flywheel.
13.	Young’s Modulus by bending of beam.

Course: BTech

Prerequisite: Basic knowledge of programming

Semester: 2

Rationale : This course is designed to provide knowledge of platform independent object oriented programming language. Java is a base language for advanced technology like three tier architecture applications, cloud computing and web development.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/	Tutorial Hrs/	Lab Hrs/	Seminar Hrs/	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	-	3	40	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	FUNDAMENTALS - I Review of OOP - Objects and classes in Java , Defining classes, Methods, Access specifiers, Static members, Constructors,Garbage collection, Arrays, Strings, Packages.	25	14
2	FUNDAMENTALS - II Inheritance ,Class hierarchy, Polymorphism, Dynamic binding, Final keyword ,Abstract classes , Object class , Reflection, Interfaces,Object cloning ,Inner classes ,proxies, Streams, I/O Programing.	30	12
3	EVENT DRIVEN PROGRAMING Graphics programming,Frame,Components,Working with shapes, Using color, fonts, and images,Basics of event handling,Event Handlers, Adapter classes,Actions, Mouse Events, AWT Event Hierarchy, Introduction to Swing, Model-View- Controller, Design pattern ,Buttons, Layout Management , Swing Components.	15	6
4	GENERIC PROGRAMMING Motivation for generic programming ,Generic classes,Generic methods, Generic code and virtual machine, Exceptions ,Exception hierarchy, Throwing and catching exceptions ,Stack Trace Elements.	15	10
5	CONCURRENT PROGRAMMING Multithreaded programming,Interrupting threads,Thread states,Thread properties,Thread-Synchronization,ThreadsafeCollections, Executors,Synchronizers, Threads and Event-Driven programming.	15	10
	Total	100	52

Reference Books

1.	Introduction to Java Programming (Comprehensive Version) (TextBook) By Daniel Liang | Pearson
2.	Core Java Volume-II Fundamentals By Horstmann & Cornell | Pearson
3.	Complete Reference Java 2 (TextBook) By Herbert Schildt | TMH

Course Outcome
After Learning the Course the students shall be able to:
After learning the course the students shall be able to: 1. Understand the principles and practice of object oriented programming. 2. Write, compile and debug programs with Java compiler. 3. Create a robust application using exception handling. 4. Design different components and make it event driven by using AWT and Swing. 5. Understand the principles of synchronization and design application using multi threading.

Course: BTech

Prerequisite: Basic knowledge of programming

Semester: 2

Rationale : This course is designed to provide knowledge of platform independent object oriented programming language. Java is a base language for advanced technology like three tier architecture applications, cloud computing and web development.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/	Tutorial Hrs/	Lab Hrs/	Seminar Hrs/	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	4	-	2	-	-	20	-	30	50

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Outcome

After Learning the Course the students shall be able to:
After learning the course the students shall be able to: 1. Understand the principles and practice of object oriented programming. 2. Write, compile and debug programs with Java compiler. 3. Create a robust application using exception handling. 4. Design different components and make it event driven by using AWT and Swing. 5. Understand the principles of synchronization and design application using multi threading.

List of Practical

1.	Write a program to count the number of words that start with a capital letter.
2.	Write a program to find the largest number in an array of numbers using command line arguments.
3.	Write a program to demonstrate class and objects using the concept of an array object.
4.	Write a program to demonstrate garbage collection using System.gc() or Runtime.gc().
5.	Write a program to demonstrate static constants and final constants.
6.	Write a program to explain static polymorphism in java.
7.	Write a program to find the factorial of a number using interface.
8.	Write a program to design student registration form using AWT components.
9.	Write a program to demonstrate array index out of bounds exception.
10.	Write a program to demonstrate class object locking using method level synchronization.

Course: BTech

Prerequisite: Basic Computer Knowledge and Physics

Semester: 2

Rationale : This course is design to provide basic knowledge of Electronics components and computer components. This course helps in learning problem solving process of Electronics circuits and Computer.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
-	-	2	-	1	-	-	20	-	30	50

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Outcome

After Learning the Course the students shall be able to:
CO1: Gain ability to understand the working of Electronics Components CO2: Ability to understand the operating of various testing and measurement instrumentation. CO3: Ability to use Power Supply CO3: Ability to learn working and use of different IoT sensors CO4: Ability to design electronic circuit for the specific applications.

List of Practical

1.	Introduction to Breadboard and Digital Multi Meter, Verify the circuit analysis (voltage and current)
2.	Identification, symbolic representation and testing of various electronics components.
3.	To study CRO and Function generator with specifications.
4.	To verify Ideal Value and practical value of voltage regulator ICs.
5.	Introduction to Arduino IDE with LED Blinking
6.	Interfacing Button-Controlled LED with Arduino board.
7.	Buzzer Alarm System Using Arduino.
8.	Demonstrate the function of LCD Display Interfacing with Arduino.
9.	Relay-Based ON/OFF Control System with Arduino
10.	Demonstrate the working of Temperature Sensor-DHT11
11.	Demonstrate the working of Ultrasonic Distance Measurement sensor.
12.	Verify the functionality of water flow sensor
13.	Demonstrate the working of PIR Sensor using Arduino.
14.	Project based on electronics components and sensors

Miscellaneous

Open Ended Problems

Mini Projects based on students' choice

Course: BTech

Prerequisite: Basic Communication Skills are essential for all Engineers

Semester: 2

Rationale : Strengthen core language and soft skills through applied grammar, communication tasks, and vocabulary building.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
1	-	2	-	2	40	-	20	60	30	150

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Subject Verb Agreement Rules of subject-verb matching Singular vs plural forms Common agreement errors	10	1
2	Reported Speech Direct and indirect speech Changing tenses, pronouns, and time expressions Reporting statements, questions, and commands	10	1
3	Active and Passive Voice Difference between Active and Passive Rules for converting sentences Usage in real-life contexts	10	1
4	Building Vocabulary Word meanings and usage Synonyms and antonyms Homonyms, Homophones, Homographs, Idioms	10	2
5	Grooming and Personality Development Importance of dressing and professional etiquette Building confidence and positive body language	10	2
6	SWOT Analysis with Self Introduction Identifying strengths, weaknesses, opportunities, threats Preparing and delivering a confident self-introduction Developing self-awareness and a growth mindset	10	2
7	Reading Comprehension (Intermediate Level) Understanding written texts Finding main ideas and supporting details Answering questions accurately	10	2
8	Listening Comprehension (Intermediate Level) Listening for specific information	10	1

	Identifying tone and purpose Responding appropriately		
9	Essay Writing Structure of an essay: introduction, body, conclusion Organizing ideas logically Using appropriate language and tone	10	2
10	Time Management Importance of managing time Prioritization Creating schedules	10	1
	Total	100	15

Reference Books

1.	Technical Communication: Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford University Press | 2nd Edition
2.	Personality Development and Soft Skills By Barun K Mitra | Oxford, 2011
3.	High School English Grammar and Composition By Wren & Martin | S. Chand Publishing, Pub. Year 2017
4.	English Grammar in Use By Raymond Murphy | Cambridge University Press, Pub. Year 2019
5.	Communication Skills and Soft Skills By Suresh Kumar | Pearson Publication, 2010

Course Outcome

After Learning the Course the students shall be able to:
Remember the essential rules of English grammar and core vocabulary required for accurate communication. Understand spoken and written texts at an intermediate level to grasp meaning, ideas, and context. Apply grammatical structures, vocabulary, and writing skills in essays, self-introductions, and everyday communication. Analyze personal strengths and weaknesses through SWOT analysis to enhance grooming and personality development. Analyze communication habits and daily routines to improve time management and professional effectiveness.

List of Practical	
1.	Subject Verb Agreement a. Fill-in-the-blank exercises b. Sentence correction tasks c. Group quiz competition d. Role-play using correct subject-verb forms
2.	Reported Speech a. Dialogue conversion practice b. Pair work: narrate a conversation c. Reporting classroom news d. Role-play followed by reporting
3.	Active and Passive Voice a. Transform active sentences to passive and vice versa b. Rewrite instructions in passive voice c. Classroom narration using passive structures d. Group activity: change story voice
4.	Building Vocabulary a. Daily word journal b. Vocabulary flashcards and games c. Synonym-antonym match-up d. Word building through storytelling
5.	Grooming and Personality Development a. Personal grooming checklist task b. Group discussion on personality traits c. Mock social interaction d. Confidence-building exercises
6.	SWOT Analysis with Self Introduction a. SWOT worksheet filling b. Self-introduction in pairs or groups c. Strength-sharing circle d. Feedback on introductions
7.	Reading Comprehension (Intermediate Level) a. Reading passage followed by Q&A b. Find-the-theme activity c. Vocabulary hunt from the passage d. Summarizing a short text
8.	Listening Comprehension (Intermediate Level) a. Listen and answer exercises b. Listening and completing notes c. Audio-based MCQs d. Paraphrasing what was heard
9.	Essay Writing a. Brainstorming and outline creation b. Writing on guided topics c. Peer feedback session d. Editing and final draft submission
10.	Time Management and Team Building a. Create a weekly schedule b. Prioritization task (urgent vs important) c. Reflection on time use habits

Course: BTech

Prerequisite: Basic knowledge of social media, privacy and security.

Semester: 2

Rationale : The course explores the fundamentals of Online Social Networks (OSNs), focusing on data collection, analysis, trust, security, and privacy.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	-	-	-	3	40	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Introduction to Online Social Networks Definition and Evolution of Online Social Networks (OSNs), Data Collection from Social Networks, Challenges, Opportunities, and Pitfalls in OSNs, Social Media APIs for Data Extraction.	20	8
2	Data Collection and Analysis in OSNs Techniques for Collecting Data from Online Social Media, Ethical Considerations in Social Media Data Collection, Data Processing and Cleaning for Analysis, Case Studies on Social Media Data Collection.	20	8
3	Trust, Credibility, and Reputation in Social Systems Understanding Trust and Credibility in Online Communities, Reputation Systems and Their Impact on User Behavior, Detecting Misinformation and Fake News in OSNs, Methods for Enhancing Trustworthiness in Social Media.	20	8
4	Security, Privacy, and Fraud Detection in OSNs Online Social Media and Its Role in Law Enforcement & Policing, Information Privacy: Disclosure, Revelation, and Its Effects, Phishing Attacks in OSNs and Their Countermeasures, Identifying Fraudulent Entities and Fake Profiles in OSNs.	20	8
5	Research and Practical ApplicationsReview and Discussion of Key Topics (Refresher), Analyzing Real-World OSN Case Studies, Research Paper Discussions on Online Social Networks and Security, Future Trends in OSN Security and privacy	20	8
	Total	100	40

Reference Books

1.	"Social Media Mining: An Introduction" – Reza Zafarani, Mohammad Ali Abbasi, Huan Liu: Provides a comprehensive introduction to social media data mining, including machine learning and network analysis techniques.
2.	Mining the Social Web" – Matthew A. Russell: Covers data collection, analysis, and visualization techniques using Python and APIs from platforms like Twitter, Facebook, and LinkedIn.
3.	Security and Privacy-Preserving Techniques in Social Networks" – Barbara Carminati & Elena Ferrari Explores security challenges, privacy risks, and trust management in online social networks.

Course Outcome
After Learning the Course the students shall be able to:
1. Understand Online Social Networks and Data Collection – Explain the fundamentals of online social networks, data collection methods, and the challenges and opportunities associated with them. 2. Analyze Trust, Credibility, and Reputation in Social Systems – Evaluate the role of trust and reputation in online communities and develop strategies to detect misinformation and enhance credibility. 3. Examine Privacy and Security Risks in OSNs – Assess the impact of privacy disclosure, phishing, and fraudulent activities in social media and propose countermeasures. 4. Apply Data Collection and Analysis Techniques – Utilize social media APIs and data processing methods to extract, clean, and analyze information from online social networks. 5. Conduct Research on Emerging OSN Topics – Engage in discussions and research on social media security, privacy, and law enforcement applications, contributing to the field through case studies and research papers.

Course: MBA Semester: 2

Prerequisite: Basic understanding of economic principles and macroeconomic concepts is recommended. Familiarity with the Indian economic structure and current affairs will be beneficial but is not mandatory.

Rationale : This course is designed to provide students with a comprehensive understanding of the Indian economy's evolution, key reforms, and current challenges.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			Marks EYE		
					T	CE	P	T	P	
3	-	-	-	3	40	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Module 1Indian economy since independence; analysis of the pre- and post-reform periods of India's economic growth and development; Assessment of agriculture sector reforms; industrial reforms in a mixed economic set-up and tracing the contours of liberalization and self-reliance.	40	18
2	Module 2Socio-economic development and tax reforms; Financial sector reforms and financial inclusion; Indian banking sector crisis and recent developments.	40	18
3	Module 3India and WTO regulations: Inward and outward analysis; Structural shocks and analysis of recent policy initiatives; Indian economy: Recent outlook and challenges.	20	9
	Total	100	45

Course Outcome

After Learning the Course the students shall be able to:

1. To critically assess the trajectory of India's economic development since independence and explain the impact of major sectoral reforms in agriculture and industry.
2. To evaluate the effectiveness of financial sector reforms, tax policies, and India's engagement with WTO regulations in promoting inclusive and sustainable economic growth.
3. To analyze the impact of recent policy shocks and government initiatives on the Indian economy and identify key challenges to future economic stability and growth.

Course: MBA Semester: 2

Prerequisite: A basic understanding of business, innovation, or creativity-related fields will be helpful.

Rationale : The course aims to empower future managers, entrepreneurs, and innovators to make informed IP-related decisions.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			Marks EYE		
					T	CE	P	T	P	
3	-	-	-	3	40	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Module 1Basics of Intellectual Property; The Intangible Economy; Patents—From ball pens to biologics; Trade Marks—What does red soles and barbie girl mean?; Copyright—Is it right to copy?	40	18
2	Module 2Unconventional IP—The expanding scope; Enforcement of IP—Protecting your rights; IP for Business—A profit making asset class .	40	18
3	Module 3IP, Research, and Universities; IP for the Creative and Entertainment Industries; Governments Role in Fostering IP; Teaching IP—Let everyone learn IP.	20	9
	Total	100	45

Course Outcome

After Learning the Course the students shall be able to:

1. To identify different forms of IP, understand their role in value creation, and analyze real-world examples of patents, trademarks, and copyrights.
2. To evaluate unconventional IPs, assess enforcement mechanisms, and apply business strategies to monetize intellectual assets.
3. To analyze the role of IP in research institutions and creative industries and assess the importance of policy and education in strengthening the IP framework.

Course: BTech

Prerequisite: Zeal to learn the subject.

Semester: 2

Rationale : Design, Technology, and Innovation (DT&I) subject's lies in equipping students with the skills to be creative problem- solvers and innovators in a rapidly evolving world. These subjects foster critical thinking, creative exploration, and the ability to translate ideas into tangible solutions, preparing students for future careers and societal challenges.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Seminar Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	-	-	-	3	40	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Design Thinking and Methodologies Introduction to Design Thinking:Understanding the design process, user needs, and problem definition. Design Process:Exploring different design methodologies, including brainstorming, sketching, and prototyping. Human and Culture Centered Design:Focusing on user needs, ergonomics, and user experience. Design for Social and Life style change. Concept Generation and Evaluation:Developing and evaluating design concepts through various techniques.	30	12
2	Technology and its Role in Design Technology for Design: Exploring how technology enables and enhances the design process. Specific Technologies: Relevant areas like CAD and Graphics software, 3D printing, Machining technologies, digital fabrication, and other relevant technology. Innovation in Emerging Technologies and methods like AR/VR, IOT, AI and ML, Supply Chain Management and Project Management. Technology to Solution: Understanding how technology can be leveraged to solve real-world problems. Engineering Aspect of design Electrical, Mechanical, Design, Material, Aspect, Safety and Reliability aspect, Sustainable and Eco friendly materials.	35	16
3	Innovation and EntrepreneurshipIntroduction to Innovation: Understanding the principles of innovation and its role in product development. Role of Innovation in Life and Society Grassroots Innovation: Learning from innovative solutions developed at the community level. Collaborative Innovation: Exploring how different individuals and teams can collaborate to drive innovation. Intellectual Property: Learning about patents, copyrights, and other forms of intellectual property. Business Model Development: Exploring how to develop a business model for a new product or service. Entrepreneurship: Fundamentals of starting a business and the challenges and opportunities of entrepreneurship.	35	16
	Total	100	44

Course Outcome

After Learning the Course the students shall be able to:

1. Apply design thinking methodologies to identify and solve user-centered problems.
2. Demonstrate creative thinking and effective ideation strategies.
3. Develop low-fidelity and high-fidelity prototypes and understand fabrication challenges.
4. Incorporate engineering principles into design and innovation.
5. Communicate ideas visually through sketching and graphical tools.
6. Understand the fundamentals of entrepreneurship and the startup process.