Course	Bachelor of Technology (B.Tech.)	Semester - 1
Type of Course	Engineering Science	
Prerequisite	Basic knowledge of Maths	
Course Objective	1. Student will be able to solve problem based on successive differentiation and Leibnitz rule. 2. Student will be able to understand basic concept of partial differential equation. 3. Student will be able to understand the application of partial differential equation. 4. Student will be able to explain Lagrange's Method of Undetermined Multipliers. 5. Student will be able to find the rank of matrix and able to solve system of equations	

Teaching Scheme (Contact Hours)				Assessment Scheme				
				Theory Marks				**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		**LAB**	
3	1	0	4	70	30		-	100

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

Course Content			

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Successive differentiation Expansion of functions** Review of Differentiability, Successive differentiation: nth Derivative of xm, nth Derivative of , nth Derivative of , nth Derivative of , nth Derivative of , nth Derivative of , nth Derivative of ,nth Derivative of , nth Derivative of , nth Derivative of , nth Derivative of .Use of Partial Fraction.Leibnitz theorem for the nth Derivative of the Product of two Functions (Without Proof) Determination of the value of the nth Derivative of a function for x=0	15	25
2	**Partial derivative** Function of several variables, limits & continuity, partial derivatives of the first order, partial derivatives of higher orders, differentiation of a function of a function, which variable is to be regarded as constant. Euler's theorem on homogeneous functions: homogeneous functions, Euler's theorem on homogeneous functions (without proof), total derivative, and the chain rule: Differentiation of implicit function, partial differentiation of implicit function Jacobians.	15	27
3	**Application of Partial differentiation** Geometrical Interpretation of partial Derivatives, Tangent plane and Normal line to a surface, Linearization and Linear Approximation, Partial Derivative with constrained variables, Taylor's expansions for functions of two variables, errors and approximations, Maxima and Minima of functions of two variables, working rule to find Maximum and or Minimum Values of a function f(x, y), Lagrange's method of undetermined multipliers.	15	23
4	**Matrix** Review of matrices, review of determinant, elementary row and column transformation, elementary matrices, to compute the inverse of matrices by elementary transformation (Gauss Elimination), Rank of a matrix, Normal form (Canonical form), Rank of Matrix by Triangular Form, solution of simultaneous equations, consistency of a system of linear equations, homogeneous equations, vectors, linear dependence and independence of vectors, linear dependence and independence of vectors by rank method.	15	25
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	50	20	10	10	5	5

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:

CO1	Student will be able to solve problem based on successive differentiation and Leibnitz rule.
CO2	Student will be able to understand basic concept of partial differential equation.
CO3	Student will be able to understand the application of partial differential equation.
CO4	Student will be able to explain Lagrange's Method of Undetermined Multipliers.
CO5	Student will be able to find the rank of matrix and able to solve system of equations.

Reference Books

1.	**Higher Engineering Mathematics (TextBook)** By B.V. Ramana, | TMG
2.	**Advance Engineering Mathematics (TextBook)** By R.K. Jain & S.R.K. Iyenger | Narosa Publishing House
3.	**Advanced Engineering Mathematics** By C.Ray Wylie & Louis C. Barrett, | TMG
4.	**Advanced engineering mathematics (TextBook)** By Mishra V P | V P Mishra Publishers, New Delhi 2009

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Course	Bachelor of Technology (B.Tech.)	Semester - 1
Type of Course	Skill Enhancement Courses	
Prerequisite	Basic English proficiency and a willingness to engage in personal growth and communication enhancement.	
Course Objective	1. Effective Communication: Develop proficiency in English communication for both personal and professional contexts. 2. Improve relationships and interactions through better self-awareness and interpersonal strategies. 3. Cultivate self-confidence in public speaking and presentation skills. 4. Develop leadership qualities and teamwork abilities for career advancement. 5. Foster personal growth and emotional intelligence to excel in various aspects of life.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA	LAB	
3	0	0	3	70	30	-	100

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

Course Content		T - Teaching Hours | W - Weightage		
Sr.	**Topics**		**T**	**W**
1	**Fundamentals of grammar** Parts of Speech (Noun, Pronoun, Adjective, Verb, Adverb, Conjunction, Preposition, Interjection) Article Tense: Application of tenses with respect to time, All tenses & their Sub-divisions Forming of Sentences & Clauses, "WH's Concepts, Understanding Sentences, Punctuation I, Degree of comparison I (Positive, Comparative & Superlative), Tenses (Introduction & Usage) Vocabulary (Roots, Prefix, Suffix, Homonyms, Synonyms & Antonyms)Auxiliaries, Modal Verbs		12	25
2	**Listening** Introduction, Definition of Listening, Listening vs Hearing, Process of Listening, Problems Students Face in Listening, Strategies of Listening, Barriers to Listening, Listening in the Workplace, Activities That Help you to become better listeners.		11	25
3	**Reading** Introduction, The Reading Process, Reading and Meaning, Methods to improve Reading, Strengthening your Vocabulary, Understanding Graphics and Visual Aids, Previewing, Reading in thought Groups, Avoiding the Re-reading of the same phrases, Barriers to Reading, Skills for Speed Reading, Sub-Skills of Reading, Skimming, Scanning, Extensive Reading, Intensive Reading, Reading E-Mail, E-Books, Blogs and Web Pages.		11	25
4	**Letter writing** Formal and informal; CV; Report Writing; Presentation as a skill Elements of Presentation Strategies – Audience – Objectives – Medium - Key Ideas, Structuring The Material, Organizing Content, Audio -Visual Aids – Handouts - Use of Power Point		11	25
		Total	45	100

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy				
Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:	
CO1	Develop proficiency in Englishcommunication for both personal and professional contexts.
CO2	Improve relationships and interactions through better self-awareness and interpersonal strategies.
CO3	Cultivate self-confidence in public speaking and presentation skills.
CO4	Develop leadership qualities and teamwork abilities for career advancement.
CO5	Foster personal growth and emotional intelligence to excel in various aspects of life.

Reference Books

1.	**High School English Grammar &Composition (TextBook)** By Wren & Martin | Blackie
2.	**Learn English vocabulary at a Glance** By Dr. Rakesh Bharadwaj | Dr. Rakesh Bharadwaj
3.	**Kenneth, Anderson, Tony Lynch, Joan Mac Lean. (TextBook)** By Study Speaking. | New Delhi: CUP
4.	**Effective Business Communication** By Asha Kaul | Prentice Hall – Economy Edition
5.	**Writing with a purpose (TextBook)** By Champa Tickoo and Jaya Sasikumar | oxford University Press, Mumbai

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)		Semester - 1
Type of Course	Core Courses		
Prerequisite	Basic knowledge of Physics and chemistry		
Course Objective	1. Understand the properties of Sound waves and their application in various engineering fields. 2. Analyze the properties of Dielectric and band theory of solids with its practical application. 3. Develop the ability to make proper understanding, precautions & design specific to LASER and Fiber optics components with its applications 4. Apply the knowledge of electrochemical reactions in industries 5. Analyze different polymeric materials.		

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA		
3	0	2	4	70	30	50	150

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

Course Content		**T** - Teaching Hours | **W** - Weightage	
Sr.	**Topics**	**T**	**W**
1	**Acoustics** Classification of Sound, Loudness, Weber - Fechner law, Absorption Coefficient, Reverberation, Sabine 's formula, Factors affecting acoustics of buildings and their remedies. **Basic of chemistry** Basics of electrochemistry, electrochemical reactions, study of conductors, polymerization techniques and their occurrence, and the various terminologies used in the chemistry	10	20
2	**Dielectrics & Band Theory** Dielectric constant, Polar and Non polar Molecules, Polarization of a Dielectric Material, Three electric vectors, Relation between Dielectric constant and susceptibility, Gauss's law in Dielectrics, Energy stored in dielectric field Concept of hole, Energy band structure of conductors, insulator and semiconductor, Intrinsic and Extrinsic semiconductor, types of diodes (simple diode, Zener diode).	8	15
3	**Lasers & Fibre Optics** Introduction of laser, Absorption, Spontaneous and Stimulated Emission, Relation between Einstein's 'A' and 'B' Coefficients, Population Inversion, Optical Pumping, Characteristics of laser beam, Action of laser, Ruby laser, Gaseous laser, Semiconductor laser, Application of Lasers. Introduction of Fibre Optics, Acceptance angle and numerical aperture, Types of fibre optics, Single and multiple modes, Mode of Propagation of wave in optical fibres, Attenuation, Signal loss and dispersion in Fibre optics advantages of Fibre optics	10	25
4	**Electrochemistry**	8	15

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Introduction, concept of electrochemistry, Differences between Metallic Conductors and Electrolytic Conductors, Electro chemical cell (or) Galvanic cell, Differences between Galvanic cell and Electrolytic cell., Single electrode potential, Standard electrode potential, Nernst Equation, Reference Electrodes(Quinehydrone Electrode).

Course Content		T - Teaching Hours | W - Weightage	

Sr.	Topics	T	W
5	**Material Chemistry**	10	25
	Introduction, Polymers-classification with examples, polymerization-addition, condensation and co- polymerization		
	Plastics: Thermoplastics and thermosetting plastics; Compounding of plastics; Preparation, properties and applications of Nylon-6, 6		
	RUBBER:-Natural rubber its process and vulcanization, elastomers, Buna-s		
	Lubricants: Classification with examples, properties- viscosity, flash, fire, cloud and pour point		
	Total	46	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy				
Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	20	20	20	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes	
At the end of this course, students will be able to:	
CO1	Understand the properties of Sound waves and their application in various engineering fields.
CO2	Analyze the properties of Dielectric and band theory of solids with its practical application.
CO3	Develop the ability to make proper understanding, precautions & design
CO4	Apply the knowledge of electrochemical reactions in industries
CO5	Analyze different polymeric materials

Reference Books	
1.	**Engineering Physics (TextBook)** By G.VIJAYAKUMARI | VIKAS | 8th
2.	**Engineering Physics** By K. RAJGOPALAN
3.	**Engineering Physics (TextBook)** By ABHIJIT NAYAK VIKAS
4.	**Engineering Physics** By R.K.GAUR
5.	**Essentials of Physical chemistry (TextBook)** By B. S. Bahl & Arun Bahl | S Chand, 2012
6.	**Engineering Chemistry** By Jain and Jain
7.	**'Vogel's Textbook of Quantitative Chemical analysis' (TextBook)** By G. H. Jeffery, J. Bassett, J. Mendham & R. C. Denney 5/E, ELBS (English Language Book Society) Longm

Dean
Raj School of Engineering
Rai University. Ahmedabad.

List of Practical	
1.	Physics :- To observe and draw the V-I characteristic of a PN Junction diode in forward bias and reverse bias.
2.	To observe and draw the V-I characteristic of a Zener diode in forward bias and reverse bias.
3.	To study x-rays diffraction.
4.	To determine the particle size of the given lycopodium powder using laser diffraction method.
5.	To determine the wavelength of the given laser source of light using grating.
6.	To study the Bragg law using X-ray diffraction method.
7.	Chemistry :- Determination of alkalinity in the given water sample.
8.	Identification of Functional groups in Organic Compound systematic procedure
9.	Estimation of Chloride contents in Water sample – Argentometric Method.
10.	Estimation of Dissolved Oxygen (DO) in water Sample (Winkler's method).
11.	Estimation of Hardness of Water sample – EDTA Method.
12.	Determination of approximate pH of a given solution using pH indicators
13.	Determination of Molecular Weight and Degree of Polymerization – Viscometry Method.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	Semester - 1
Type of Course	Core Courses	
Prerequisite		
Course Objective	1. To objective is to impart training to help the students to develop engineering skill on basic topics of mechanical engineering. By this course student can gain knowledge of basic equipment knowledge. 2. To Looking the wide field of the engineering there is a need of basic mechanical course.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	3	70	30	50	150

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

Course Content			

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction** Prime movers, Sources of energy, Types of prime movers, Pressure, Work, Power, temperature, Systems and control volumes, thermodynamic properties, state and equilibrium processes and cycles, Enthalpy, Entropy, Efficiency, zeroth law of thermodynamics. Forms of Energy, energy transfer by work and heat, First and second law of thermodynamics	6	13
2	**Properties of gases** Gas laws, Boyle's law, Charle's law, Combined gas law, Gas constant, Internal energy, Relation between Cp and Cv, Enthalpy, Non flow process, Constant volume process, Constant pressure process, Isothermal process, Polytropic process, Adiabatic process.	5	12
3	**Properties of Steam** Introduction, Steam formation, Types of Steam, Enthalpy, Specific volume of steam and dryness fraction of steam, Internal energy, Steam tables, Measurement of dryness fraction, Bucket calorimeter, Throttling calorimeter, Separating calorimeter, Combined calorimeter.	6	13
4	**Heat Engines** Heat Engines and their classifications, working substances, converting machines, Essential elements of heat engines, Heat engine cycles, Carnot cycle, Rankine cycle, Ottocycle, Diesel cycle.	5	13
5	**Steam Boilers** Study of steam, boilers, fire tube and water tube boilers, its accessories and mountings.	6	13
6	**Internal Combustion Engines** Introduction, classification and brief description of I.C. engines mechanism, 4-Stroke and 2-Stroke petrol and diesel engines, Otto, Diesel and Dual cycles and their air standard efficiencies and mean effective pressures. Comparison of petrol and diesel engines. Engine efficiencies and performance	6	13

Dean
Rai School of Engineering
Rai University, Ahmedabad.

| 7 | Pumps | 4 | 8 |

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
	Introduction, Reciprocating pump, types and operation, Air Chamber, Centrifugal pumps, Priming, Positive displacement pumps.		
8	**Air Compressors** Introduction and classification of air compressor, Reciprocating compressors, Operation of a compressor, Work for compression, Power required, Reciprocating compressor efficiency, Rotary compressors.	4	8
9	**Refrigeration & Air Conditioning** Introduction, Refrigerant, Types of refrigerators, Vapour compression refrigerating system, Window and split air conditioners.	3	7
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze
Weightage	30	30	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:

CO1	Discuss the various sources of energy and basic terminology of Mechanical engineering
CO2	Make calculations for commonly used working fluids i.e. ideal gases and steam
CO3	Analyze various heat engine cycles and understand construction and working of IC engines
CO4	Discuss working and applications of steam boilers and various energy conversion systems

Reference Books

1.	**Elements of Mechanical Engineering** By K. P. Roy and Prof. S. K. Hajra Chaudhary | Media Promoters & Publishers Pvt. Ltd.
2.	**Fundamental of Mechanical Engineering** By G.S. Sawhney | Prentice Hall
3.	**Elements of Mechanical Engineering** By N M Bhatt and J R Mehta | Mahajan Publishing House
4.	**Basic Mechanical Engineering** By Pravin Kumar | Pearson Education
5.	**Fundamental of Mechanical Engineering** By G.S. Sawhney | PHI Publication New Delhi
6.	**Elements of Mechanical Engineering** By Sadhu Singh | S. Chand Publication
7.	**Introduction to Engineering Materials** By B.K. Agrawal | McGraw Hill Publication, New Delhi

Dean
Rai School of Engineering
Rai University, Ahmedabad.

List of Practical	
1.	To demonstrate & study of different types of boilers
2.	To demonstrate & study of different types of boiler mountings & accessories
3.	To study about different types of calorimeters
4.	To demonstrate & study of I.C. engine
5.	To carry out performance test on centrifugal pump
6.	To carry out performance test on Reciprocating pump
7.	To find out different operating parameters and to do performance of two stage air compressor
8.	To study about refrigeration system & Air conditioner.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)		Semester - 1
Type of Course	Core Courses		
Prerequisite			
Course Objective	1. Understand the standards and common cases as well as dimensioning in technical drawings. 2. Able to develop multi-aspect sketches, sectional views and geometries of complex parts. 3. Visualize objects in all dimensions and learn displaying technique for graphical presentation of part.		

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA		
2	0	4	2	70	30	50	150

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

Course Content			
		T - Teaching Hours | **W** - Weightage	
Sr.	Topics	T	W
1	**Introduction to Engineering Graphics** Drawing instruments and accessories, BIS – SP 46. Use of plane scales, Diagonal Scales and Representative Fraction	2	10
2	**Engineering Curves** Classification and application of Engineering Curves, Construction of Conics, Cycloidal Curves, Involutes and Spirals along with normal and tangent to each curve.	5	20
3	**Projections of Points and Lines** Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes.	4	10
4	**Projections of Planes** Projections of planes (polygons, circle and ellipse) with its inclination to one reference plane and with two reference planes, Concept of auxiliary plane method for projections of the plane	4	10
5	**Projections of Solids and Section of solids** Classification of solids. Projections of solids (Cylinder, Cone, Pyramid and Prism) along with frustum with its inclination to one reference plane and with two reference planes. Section of such solids and the true shape of the section	4	10
6	**Orthographic Projections** Fundamental of projection along with classification, Projections from the pictorial view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view	6	20
7	**Isometric Projections and Isometric View or Drawing**	5	20

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course Content

T - Teaching Hours | W - Weightage

Sr.	Topics	T	W
	Isometric Scale, Conversion of orthographic views into isometric projection, isometric view or drawing		
	Total	30	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Create
Weightage	20	20	10	10	40

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:

CO1	Know and understand the conventions and the methods of engineering drawing
CO2	Interpret engineering drawings using fundamental technical mathematics.
CO3	Construct basic and intermediate geometry and comprehend the theory of projection.
CO4	Improve their visualization skills so that they can apply these skills in developing new products
CO5	Improve their technical communication skill in the form of communicative drawings
CO6	Use computer software for engineering drawing.

Reference Books

1.	**A Text Book of Engineering Graphics** By P.J.Shah | S.Chand & Company Ltd
2.	**Elementary Engineering Drawing** By N.D.Bhatt | Charotar Publishing House
3.	**Engineering Drawing** By N.D.Bhatt | Charotar publication

List of Practical

1.	Lettering and Dimensioning
2.	Engineering Curves
3.	Loci of Points
4.	Projection of points and line.
5.	Projections of Plane and solid
6.	Development of surfaces
7.	Orthographic Projection.
8.	Isometric Projection.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	**Semester - 1**
Type of Course	Core Courses	
Prerequisite	Basic Computer Fundamentals	
Course Objective	1.To understand basic computer knowledge and programming structure 2 To Learn programs for conditional, branching looping. 3.To develop application using array, structure, function, pointer and file	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
3	0	2	4	70	30	50	150

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

Course Content			**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction** **Fundamental of Computer-** Basic block diagram of Computer components, hardware, software, memory, generation of computer, Flowcharts and algorithm **Overview of C-** Introduction, Importance of C, Sample C programs, Basic structure of C programs, Programming style, Executive a C program. **Constants, Variables, and Data Types-** Introduction, Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, assigning values to variables, Defining symbolic constants. **Operators and Expression-** Introduction, Arithmetic of Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bit-wise Operators, Special Operators, Arithmetic Expressions, Evaluation of expressions, Precedence of arithmetic operators, Some computational problems, Type conversions in expressions, Operator precedence and associatively, Mathematical function	15	20
2	**Management Input and Output Operators, Decision-Making statement** Introduction, reading a character, writing a character, formatted input, formatted output, the structure of c program input-output function Introduction, Decision-making with IF statement, Simple IF statement, the IF ELSE statement, Nesting of IF … ELSE statements, The ELSE IF ladder, The switch statement, the turnery (? :) Operator, the GOTO statement.	10	20
3	**Loop and arrays** **Decision-Making Looping-** Introduction, the WHILE statement, the DO statement, and The FOR statement, Jump in loops Break and continue. **Array-** Introduction, One-dimensional arrays, Two-dimensional arrays, Initialization of two-dimensional arrays, Concept of Multidimensional arrays	10	20
4	**Handling of Character strings, User-Defined Functions**	15	20

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course Content

T - Teaching Hours | W - Weightage

Sr.	Topics	T	W
	Introduction, Declaring and initializing string variables, reading string from the terminal, writing a string to the screen, Arithmetic operations on characters, Putting string together, String Operations String Copy, String Compare, String Concatenation and String Length, String Handling functions. Introduction, Need for user-defined functions, The form of C function, Return values, and their types, Calling a Function, category of functions, No arguments and no return values, Arguments with return values, Handling of non-integer functions, Nesting of functions, Recursion, Functions with arrays, The scope and Lifetime of variables in functions, ANSI C functions.		
5	**Structures and Unions, Pointers, File Management in C** Introduction, Structure definition, giving values to members, Structure initialization, Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures, and functions, Unions, Size of structures, and Bit fields. Introduction, understanding pointers, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Pointer expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers and Functions, Pointers, and structures. Dynamic memory allocation. Introduction, Defining files and their Operations, Error handling during I/O operations, Random access files, Command line arguments	10	20
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze
Weightage	10	30	30	30

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:

CO1	Formulate algorithm/flowchart for given arithmetic and logical problem
CO2	Translate the algorithm/flowchart into C program using the correct syntax and execute it.
CO3	Write a program using branching ,looping, iteration and recursion.
CO4	Implement simple program using structure and Union.
CO5	Implement simple program using array and pointer.

Reference Books

1.	**Let Us C (TextBook)** By Yashwant Kanetker | BPB Publication
2.	**ANSI C** By Balaguruswami | Wiley India Pvt Ltd
3.	**"Computer programming" (TextBook)** By Ashok N. Kamthane | Pearson Education

Dean
Raj School of Engineering
Rai University. Ahmedabad.

List of Practical

1.	Write a program to display "Hello Computer" on the screen.
2.	Write a C program to display Your Name, Address and City in different lines.
3.	Write a C program to find the area of a circle using the formula: Area = PI * r.
4.	Write a C program to print the multiply, addition, division & subtraction value of two accepted numbers.
5.	Write a C program to swap a variable value of no1 and no2.
6.	Write a program to find a maximum from given two numbers.
7.	Write a program to find a minimum from given two numbers.
8.	Write a program to find a maximum from given three numbers.
9.	Write a program to find a minimum from given three numbers.
10.	Write a C program to print a multiplication table from 1 to 12.
11.	Write a C program to find addition of 45 to 65 using loop.
12.	Write a C program to check whether a number is prime or not.
13.	Write a C program to show month using Switch statement.
14.	Write a C program to print the 3x3 array.
15.	Write C program to print range of 101 to 130 using array.
16.	Write a C program to find the length of the given string.
17.	Write a C program to copy one string into another string.
18.	Write a C program to concate (merge) the two strings.
19.	Write a C program to print the following shape. * * * * * * * * * *
20.	Write a C program to find the addition of two values using function.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)		Semester - 1
Type of Course	Ability Enhancement Courses		
Prerequisite	A basic educational background and a willingness to learn about corporate environments.		
Course Objective	1. Gain insights into the corporate world, its structure, and the factors affecting it. 2. Develop ethical reasoning skills for responsible corporate behavior. 3. Acquire knowledge of financial concepts crucial for corporate decision-making. 4. Learn to assess market trends and competition to make informed business choices. 5. Evaluate potential risks and strategies to mitigate them in a corporate context.		

Teaching Scheme (Contact Hours)				Assessment Scheme				
				Theory Marks				**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**		**LAB**	
3	1	0	4	70	30		-	100

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

Course Content				**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Self-awareness**	8	20
	Learning and its importance The Success Triangle: Understanding the combination of skills, attitude, knowledge Change Management : Learning the art of updating with time. Soft skills: Learning with fun Introduction to SWOT Identifying your Strength, Weakness, Opportunity, Threat Setting Goals: Using SMART Technique		
2	**Effective Communication**	8	15
	Introduction to Communication Types : Verbal, Non-verbal, Para-verbal, Creating a powerful Self Introduction Powerful Self-Introduction : Practice Session, Managing conflicts through, Assertive Communication, Negotiating Assertively for solutions Practice Session		
3	**Impression Management**	8	15
	Creating and maintaining LinkedIn profile, Professional Grooming and Attire CV, Resume: Defining and Differentiating, creating an effective Curriculum Vitae Designing an effective cover letter Justifying your Curriculum Vitae.		
4	**Corporate Readiness-**	9	20
	4 Ps of presentation, Building up content for presentation, Individual and group presentations, Understanding the appropriate gestures and postures, Using Microsoft PowerPoint effectively Practice Sessions, Understanding the structure of an e-mail Effective usage of salutations, Types of E-mail : Formal & Informal Practice Session		
5	**Group Discussion & Personal Interview**	12	30
	Introduction : Group Discussion and its needs, Types of GD: Factual, Abstract, and Controversial Skills assessed during Group Discussion, Structure/Process of Group Discussion, Content Generation, Techniques Practice Sessions: GD Interview and its types Pre-interview preparation process, Do's and Don'ts of Interview Successful Answering, Techniques Competencies tested during interview Practice Sessions : General Questions, Behavioral & Situational Questions, Domain- related Questions, CV-related Questions.		
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy				
Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course Outcomes

At the end of this course, students will be able to:	
CO1	Gain insights into the corporate world, its structure, and the factors affecting it.
CO2	Develop ethical reasoning skills for responsible corporate behavior.
CO3	Acquire knowledge of financial concepts crucial for corporate decision-making.
CO4	Learn to assess market trends and competition to make informed business choices.
CO5	Evaluate potential risks and strategies to mitigate them in a corporate context.

Reference Books

1.	**Corporate Governance: Theory and Practice (TextBook)** By Anil Kumar | Indian Book House

Course	Bachelor of Technology (B.Tech.)	Semester - 1
Type of Course	General Elective Courses	
Prerequisite	basic understanding of science and mathematics.	
Course Objective	1. Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions. 2. Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving. 3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems. 4. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
Lecture	**Tutorial**	**Lab**	**Credit**	**Theory Marks**		**LAB**	**Total Marks**
				SEE	**CIA**		
4	0	0	4	70	30	-	100

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

Course Content			

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**The multidisciplinary nature of environmental studies**	15	25
	Environmental Science – definition, scope & importance, Evolution of the universe, origin of the earth; solar system; atmosphere of the primitive earth, abiotic component of environment, Environmental balance**,** balance in O_2 and CO_2 in air; thermal balance; balance in predator and prey population.		
2	**Ecology**	15	25
	Ecology & its branches, scope of Ecology and its relation to other divisions of sciences; autecology and synecology, Concept and structure of ecosystem, functions of ecosystem, Types of Ecosystems, Concept of habitat; Significance of ecological adaptation; ecological adaptation in plants and animals.		
3	**Ecosystem**	15	25
	Concept and scope of environmental chemistry, chemical toxicology, hazardous chemicals, carcinogens, occupier, effluent etc.The natural cycles of the environment, Ozone depletion –causes and effects; Global warming – major green house gases, causes and effects; Acid rain –causes and effects, Acid – base reactions in water.		
4	**Biogeochemical cycles**	15	25
	Biogeochemical cycles and Environmental Pollution **,** Carboncycle**,** Nitrogen cycle**,** Oxygen cycle**,** Water cycle Environmental Pollution, Types of Environmental Pollution, Water Pollution, Air Pollution, Land and Noise Pollution Current Issues in environment sciences		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	40	30	5	5	10	10

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course Outcomes

At the end of this course, students will be able to:

CO1	1.Understand key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
CO2	2.Appreciate concepts and methods from ecological and physical sciences and their application in environmental problem solving.
CO3	3.Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
CO4	4.Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Reference Books

1.	**Textbook of Environmental (TextBook)** By Erach Bharucha	Universities Press (India) Private Ltd, Hyderabad.	Second edition, Pub. Year 2013
2.	**Environmental Sciences** By Daniel B Botkin & Edward A Keller	John Wiley & Sons.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)	Semester - 2
Type of Course	Engineering Science	
Prerequisite	03000101-MATHEMATICS-I	
Course Objective	To equip students with advanced mathematical techniques and tools essential for solving complex problems in engineering and science.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
Lecture	**Tutorial**	**Lab**	**Credit**	**Theory Marks**		**LAB**	**Total Marks**
				SEE	**CIA**		
3	1	0	4	70	30	-	100

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

Course Content			

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Review of the maxima & minima, point of inflexion, Asymptotes, Curve Tracing**	13	28
	Review of the maxima & minima, point of inflexion. Introduction of Asymptote, Types of Asymptotes: Asymptote parallel to x-axis, Asymptote parallel to y-axis, oblique Asymptote, Rules to find Asymptote parallel to x-axis, Rules to find Asymptote parallel to y-axis, Rules to find Curve Tracing oblique Asymptote, problems based on Asymptote. Multiple point, cusp, node, symmetry about x-axis, symmetry about y-axis, symmetry about x=y line, symmetry about opposite coordinate, Origin, tangent, intercept, tracing of curve.		
2	**Gamma Function & Beta Function**	10	22
	Introduction Gamma function, the value of Gamma(without proof), Problem based on Gamma function, Beta functions, Relation between Beta and Gamma function, Show that B(m, n)=B(n, m), Problem-based on Beta Function, application to the area, volume, Define Dirichlet integral, Problem-based on Dirichlet integral.		
3	**Double and triple integral**	9	20
	Introduction, Double Integral, Problems based on Double Integral, Change of order of integration, Problems based on Change of integration, Change of variables, Problem based on Change of variables, Triple integral, Problem based on Triple Integral		
4	**Differential of Vector**	6	14
	Introduction, Point function, Gradient, Problems based on Gradient of a vector, Divergence of a vector, Problems based on divergence Curl of a vector, Problems based on curl and their physical interpretations.		
5	**Integration of Vector**	7	16
	Line integral, problems based on line integral, Surface integral, problems based on Surface integral, Volume integral, Problems based on Volume integral, Green's theorem(without proof) and problems based on Green's theorem, Stoke's theorem(without proof), problems based on Stoke's theorem, Gauss divergence theorems (without proof), problems based on Gauss divergence theorems.		
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	50	20	10	10	5	5

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Course Outcomes	
At the end of this course, students will be able to:	
CO1	Student will be able to tracing a curve able to explain relation between Gamma and beta function.
CO2	Student will able to solve double and triple integral and change of variable in integral.
CO3	Student will able to understand gradient, divergence and curl.
CO4	Student will be able to use vector integration.
CO5	Student will be able to solve problem based of Green's theorem, Stock's theorem and Gauss divergence theorem

Reference Books	
1.	**Higher Engineering Mathematics (TextBook)** By Dr. B. S. Grewal
2.	**Advanced engineering mathematics** By Mishra V P | V P Mishra Publishers, New Delhi 2009

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	Semester - 2
Type of Course	Core Courses	
Prerequisite	03000101-MATHEMATICS-I	
Course Objective	1. The objective of this Course is to provide an introductory treatment of Engineering Mechanics to all the students of engineering, with a view to prepare a good foundation for taking up advanced courses in the area in the subsequent semesters. 2. This course provides basic fundamentals of how to determine stress and deformation in a wide range of simple, practical structural problems, and an understanding of the mechanical behavior of materials under various load conditions.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			Total Marks
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
3	0	2	3	70	30	50	150

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

Course Content			
		T - Teaching Hours | **W** - Weightage	
Sr.	**Topics**	**T**	**W**
1	**Introduction** Scalar and vector quantities, absolute and derived units, The science of mechanics, fundamental principles, SI units.	5	13
2	**Fundamentals of Statics** Coplanar concurrent and non-concurrent force system: Resultant, Equilibrant, Free body diagrams. Coplanar concurrent forces:- Resultant of coplanar concurrent force system by analytical and graphical method, Law of triangle of forces, Law of polygon of forces, Equilibrium conditions for coplanar concurrent forces, Lami's theorem. Application of statically determinate pin – jointed structures. Coplanar non-concurrent forces:- Moments & couples, Characteristics of moment and couple, Equivalent couples, Force couple system, Varignon's theorem, Resultant of non-concurrent forces by analytical method, Equilibrium conditions of coplanar non-concurrent force system, Application of these principles.	10	20
3	**Centre of gravity and Moment of Inertia** Center of gravity of curves, plane areas and bodies, Pappus Guldinus theorem I & II, method of integration, Area moment of inertia, mass moment of inertia, M.I. of flywheel, Different methods of M.I., law of parallel axis, law of perpendicular axis	5	13
4	**Friction** Theory of friction, Types of friction, inclined plane friction, ladder friction, wedge friction, belt and rope friction	5	13
5	**Simple Lifting Machines** Velocity ratio, mechanical advantage, efficiency, reversibility, Law of machines, simple wheel & axle, differential wheel & axle, single purchase crab winch, differential wheel & axle, pulley & pulley block.	5	13

Dean
Rai School of Engineering
Rai University. Ahmedabad.

6	Dynamics of Particles	6	13

Course Content		**T** - Teaching Hours | **W** - Weightage		
Sr.	**Topics**		**T**	**W**
	De-Alembert's principle, motion of connected bodies, motion along inclined planes, impulse and momentum, Single degree free vibration Physical and Mechanical properties of materials:- Properties related to axial, bending and torsional and shear loading, Toughness, hardness, proof stress, factor of safety, working stress, and load factor.			
7	**Stresses & Strains**		5	8
	Elastic, homogeneous, isotropic materials, limit of elasticity and proportionality, yield limit, ultimate strength, strain hardening, section of composite materials, prismatic and non prismatic sections Strains:- Linear, shear, lateral, thermal and volumetric, Poisson's ratio. Stresses:- Normal stresses axial- tensile and compressive, shear and complementary shear, thermal and hoop. Applications to composite material stepped and tapered bars.			
8	**Beams**		4	7
	Types of supports, Types of beams, Types of loads, determinate and indeterminate beams. Bending moments and Shear force , Bending moment and shear force diagrams for statically determinate beams subjected to couples, connected forces, uniformly distributed loadings, relation between bending moment, shear force and rate of loading, point of contra flexure.			
		Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy					
Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	30	30	10	10	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes	
At the end of this course, students will be able to:	
CO1	Solve practical problems of engineering by applying fundamental principles of mechanics & principles of equilibrium.
CO2	Calculate stability of systems using fundamentals of friction and its importance through simple applications.
CO3	Determine stresses and strains under axial & thermal loads.
CO4	Apply principles of statics to analyze statically determinate beams, cables and trusses.

Reference Books	
1.	**Strength of Materials** By S. Ramamrutham | S.Chand Publication
2.	**Applied Mechanics** By B.Junarkar & H. J. Shah | Charotar publication
3.	**Engineering Mechanics** By M.N.Patel | Mahajan publication

Dean
Rai School of Engineering
Rai University. Ahmedabad.

List of Practical	
1.	Law of parallelogram
2.	Warm and warm Wheel
3.	Simple Lifting Machine
4.	Lami's Theorem
5.	Simple Wheel & Axle
6.	Equilibrium of coplanar concurrent forces
7.	Equilibrium of Non-coplanar concurrent forces
8.	Single purchase crab
9.	Double purchase crab

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	Semester - 2
Type of Course	Core Courses	
Prerequisite	03000101-MATHEMATICS-I	
Course Objective	1. To study and understand the role of civil engineering in national development. 2. To study the various branch of civil engineering and their scope. 3. To do different surveys like chain survey, compass survey for measurement of ground.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
Lecture	**Tutorial**	**Lab**	**Credit**	**Theory Marks**		**LAB**	**Total Marks**
				SEE	**CIA**		
3	0	2	4	70	30	50	150

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

Course Content		**T** - Teaching Hours | **W** - Weightage	
Sr.	**Topics**	**T**	**W**
1	**Introduction and Water Resources and Hydraulics** • Impact of Infrastructural Development on the Economy of a Country. • Role of Civil Engineers, Importance of Planning. • Scheduling and Construction management. Collection and conveyance of raw water from the source **Water Resources and Hydraulics** • Importance of Hydrology, Classification of Water resources & Requirement of water for Various uses. • Water Management Strategies, Water Resources Development in India. • Introduction of Dams, Introduction of water supply and Drainage System.	7	15
2	**Surveying** **Chain Survey:-** • Linear measurements, Errors in chaining, problems on obstacle **Directions and Bearings:-** • Types of Bearings and Meridians, Whole Circle Bearing and Quarter Circle Bearings, • Compunctions of Angles from bearings and bearings from angle, Magnetic Declination, Local Attraction, Various Problems. **Elevation Measurements:-** • Introduction of Level Machine, Methods of leveling, Recording and Reducing of levels, Contour Survey. **Area and volume:** • Measurement by Planimeter. **Modern Tools of Surveying and Mapping:** • Introduction to Theodolite, Electronic Distance Measurement Instruments, Total Station.	26	55
3	**Construction Materials**	6	15

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Introduction, Masonry Materials: Stones, Bricks, Blocks, Tiles; Binding Materials: Lime & Cement; Aggregates, Mortar & Concrete, Timber, Specification of all Building Materials as per IS Standards, Method of Drawing Plan, Elevation and Section of Building.

Course Content

T - Teaching Hours | W - Weightage

Sr.	Topics	T	W
4	**Transportation Engineering**	6	15
	• Role of Transportation in National development, Transportation Ways, Surface Transportation and Aviation. • Elements of Highway materials properties and highway Construction, BOT Projects for Highways, Elements of Traffic Engineering and Traffic Control.		
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	25	40	25	5	5

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:

CO1	Comprehend infrastructure's economic impact, civil engineering roles, water resources, and management basics
CO2	Learn chain survey techniques, elevation measurements, angular compunctions, and modern surveying tools' basics
CO3	Analyze errors in chaining, apply complex angular compunctions, utilize modern surveying instruments for intricate measurements and mapping
CO4	Analyze and interpret construction materials, examining their specifications to demonstrate an understanding of their properties and uses
CO5	Understand transportation's role in development, surface transport, highway materials, and traffic engineering basics.

Reference Books

1.	**Elements of Civil Engineering (TextBook)** By Dr. R. P. Retaliya | Atul Prakashan
2.	**1. Elements of civil engineering** By B.C.Punamia | Lakshmi Publication
3.	**Elements of civil engineering** By R. K. Jain | Tata McGraw Hill Pub. Co. New Delhi.

Dean
Raj School of Engineering
Rai University. Ahmedabad.

List of Practical	
1.	Introduction To Surveying Lab
2.	chaining of a survey line
3.	Ranging and chaining of a survey line
4.	Study of prismatic compass
5.	Traversing using prismatic compass
6.	Study and use of dumpy level
7.	Study and use of dumpy level and simple levelling
8.	Study and use of dumpy level and Reciprocal leveling
9.	Study of theodolite and its uses
10.	Introduction to Construction Material Testing Lab

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	Semester - 2
Type of Course	Core Courses	
Prerequisite	03000101-MATHEMATICS-I	
Course Objective	To provide a comprehensive understanding of electrical principles, circuit analysis, and applications essential for designing and managing electrical systems.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA		
3	0	2	4	70	30	50	150

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

Course Content		**T** - Teaching Hours	**W** - Weightage	

Sr.	Topics	T	W
1	**Introduction**	10	20
	DC Circuits: Electrical circuit elements (R, L, and C), voltage and current sources, Kirchhoff's current and voltage laws, and analysis of simple circuits with dc excitation. Superposition, Thévenin, and Norton Theorems. Time-domain analysis of first-order RL and RC circuits		
2	**AC Circuits**	10	25
	Representation of sinusoidal waveforms, peak and RMS values, Phasor representation of AC quantities, real power, reactive power, apparent power, and power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), and Series and parallel resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections, Power measurement in three-phase circuits.		
3	**Transformers**	10	15
	Magnetic materials, BH characteristics. Construction and working principle of single phase and three phase transformers. Ideal and practical transformer. Auto-transformer and its applications.		
4	**Electrical Machines**	10	20
	Generation of rotating magnetic fields. Construction and working of the following machines: Three-phase induction motor, Single-phase induction motor, Separately excited DC motor, and Synchronous generators.		
5	**Electrical Installations Components of LT Switchgear**	10	20
	Switch Fuse Unit (SFU), MCB, ELCB, MCCB. Types of Wires and Cables. Earthing – Types of Earthing and its importance. Safety precautions for electrical appliances. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption. Basics of power factor improvement		
	Total	50	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy				
Level	Remembrance	Understanding	Application	Analyze
Weightage	40	20	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course Outcomes

At the end of this course, students will be able to:

CO1	Apply fundamental electrical laws and circuit theorems to electrical circuits.
CO2	Compare Ac and Dc circuits and apply their concepts to practical problems.
CO3	Analyse single-phase and three-phase AC circuits.
CO4	Describe the operating principle and applications of static and rotating electrical machines.
CO5	Comprehend electrical installations, their protection, and personnel safety.

Reference Books

1.	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERINGUNIVERSITY SCIENCE PRESS (TextBook)** By R. K. Rajput | UNIVERSITY SCIENCE PRESS | Second, Pub. Year 2012
2.	**Basic Electrical Engineering** By U. A. Bakshi, V. U. Bakshi | Technical Publications Pune | Second Revised Edition, Pub. Year 2009
3.	**Basics Of Electrical Engineering (TextBook)** By J.S. Katre | Khanna publication, New Delhi, Pub. Year 2011
4.	**A Textbook of Electrical Technology - Vol 2** By Thereja B.L, Theraja A.K., | S.Chand & Company Ltd, New Delhi.
5.	**Elements of Electrical Engineering (TextBook)** By U. A. Patel | Atul Prakashan , Ahmedabad
6.	**ELEMENTS OF ELECTRICAL ENGINEERING (TextBook)** By J. N. SWAMY, N. V. SINHA | MAHAJAN PUBLISHING HOUSE | NINTH, Pub. Year 2013

List of Practical

1.	Verification of Kirchhoff's law.
2.	Perform series and parallel combination of resistors.
3.	Measurement of active and reactive power in single phase A.C. Circuit.
4.	Measurement of impedance of R-L, R-C & R-L-C series circuit and study of resonance phenomenon.
5.	To Measure the active reactive power in 3Φcircuit. To Measure the power factor.
6.	To study star and delta connection on three phase circuit and verify equivalent circuit.
7.	To perform(a) turn ratio and polarity test on single phase transformer. (b) Conversion of the two-winding transformer into autotransformer.
8.	To determine the efficiency and voltage regulation of a single-phase transformer by load test.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)	Semester - 2
Type of Course	Core Courses	
Prerequisite	Basic Knowledge of HTML	
Course Objective	HTML provides the basic structure of sites, which is enhanced and modified by other technologies like CSS and JavaScript. CSS is used to control presentation, formatting, and layout. JavaScript is used to control the behavior of different elements.	

Teaching Scheme (Contact Hours)				Assessment Scheme				
				Theory Marks		Practical Marks		Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA	External Mark (P)	Internal Marks (P)	
3	0	2	4	70	30	-	50	150

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

Course Content				**T** - Teaching Hours	**W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Web Technologies** ● Overview of web development and its importance ● Basics of HTML: structure, elements, and attributes ● Introduction to CSS: styling basics and selectors	20	20
2	**Building Dynamic Interfaces with JavaScript** ● Understanding JavaScript: variables, data types, and operators ● Control flow: conditional statements and loops ● Functions and scope in JavaScript ● Introduction to the DOM (Document Object Model)	10	20
3	**Enhancing Interactivity with jQuery** ● Introduction to jQuery library ● DOM manipulation using jQuery ● Event handling with jQuery ● Animation and effects with jQuery	10	20
4	**Responsive Design and Layout** ● Basics of responsive web design ● Media queries for responsive layouts ● Flexbox and Grid for modern layout ● Building mobile-first and responsive web pages	10	20
5	**Project Development and Final Assessment** ● Integrating HTML, CSS, JavaScript, and jQuery in a project ● Responsive design principles in real-world applications ● Version control with Git for collaborative development ● Final project presentation and assessment	10	20
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy					
Level	Remembrance	Understanding	Application	Analyze	Create

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Weightage	20	20	20	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Rai School of Engineering
Rai University, Ahmedabad.

List of Practical	
1.	HTML Tags: Create a simple HTML document with basic tags such as <html>, <head>, <title>, <body>, <h1> for heading, <p> for paragraph, <a> for link, and for unordered list, and for ordered list, <div> for division, <span> for inline division, and <img> for image inclusion
2.	Linking Pages: Create multiple HTML pages and link them together using anchor <a> tags.Linking Pages: Create multiple HTML pages and link them together using anchor <a> tags.
3	Image Inclusion: Insert images into your HTML pages using the <img> tag. Experiment with attributes like src, alt, height, and width.
4	Tables: Create a simple HTML table with rows and columns using <table>, <tr>, <td>, and <th> tags. Experiment with attributes like border, cellpadding, and cellspacing.
5	Forms: Build a basic HTML form with input fields such as text, password, email, radio buttons, checkboxes, and a submit button using <form> and various input elements like <input>, <textarea>, <select>, <option>, <button>.
6	CSS Styling: Apply styles to your HTML elements using inline CSS, embedded CSS, and external CSS files. Experiment with properties like color, background-color, font-family, font-size, text-align, padding, margin, border, and width.
7	External CSS File: Create a separate CSS file and link it to your HTML document using the <link> tag.
8	Box Model: Understand the CSS box model and experiment with properties like margin, border, padding, and width.
9	Floats and Clearfix: Create a layout using floats and clearfix to position elements side by side.
10	Flexbox: Learn about Flexbox layout and create a simple layout using Flexbox properties like display: flex, flex-direction, justify-content, and align-items.
11	Grid System: Explore Bootstrap's grid system to create responsive layouts. Use classes like .container, .row, and .col-* to structure your content
12	Bootstrap Components: Utilize Bootstrap components such as buttons, navigation bars, breadcrumbs, alerts, badges, and progress bars to enhance the UI of your website.
13	Responsive Design: Apply media queries to make your website responsive and adapt to different screen sizes. Experiment with breakpoints and adjust the layout and styling accordingly.
14	Typography: Experiment with different fonts, font sizes, and font weights to improve the readability and aesthetics of your website.
15	Advanced CSS: Dive deeper into CSS by exploring concepts like pseudo-classes, pseudo-elements, transitions, animations, and transforms to add interactivity and visual effects to your website.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)	Semester - 2
Type of Course	Core Courses	
Prerequisite	03080101 - PROGRAMMING IN C	
Course Objective	1. Allow programmers to think in terms of the structure of the problem rather than in terms of the structure of the computer. 2. Decompose the problem into a set of objects. 3. Objects interact with each other to solve the problem.	

Teaching Scheme (Contact Hours)				Assessment Scheme				
				Theory Marks		Practical Marks		Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA	External Mark (P)	Internal Marks (P)	
3	0	2	4	70	30	-	50	150

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

Course Content		T - Teaching Hours	W - Weightage

Sr.	Topics	T	W
1	**Introduction of OOPS, C++ Basics** Introduction to Object Oriented Programming, Difference between Procedure Oriented and Object Oriented Programming, Difference between C and C++ Data types, Declaration of variables, Expressions, Operators, Operator Precedence, Evaluation of expressions, Type conversions, Pointers, Arrays, Pointers and Arrays, Strings, Structures, and References. Flow control statement- if, switch, while, for, do, break, continue, go to statements. Functions - Scope of variables, Parameter passing, Default arguments, inline functions, Recursive functions, Pointers to functions. Dynamic memory allocation and de-allocation operators-new and delete Preprocessor directives.	15	20
2	**Principles of OOP, Classes, Object and Function, Constructor & Destructor** Structure of a C++ program, Class, Object, Inheritance, Polymorphism, Dynamic Binding, Message Passing. Introduction to Class and Objects, Access Specifier, Memory Allocation for object, Simple Function, Call and Return by Reference, Static data, Function and Members, Inline Function, Function Overloading, Friend Functions, Friend Class, Array of Class Object. Constructor, Characteristics of Constructor, Types of Constructor, Destructor, Characteristics of Destructor	15	20
3	**Inheritance, Polymorphism** Introduction, Advantages of Inheritance, Inheritance using different access Specifiers, Initialization of Base class members through a derived class object, Different forms of Inheritance, Virtual Base Classes, Abstract Class, Function Overriding. Overloading unary-binary operators, data conversion, pitfalls of operators overloading and conversion keywords, function overloading, Explicit and Mutable.	10	20
4	**Operator Overloading, Virtual Function**	10	15

Course Content		T - Teaching Hours | W - Weightage		
Sr.	**Topics**		**T**	**W**
	Introduction to Operator overloaded, Rules for Overloading Operator, Declaration of Operator Overloading, Unary Operator Overloading, Binary Operator Overloading, Data Conversion, and Type Conversions			
	Inline function, Virtual Function, friend function, Static function, Assignment and copy initialization, this pointer, dynamic type information			
5	**Files & Pointers, Exception Handling**		10	15
	I/O using C functions, Stream classes' hierarchy, Stream I/O, File streams and String streams, Overloading operators, Error handling during file operations, Formatted I/O.			
	Benefits of exception handling, Throwing an exception, The try block, Catching an exception, Exception objects, Exception specifications, Stack unwinding, Re-throwing an exception, Catching all exceptions.			
		Total	60	90

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	0	40	20	40	0	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes	
At the end of this course, students will be able to:	
CO1	Understand the basic concept of C++.
CO2	Apply the concept of OOPs.
CO3	Analyze the concept of inheritance and polymorphism.
CO4	Analyze the concept of operator overloading and virtual function.
CO5	Understand the concept of Files & Pointers along with Exception Handling.

Reference Books	
1.	**Object Oriented Programming with C++ (TextBook)** By E Balaguruswami | The Mc Graw-Hill Education India Pvt. Ltd
2.	**Let us C++** By Y kanitkar | BPB Publication
3.	**Object-oriented programming in Turbo C++** By Robert Lafore | Galgotia Publications Pvt Ltd

Dean
Rai School of Engineering
Rai University. Ahmedabad.

List of Practical	
1.	Write a program in C++ that takes the input of the age of 3 people by the user and finds out the oldest and youngest among them.
2.	Write a program in C++ to find positive or negative values using if else from the user input.
3.	Write a program in C++ to find out if a number is divisible by 5 and 7 using an if-else statement.
4.	Write a program in C++ to find out if a number is odd or even using user input.
5.	Write a program in C++ to find out profit or loss using user input.
6.	Write a program in C++ to check if a year is a leap year or not using input from the user.
7.	Write a program in C++ to find out if the input number is Armstrong or not using a loop (User Input).
8.	Write a program in C++ to find out if the input number is Palindrome or not using a loop (User Input).
9.	Write a program in C++ to find out the 1st 10 Fibonacci series numbers using a loop (User Input).
10.	Write a program in C++ to find out the factorial of a given number using a loop (User Input).
11.	Write a program in C++ to find out whether a given number is prime or not using a loop (User Input).
12.	Write a program in C++ to perform Multilevel GCD and LCM of the given number (User Input).
13.	Write a program in C++ that asks the user to enter marks of 5 subjects and print the corresponding grade using Switch Case.
14.	Write a program in C++ to perform Single inheritance.
15.	Write a program in C++ to perform Multilevel inheritance.
16.	Write a program in C++ to perform Hierarchical inheritance.
17.	Write a program in C++ to perform Multiple inheritance.
18.	Write a program in C++ to perform Hybrid inheritance.
19.	Write a program in C++ to perform Method Overloading.
20.	Write a program in C++ to perform Method Overriding.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)	Semester - 3
Type of Course	Engineering Science	
Prerequisite	03000201 - MATHEMATICS-II	
Course Objective	To equip students with advanced mathematical tools and techniques essential for solving complex problems in engineering and applied sciences.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
Lecture	**Tutorial**	**Lab**	**Credit**	**Theory Marks**		**LAB**	**Total Marks**
				SEE	**CIA**		
3	0	0	3	70	30	-	100

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

Course Content

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**First order ODE Application of differential equations of first order.**	12	26
	Definition, practical approach to differential equations, formation of a differential equation-Geometrical meaning, equation of the first order and first degree, Variable separable, homogeneous equations, equation reducible to homogeneous form, linear equations, Bernoulli's equation, exact equations, equation reducible to exact equation. Orthogonal trajectories.		
2	**Linear differential equations of nth order**	11	24
	Linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Method of variation of parameters, Method of undetermined coefficients. Cauchy's and Legendre's linear equations, linear dependence of solutions, Applications to engineering problems (without derivation).		
3	**Series Solution of Differential Equation and Special Functions**	7	16
	Series solution of ordinary differential equations of 2nd order with variable coefficients (Frobenius Method),Bessel and Legendre equations and their series solutions, Properties of Bessel functions and Legendre polynomials		
4	**Laplace Transform**	9	21
	Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step function, Dirac delta function, Laplace transform of periodic functions, Convolution theorem, Application to solve simple linear and simultaneous differential equations		
5	**Fourier series**	6	13
	Periodic functions, Trigonometric series, Fourier series of period 2π, Euler's formulae, Functions having arbitrary period, Change of interval, Even and odd functions, Half range sine and cosine series.		
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	50	20	10	10	5	5

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course Outcomes

At the end of this course, students will be able to:

CO1	Student will be able to learn concepts of ordinary differential equation and able to solve differential equation.
CO2	Student will able to solve nth order differential equation, differential equation with constant coefficient and variable coefficient.
CO3	Student will be able to use Frobenius method.
CO4	Student will be able to solve problem based on Laplace transformation.
CO5	Student will be able to explain Fourier series.

Reference Books

1.	**Higher Engineering Mathematics** By B.V. Ramana, | TMG
2.	**Advance Engineering Mathematics** By R.K. Jain & S.R.K. Iyenger | Narosa Publishing House
3.	**Higher Engineering Mathematics** By Dr. B. S. Grewal
4.	**Advanced Engineering Mathematics** By E. Kreyszig | John Wiley & Sons
5.	**Ordinary and Partial Differential Equations** By M.D. Raisinghania | S. Chand Publishing | Twentieth edition, Pub. Year 2020

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	Semester - 3
Type of Course	Ability Enhancement Courses	
Prerequisite	Proficiency in the language of instruction (usually English) and a basic understanding of academic writing conventions.	
Course Objective	1. Clarity and Precision : Develop the ability to express complex idea clearly and concisely . 2. Research Proficiency : Acquire skills in conducting and citing academic research effectively. 3. Critical Thinking : Enhance critical analysis and argumentation skills in writing. 4. Citation and Referencing : Master proper citation and referencing formats , such as APA or MLA. 5. Academic Integrity : Promote ethical writing practices and avoid plagiarism in academic work.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	**Total Marks**
0	0	2	1	-	-	50	50

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

Course Content		**T** - Teaching Hours | **W** - Weightage	

Sr.	Topics	T	W
1	**Academic & research writing**	11	25
	Introduction; Importance of academic writing; Basic rules of academic writing, English in academic writing I & II; Elements of Writing Styles of research writing, Types of Academic Writing, Process of Academic Writing.		
2	**Plagiarism:**	12	25
	Introduction: Tools for the detection of plagiarism; Avoiding plagiarism,Literature review: Introduction, Source of literature; Process of literature review, Online literature databases; Literature management tools, referencing and citations		
3	**Report**	11	25
	Report writing for an event, CV writing, Job Application, Types of letters- Business letters, Cover letter.		
4	**E-Mails**	11	25
	Memo, Notice, Agenda, Minutes of Meeting, Business correspondence, How to write emails- do's and don'ts		
	Total	45	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy				
Level	Understanding	Analyze	Evaluate	Create
Weightage	25	25	25	25

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course Outcomes

	At the end of this course, students will be able to:
CO1	Develop independent perspectives and arguments via persuasive support and successful incorporation of research, thus developing their own voice and creating a balance between their own voice and source summaries.
CO2	Practice the revision skills necessary for the accomplishment of a writing project.
CO3	Constructively critique their own and peers' writing, with an awareness of the collaborative and social aspects of the writing process.
CO4	Students will develop critical thinking skills, enabling them to analyze and synthesize information effectively, leading to well-informed and thought-provoking academic writing.
CO5	Students will understand how to adapt their writing style and approach to meet the requirement of various academic disciplines and audiences.

Reference Books

1.	**Academic Writing, Anti- Plagiarism And Citations (TextBook) (TextBook)** By By Vinod Kumar Kanvaria | Shipra Publications

Laboratory work will be based on above syllabus with minimum required experiments/exercises to be incorporated.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)						**Semester - 3**
Type of Course	Core Courses						
Prerequisite	03080101 - PROGRAMMING IN C						
Course Objective	1. To organizing data for implementation of efficient algorithms and program development. 2. To develop the capability of selecting a particular data structure. 3. To develop application using array, structure, function, pointer and file						

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			**Total Marks**
Lecture	**Tutorial**	**Lab**	**Credit**	**SEE**	**CIA**	**LAB**	
3	0	2	4	70	30	50	150

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

Course Content			**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Data Structure, Types of Data Structures**	10	15
	Introduction to Data Structure and Algorithm Data Types, primitive and non-primitive Performance Analysis and Measurement Linear & Non Linear Data Structures. String, Introduction, Operation performed on string Array, Introduction to Arrays, Linear array and its representation Binary Search and Linear Search with algorithm Pointers, Records and its representations., Recursion, Tower of Hanoi.		
2	**Link List, Stack, Queue (Linear data Structure)**	15	20
	Introduction of stack, PUSH and POP operation along with algorithms, Application of Stack Expression Conversion: Prefix, Postfix ,Infix Link List Introduction, Types of Link List, Operations along with Algorithms-Insert, Delete, Search, Traverse, Application Queue types and Representation of Queue -Simple, Circular, Dequeue, Priority Operations Performed on Queue-Insert, delete, search, Application of Queue		
3	**Tree and Graphs-(Non Linear)**	15	20
	Introduction of different trees and its representations, Types of Tree, Traversal algorithm, Binary search tree, Insert, Delete, Search in tree, Conversion of General Trees To Binary Trees, Applications Of Trees, Heap tree Graphs, Basic Terminology and Representation, Traversal of Graph, Sequential representation of graphs, Link list of graph, Graph-Matrix Representation of Graphs, Operations on graphs		
4	**Hashing and File Structure, File Organization**	10	20
	Hashing, Hash Table, Hash Function, Hashing Technique, Collision, Collision Resolution Techniques File Organization, Introduction to File, Types of File Organization, Concepts of fields, records and files, Sequential, Indexed and Relative/Random File Organization, Indexing structure for index files, hashing for direct files, Multi-Key file organization and access methods.		
5	**Sorting and Searching**	10	25
	Sorting types, Insertion, sort, Selection Sort, Quick Sort, Merge Sort, Radix sort, Searching types, Sequential Search and Binary Search		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	10	15	15	20	20	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may

Dean
Rai School of Engineering
Rai University. Ahmedabad.

vary slightly from above table.

Course Outcomes

	At the end of this course, students will be able to:
CO1	Discuss The Basic Concept and Principle of Data Structure
CO2	Implement Data Strcuture And Algorithm to Solve Problem.
CO3	Learn the Basic Techniques of Algorithm Analysis
CO4	Descibe various Tree and Graph travsersal Algorithm
CO5	Differentiate Primitive and Non Primitive Structures

Reference Books

1.	**An Introduction to Data Structures with Applications (TextBook)** By Jean-Paul Tremblay & Paul G. Sorenson | Tata McGraw Hill.
2.	**Data Structures using C & C++** By Ten Baum | Prenctice-Hall International
3.	**Fundamentals of Computer Algorithms by** By Horowitz, Sahni | Galgotia Pub. 2001 ed.

List of Practical

1.	Write a C program to display linear array elements.
2.	Write a C program to calculate length of a given string.
3.	Write a C program to perform index operation on a given String.
4.	Write a C program to Concate two String.
5.	Write a C program to find Sub string of given string.
6.	Write a C program to implement PUSH and POP operation of STACK.
7.	Write program to implement simple queue using C language.
8.	Write a C program to search an element using linear search.
9.	Write a C program to search an element using Binary search.
10.	Write a C program to sort given list using Insertion sort.
11.	Write a C program of matrix addition.
12.	Write a C program of matrix multiplication.
13.	Write a C program to traverse single linked list.
14.	Write a C program to implement Bubble sort.
15.	Write a C program to implement Radix sort.
16.	Write a C program to implement Merge sort.
17.	Write a C program to implement Selection sort.

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Course	Bachelor of Technology (B.Tech.)	Semester - 3
Type of Course	Core Courses	
Prerequisite	03080101 - PROGRAMMING IN C	
Course Objective	The goal of this course is to provide students with an understanding of basic concepts in the theory of computation. At the end of this course students will: understand key mechanisms in design of operating systems modules understand process management, concurrent processes and threads, memory management, virtual memory concepts, deadlocks compare performance of processor scheduling algorithms produce algorithmic solutions to process synchronization problems use modern operating system calls such as Linux process and synchronization libraries practice with operating system concepts such as process management, synchronization, networked processes and file systems	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks			
Lecture	Tutorial	Lab	Credit	SEE	CIA	LAB	Total Marks
3	0	0	3	70	30	-	100

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

Course Content			

T - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction**	12	20
	What is an O.S, Evolution of OS, OS Services, Types Of OS: Batch Processing, Time Sharing, and Real-time Operating Systems, Concepts of OS, Different Views of OS, Processes and Communication, Manage Memory, brief introduction about the Linux and Unix Operating System, Input Output Management		
2	**Process Management & Communication**	18	25
	Process, Process Control Block, Process States, Threads, Types of Threads, Multithreading, Classical IPC Problems, Reader 's and writer Problem, Dinning Philosopher Problem, etc., Scheduling, Scheduling Algorithms, Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer-Consumer Problem, Semaphores, Event Counters, Monitor, Message Passing.		
3	**Deadlock**	12	20
	Deadlock Problem, Deadlock Characterization-Detection, recovery, avoidance, ignorance., Banker's algorithm for single & multiple resources, Deadlock Prevention.		
4	**Memory Management**	10	20
	Paging: Principle Of Operation, Page Allocation, H/W Support For Paging, Multiprogramming With Fixed partitions, Segmentation, Swapping, Virtual Memory: Concept, Performance Of Demand Paging, Page Replacement Algorithms, Thrashing, Locality.		
5	**Unix/Linux Operating System & File System**	8	15
	Unix/Linux Operating System & File System		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy					
Level	Remembrance	Understanding	Application	Analyze	Evaluate
Weightage	20	30	15	15	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may

Dean
Raj School of Engineering
Rai University. Ahmedabad.

vary slightly from above table.

Course Outcomes

At the end of this course, students will be able to:

CO1	Understand critical mechanisms in the design of operating systems modules.
CO2	Understand process management, concurrent processes, and threads, memory management, virtual memory concepts, deadlocks
CO3	Compare the performance of processor scheduling algorithms
CO4	Analyze different IPC problems and their solutions.
CO5	Explain the difference between Linux and Windows Operating Systems.

Reference Books

1.	**Operating System by Tanenbaum (TextBook)** By Tanenbaum | Pearson publication

Dean
Rai School of Engineering
Rai University. Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	Semester - 3
Type of Course	Core Courses	
Prerequisite	03070208 - FRONT END (HTML, CSS, JAVASCRIPT, JQUERY)	
Course Objective	Entry Level Frontend Developers are responsible for creating websites, web applications, and mobile applications. They design and develop user interfaces using HTML, CSS, JavaScript, React, Angular and Vue, and ensure that the applications run smoothly across multiple platforms.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
				Theory Marks		LAB	Total Marks
Lecture	Tutorial	Lab	Credit	SEE	CIA		
3	0	2	4	70	30	50	150

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

Course Content		**T** - Teaching Hours | **W** - Weightage	
Sr.	Topics	T	W
1	**Introduction to Front-end Development**	12	20
	Overview of front-end development, Importance of front-end in web development, Key concepts: HTML, CSS, JavaScript, Introduction to Single Page Applications (SPA), Comparison of popular front-end frameworks.		
2	**Fundamentals of React JS**	12	20
	Introduction to React JS, Setting up the development environment, Understanding JSX, Components, Props, and State, Lifecycle methods in React, Handling events, Conditional rendering, Lists and keys.		
3	**Advanced React JS Concepts**	12	20
	React Hooks: useState, useEffect, and custom hooks, Context API for state management, Higher-order components, React Router for navigation, Performance optimization in React, Code splitting and lazy loading, Testing React components, Building and deploying a React application		
4	**Introduction to Angular JS**	12	20
	Overview of Angular framework, setting up the Angular environment, Understanding Angular architecture, Modules, Components, and Services, Data binding and directives, Dependency injection, Angular CLI basics		
5	**Full Stack Integration and Best Practices**	12	20
	Integrating React and Angular with backend APIs, RESTful services, GraphQL integration, authentication, authorization, real-time data with WebSockets, deployment strategies for full-stack applications, code quality, linting, responsive design principles, accessibility considerations, UI/UX best practices, planning and designing a front-end project.		
	Total	60	100

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Rai University
EVOLVING THINKING MINDS

List of Practical	
1.	How do you set up a development environment for React JS and Angular JS?
2.	How do you create simple components in React JS and Angular JS?
3.	How do you implement state management in React using use State and in Angular using services and RxJS?
4.	How do you pass data between components using props in React and data binding in Angular?
5.	How do you handle user events (e.g., click, input) in React and Angular?
6.	How do you create and validate forms in React using form libraries and in Angular using Reactive Forms?
7.	How do you implement client-side routing and navigation in React using React Router and in Angular using Angular Router?
8.	How do you fetch data from external APIs using fetch or axios in React and HttpClient in Angular?
9.	How do you implement global state management using Redux in React and NgRx in Angular?
10.	How do you apply styling to components using CSS, CSS-in-JS libraries (e.g., styled components) in React, and Angular styles?
11.	How do you implement responsive design principles using CSS media queries and frameworks like Bootstrap in React and Angular?
12.	How do you use the Context API in React and Dependency Injection in Angular to manage dependencies?
13.	How do you write unit tests for components using Jest and React Testing Library for React, and Jasmine and Karma for Angular?
14.	How do you optimize performance by using techniques such as lazy loading, memorization in React, and On Push change detection strategy in Angular?
15.	How do you develop a single-page application using React or Angular?
16.	How do you integrate the frontend application with a backend service (e.g., Node.js, Firebase)?
17.	How do you implement real-time data updates using Web Sockets in React and Angular?
18.	How do you implement user authentication and authorization in React and Angular?
19.	How do you convert the application into a Progressive Web App (PWA) in React and Angular?
20.	How do you deploy React and Angular applications to hosting platforms like Netlify, Vercel, or AWS?

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Rai University
EVOLVING THINKING MINDS

Course	Bachelor of Technology (B.Tech.)	Semester - 3
Type of Course	Core Courses	
Prerequisite	03070208 - FRONT END (HTML, CSS, JAVASCRIPT, JQUERY)	
Course Objective	Entry Level Frontend Developers are responsible for creating websites, web applications, and mobile applications. They design and develop user interfaces using HTML, CSS, JavaScript, React, Angular and Vue, and ensure that the applications run smoothly across multiple platforms	

Teaching Scheme (Contact Hours)				Examination Scheme			
Lecture	Tutorial	Lab	Credit	Theory Marks		LAB	Total Marks
				SEE	CIA		
2	0	2	3	25	25	50	100

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

Course Content		**T** - Teaching Hours	**W** - Weightage	

Sr.	Topics	T	W
1	**Introduction to JavaScript and TypeScript**	12	20
	Overview of JavaScript, evolution of JavaScript, introduction to TypeScript, benefits of using TypeScript, setting up the development environment, basic syntax and types, transpiling TypeScript to JavaScript.		
2	**Advanced JavaScript Concepts**	12	20
	Closures, promises and async/await, event loop, prototypes and inheritance, modules and namespaces, working with the DOM, ES6+ features (e.g., destructuring, spread operator, arrow functions), debugging and error handling.		
3	**Advanced TypeScript Features**	12	20
	Interfaces and types, generics, decorators, advanced types (e.g., union, intersection, tuple), type inference, type assertion, namespaces and modules, TypeScript configuration and compiler options, integrating TypeScript with existing JavaScript projects.		
4	**Front-end Development with JavaScript and TypeScript**	12	20
	Using TypeScript with popular frameworks (React, Angular, Vue), state management, routing and navigation, component-based architecture, handling forms and validation, integrating APIs and third-party libraries, performance optimization, testing and debugging.		
5	**Back-end Development with JavaScript and TypeScript**	12	20
	Node.js fundamentals, setting up a server with Express, working with databases (SQL and NoSQL), RESTful API development, GraphQL API development, authentication and authorization, middleware, deploying back-end applications, best practices for secure and scalable applications.		
	Total	60	100

Dean
Rai School of Engineering
Rai University, Ahmedabad.

List of Practical

1.	How do you set up a development environment for TypeScript and JavaScript?
2.	How do you create and use interfaces and types in TypeScript?
3.	How do you implement classes and inheritance in TypeScript?
4.	How do you use modules and namespaces in TypeScript and JavaScript?
5.	How do you manage asynchronous code using Promises, async/await, and callbacks in JavaScript and TypeScript?
6.	How do you implement and use decorators in TypeScript?
7.	How do you perform advanced array and object manipulations using JavaScript and TypeScript?
8.	How do you use TypeScript with popular frameworks like React or Angular?
9.	How do you integrate TypeScript with Node.js for server-side development?
10.	How do you handle exceptions and errors in JavaScript and TypeScript?
11.	How do you set up and configure a build process using Webpack or other bundlers for TypeScript and JavaScript projects?
12.	How do you use advanced JavaScript concepts such as closures, IIFEs (Immediately Invoked Function Expressions), and the module pattern?
13.	How do you implement design patterns (e.g., singleton, factory, observer) in JavaScript and TypeScript?
14.	How do you perform unit testing and integration testing in TypeScript and JavaScript using frameworks like Jest or Mocha?
15.	How do you optimize JavaScript and TypeScript code for performance, including techniques like debouncing, throttling, and memory management?
16.	How do you implement and use modern JavaScript features such as ES6+ syntax, including destructuring, spread/rest operators, and template literals?
17.	How do you perform DOM manipulation and event handling using vanilla JavaScript and TypeScript?
18.	How do you use TypeScript with popular state management libraries like Redux or MobX?
19.	How do you implement security best practices in JavaScript and TypeScript applications, including XSS and CSRF prevention?
20.	How do you deploy TypeScript and JavaScript applications to cloud platforms like AWS, Azure, or Google Cloud?

Dean
Rai School of Engineering
Rai University, Ahmedabad.

Course	Bachelor of Technology (B.Tech.)	Semester - 3
Type of Course	Core Courses	
Prerequisite	03080301- OBJECT ORIENTED PROGRAMMING WITH C++	
Course Objective	The objective of Programming in Java is to develop proficiency in Java programming concepts, techniques, and best practices to create robust and efficient software applications.	

Teaching Scheme (Contact Hours)				Assessment Scheme			
Lecture	Tutorial	Lab	Credit	**Theory Marks**		LAB	Total Marks
				SEE	CIA		
3	0	2	4	70	30	50	150

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

Course Content			**T** - Teaching Hours | **W** - Weightage

Sr.	Topics	T	W
1	**Introduction to Java Programming**	12	20
	Overview of Java, history and evolution of Java, setting up the development environment, basic syntax and structure, data types and variables, operators, control flow statements (if, switch, loops), introduction to Java Development Kit (JDK) and Java Runtime Environment (JRE).		
2	**Object-Oriented Programming (OOP) in Java**	12	20
	Classes and objects, constructors, methods, inheritance, polymorphism, encapsulation, abstraction, interfaces, abstract classes, access modifiers, method overloading and overriding.		
3	**Advanced Java Concepts**	12	20
	Exception handling, collections framework (List, Set, Map), generics, lambda expressions, streams API, file I/O, multithreading and concurrency, JDBC for database connectivity, Java Memory Model and garbage collection.		
4	**Java Development Tools and Libraries**	12	20
	Integrated Development Environments (IDEs) (e.g., Eclipse, IntelliJ IDEA), build tools (Maven, Gradle), unit testing with JUnit, logging frameworks (SLF4J, Log4j), JavaFX for GUI development, RESTful web services with Spring Boot, dependency injection with Spring Framework.		
5	**Java Application Development Best Practices**	12	20
	Design patterns (Singleton, Factory, Observer, etc.), code quality and best practices, version control with Git, documentation and Javadoc, performance tuning, secure coding practices, deploying Java applications, case studies of real-world Java applications.		
	Total	60	100

Suggested Distribution Of Theory Marks Using Bloom's Taxonomy					
Level	Remembrance	Understanding	Application	Evaluate	Create
Weightage	25	25	10	10	20

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Dean
Raj School of Engineering
Rai University. Ahmedabad.

Course Outcomes

At the end of this course, students will be able to:

CO1	Understand fundamentals of Java programming.
CO2	Learn object-oriented programming, including inheritance and polymorphism.
CO3	Gain proficiency in exception handling and multithreading.
CO4	Explore inbuilt classes and libraries in Java.
CO5	Basic knowledge of advanced topics such as JavaBeans, network programming, and collections.

Reference Books

1.	**Programming with Java** By E. Balagurusamy | Sixth Edition, Tata Mc Graw Hill
2.	**Java Programming** By Hari Mohan Pandey | Pearson
3.	**Java™: A Beginner's Guide** By Herbert Schildt | 7th Edition

List of Practical

1.	How do you set up a development environment for Java?
2.	How do you create and run a basic Java program?
3.	How do you use primitive data types and control structures (if, for, while) in Java?
4.	How do you implement classes and objects in Java?
5.	How do you use inheritance and polymorphism in Java?
6.	How do you implement interfaces and abstract classes in Java?
7.	How do you handle exceptions using try-catch blocks and custom exceptions in Java?
8.	How do you work with Java collections (List, Set, Map) and their implementations?
9.	How do you perform file I/O operations in Java?
10.	How do you use Java Streams for functional programming and data processing?
11.	How do you implement multithreading and concurrency using Java's Thread class and Executor framework?
12.	How do you use Java generics to create type-safe collections and methods?
13.	How do you perform database operations using JDBC in Java?
14.	How do you create and use annotations in Java?
15.	How do you perform unit testing using JUnit and Mockito in Java?
16.	How do you build and manage Java projects using Maven or Gradle?
17.	How do you create and consume RESTful web services using Spring Boot?
18.	How do you handle dependency injection using Spring Framework?
19.	How do you implement design patterns (e.g., singleton, factory, observer) in Java?
20.	How do you deploy Java applications to cloud platforms like AWS, Azure, or Google Cloud?

Dean
Rai School of Engineering
Rai University, Ahmedabad.