



Four-Year Undergraduate Programmes

Bachelor of Science

B.Sc. Mathematics with minor in Data Analytics (Honors)

Faculty of Applied Sciences

Parul University

Vadodara, Gujarat, India

Faculty of applied sciences
Bachelor of science in mathematics

1. Vision of Department

This syllabus covers fundamental concepts like functions, limits, and continuity, alongside advanced topics such as differentiation, applications of derivatives, and multivariable calculus including partial differentiation and optimization techniques like Lagrange's Multiplier. It aims to equip students with a strong understanding of mathematical functions and their applications in various fields.

2. Mission of the Department

The mission of this syllabus is to equip students with a solid understanding of fundamental mathematical concepts and their applications. This includes mastering functions and their graphical representations, exploring trigonometric and hyperbolic functions, understanding limits, continuity, and properties of functions. Additionally, students will delve into differentiation techniques, including rules, derivatives of trigonometric functions, and applications such as finding rates of change, maxima, minima, and error approximation. They will also learn about successive differentiation, asymptotes, concavity, and convexity. Furthermore, the syllabus covers functions of multiple variables, partial differentiation, and their applications in various fields, providing a robust foundation for further mathematical studies and real-world problem-solving.

3. Programme Educational Objectives

The PEOs describe the expected accomplishments and career of the graduates after completion of the Four-year B.Sc. programme in Mathematics.

PEO1	Comprehensive understanding of fundamental mathematical principles and their application in problem-solving.
PEO2	Proficiency in mathematical modeling and communication, facilitating effective analysis and presentation of solutions.

4. Program Learning Outcomes (PLOs):

PLO 1	Core Knowledge: Demonstrate a solid understanding of foundational mathematics, including algebra, calculus, geometry, statistics, and discrete mathematics.
PLO 2	Problem-Solving Skills: Apply mathematical concepts to formulate and solve real-world problems using analytical and computational tools.
PLO 3	Critical Thinking: Analyse and synthesize information critically to address mathematical and interdisciplinary challenges.
PLO 4	Communication: Effectively communicate mathematical ideas and solutions, both orally and in writing, to diverse audiences.
PLO 5	Ethical Awareness: Understand and uphold ethical practices in mathematical research and applications.
PLO 6	Teamwork and Collaboration: Work effectively as part of a team in problem-solving and mathematical projects.
PLO 7	Lifelong Learning: Develop the ability to pursue further studies and adapt to advancements in mathematics and related fields.

5. Program-Specific Learning Outcomes (PSLOs):

PSLO 1	Specialized Knowledge: Gain proficiency in advanced mathematical topics such as linear algebra, number theory, complex analysis, and abstract algebra.
PSLO 2	Computational Proficiency: Utilize modern mathematical software and computational tools for modelling, simulations, and solving complex mathematical problems.
PSLO 3	Interdisciplinary Applications: Apply mathematical methods to solve problems in fields such as physics, computer science, economics, and engineering.
PSLO 4	Research and Inquiry: Develop skills to undertake independent mathematical research, including literature review, hypothesis formulation, and the presentation of findings.
PSLO 5	Professional Preparation: Acquire the skills and knowledge necessary for employment in education, industry, research, and technology sectors or for advanced academic pursuits.

6. Credit Framework

Semester wise Credit distribution of the programme	
Semester-1	22
Semester-2	22
Semester-3	22
Semester-4	22
Semester-5	22
Semester-6	22
Semester-7	22
Semester-8	22
Total Credits:	176

Category wise Credit distribution of the programme	
Category	For Honors
Ability Enhancement Courses (AEC)	10
Skill Enhancement Courses (SEC)	10
Value Added Courses (VAC)	8
Multidisciplinary Courses	12
Discipline Specific Courses (DSC)	88
Minor	32
Dept. Vocational Studies (DVSC)	0
Internship/Project	4
Research	12
Total Credits	176

7. Programme Curriculum

Semester – 1					
Code	Subject	Credit	Lect	Lab	Tut
11010601DS01	Differential Calculus	4	4	-	-
11010601DS02	Matrices	4	4	-	-
03010501D A01	Programming in Python	3	3	-	-
03010501D A02	Programming in Python Lab	1	-	2	-
11010601SE01	History of Mathematics	2	2	-	-
11011401VA01	Climate Change & Sustainable Environment	2	2	-	-
	AEC-1 (Compulsory Subjects :1)	2	2	-	-
	UE	4	3	2	-

	Total	22	18	4	2
Semester - 1 AEC-1					
Code	Subject	Credit	Lect	Lab	Tut
00019301AE01	Basic English-I	2	2	-	-
00019301AE02	Basic Hindi-I	2	2	-	-
00019301AE03	Basic Gujarati-I	2	2	-	-
Semester - 1 Elective - 1					
Code	Subject	Credit	Lect	Lab	Tut
03010901UE01	Introduction to MATLAB Programming	4	3	2	-
05010101UE01	Office Automation	4	3	2	-
09010101UE01	First Aid and Life Support	4	4	-	-
18010201UE01	Basic Photography	4	2	4	-
Semester - 2					
Code	Subject	Credit	Lect	Lab	Tut
11010602D S01	Integral Calculus	4	4	-	-
11010602D S02	Sequence and Series	4	4	-	-
03010502DA01	Business Analytics with Ms-Excel	3	3	-	-
03010502DA02	LAB: Business Analytics with Ms-Excel	1	-	2	-
00019101SE01	Mathematical Aptitude	2	2	-	-
00019302V A01	IPDC including history and culture of India and IKS-I	2	2	-	-
	AEC Elective-II (Compulsory Subjects :1)	2	2	-	-
	University Elective-II (Compulsory Subjects :1)	4	3	2	-
	Total	22	18	4	2
Semester - 2 AEC Elective-II					
Code	Subject	Credit	Lect	Lab	Tut
00019302A E04	Basic English-II	2	2	-	-
00019302A E05	Basic Hindi-II	2	2	-	-
00019302A E06	Basic Gujarati-II	2	2	-	-
Semester - 2 University Elective-II					
Code	Subject	Credit	Lect	Lab	Tut
03010602UE01	Maintenance of Household Apparatus	4	3	2	-
15010402UE01	Human Psychology	4	4	-	-
19010002UE01	Digital Health	4	4	-	-
19010202UE01	Public Health Nutrition	4	3	2	-
Semester - 3					
Code	Subject	Credit	Lect	Lab	Tut
11010603DS01	Ordinary Differential Equations	4	4	-	-
11010603DS02	Linear Algebra	4	4	-	-

11010603DS03	Linear Programming Problem and its Variants	4	4	-	-
03010503SE 01	Skill Enhancement Course -3 (Artificial Intelligence -AI)	2	2	-	-
00019303V A01	Value Added Course-3 (IPDC including History and Culture of India and IKS-2)	2	2	-	-
	AEC Elective-III (Compulsory Subjects :1)	2	2	-	-
	University Elective-III (Any one)	4	4	-	-
	Total	22	20	-	2
Semester - 3 AEC Elective-III					
Code	Subject	Credit	Lect	Lab	Tut
00019303A E01	Advanced English - I	2	2	---	----
00019303A E02	Basic German	2	2	---	----
00019303A E03	Basic French	2	2	---	----
Semester - 3 University Elective-III					
Code	Subject	Credit	Lect	Lab	Tut
17010103U E01	Intellectual Property	4	4	-	-
06010103U E02	Cyber Security, Tools, Techniques and Counter Measures	4	4	-	-
05010103U E01	Artificial Intelligence Application in People Management	4	4	-	-
21010101U E02	Basics of Event Management	4	4	-	-
Semester - 4					
Code	Subject	Credit	Lect	Lab	Tut
11010604DS01	Partial Differential Equations	4	4	-	-
11010604DS02	Integral Transforms	4	4	-	-
11010604DS03	Real Analysis	4	4	-	-
03010504DA01	Data Science using Python	3	3	-	-
03010504DA02	LAB: Data Science using Python	1	-	2	-
11010604SE01	Skill Enhancement Course -4 [SEC-4 (Vedic Mathematics)]	2	2	-	-
	Value Added Course-4/ Physical Education (Select anyone)				-
19010204VA01	Positive Mental Health	2	2	-	
00019404VA01	Physical Education: Yoga	2	1	2	
00019404VA02	Physical Education: Sports	2	1	2	
00019404VA03	Physical Education: NCC	2	1	2	
00019404AE01	Ability Enhancement Course -4 (MEL-2)	2	2	---	----

	Total	22	20	4	2
Semester - 4 AEC Elective-IV					
Code	Subject	Credit	Lect	Lab	Tut
00019304AE01	Advanced English - II	2	2	---	----
00019304AE02	Advanced German -II	2	2	---	----
00019304AE03	Advanced French -II	2	2	---	----
Semester – 5					
Code	Subject	Credit	Lect	Lab	Tut
11010605DS01	Discrete Mathematics	4	4	-	-
11010605DS02	Modern Algebra	4	4	-	-
11010605DS03	Optimization Technique	4	4	-	-
03010505DA01	Data Analytics with R and Tableau	3	3	-	-
03010505DA02	LAB: Data Analytics with R and Tableau	1	-	2	-
03010505DA03	Training on Power BI	3	3	-	-
03010505DA04	LAB: Training on Power BI	1	-	2	-
	Skill Enhancement Course -5(any one)	2	2	-	-
06010105SE01	Digital Literacy				
06010105SE02	Finance for everyone				
	Total	22	20	4	0
Semester – 6					
Code	Subject	Credit	Lect	Lab	Tut
11010606DS01	Numerical Methods	4	4	-	-
11010606DS02	Graph Theory	4	4	-	-
11010606DS03	Statistical Methods	4	4	-	-
03010506DA01	Computational Data analytics	3	3	-	-
03010506DA02	LAB: Computational Data analytics	1	-	2	-
00019306AE 01	Ability Enhancement Course -5 (Professional Ethics and Communication)	2	2	---	----
11010606IN01	Internship/Mini Project-1 (in Major Specific Course)	4	--	--	--
	Total	22	17	2	0
Semester – 7					
Code	Subject	Credit	Lect	Lab	Tut
11010607DS01	Complex Analysis	4	4	-	-
11010607DS02	Field Theory	4	4	-	-
11010607DS03	Introduction to software	4	4	-	-
03010507DA01	Machine Learning and Data Analytics	3	3	-	-
03010507DA02	Lab: Machine Learning and Data Analytics	1	-	2	-
(for Hons. Degree)					

11010607IN01	On Job Training (OJT)- in Major Specific	6		12	
(for Hons. with Research Degree)					
11010607RP01	Research Project in Major Specific course	6		12	
	Total	22	15	14	0
Semester – 8					
Code	Subject	Credit	Lect	Lab	Tut
11010608DS01	Mechanics	4	4	-	-
11010608DS02	Functional Analysis	4	4	-	-
11010608DS03	Number Theory	4	4	-	-
03010508DA01	Mini Project	4		8	
(for Hons. Degree)					
	On Job Training (Internship)	6	-	12	-
(for Hons. with Research Degree)					
11010608RP01	Research Project	6	-	12	-
	Total	22	12	20	0

8. Detailed Syllabus

Semester – 1

Course Name: Differential Calculus

Course Code: 11010601DS01

Prerequisite: Basic knowledge of Algebra, Functions, Trigonometric, Limit.

Rationale: Studying differential calculus provides essential tools and concepts for analyzing rates of change, understanding function behavior, solving optimization problems, establishing connections with other areas of mathematics, and applying mathematical principles to real-world scenarios.

Course Objectives:

COBJ1	Gain familiarity with the concepts of limit, continuity and indeterminant forms
COBJ2	Analyze and interpret the different versions of mean value theorems.
COBJ3	Understand the relationship between the concepts of differentiability and continuity.
COBJ4	Learn successive differentiation and n^{th} derivative of product of two functions.
COBJ5	Find derivative of functions of more than one variable.
COBJ6	Analyze the curvature of curves in Cartesian, parametric, and polar forms, and calculate the radius of curvature.
COBJ7	Use calculus to trace curves and analyze their properties in Cartesian and polar forms.

Course Learning Outcome:

CL01	Demonstrate a clear understanding of limits and indeterminate forms, and confidently apply L'Hospital's rule to solve limit problems.
CL02	Solve problems involving successive derivatives of functions and confidently use Taylor's and Maclaurin's series to approximate function values

CL03	Create curves for functions in Cartesian, parametric, and polar forms using concepts about curvature, envelope and evolutes.
CL04	Apply multivariable calculus concepts, such as partial derivatives and the chain rule, to analyze functions of several variables and their series expansion
CL05	Demonstrate the ability to apply calculus in solving real-world problems, such as finding tangent planes and normal lines to surfaces, optimization problems, motion problems, and related rates problems.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	0	60	0	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

Sr.	Content	Weightage	Teaching Hours
Unit:1	Limit, Continuity, Differentiability, Indeterminate forms and Mean Value Theorem: Definition of the limit of a function (ε - δ) form Continuity, Types of discontinuities Differentiability L-Hospital and indeterminate forms Rolle's theorem, Lagrange's Mean Value Theorem and Cauchy's Mean Value Theorem and their application.	20	12
Unit:2	Successive Differentiation Successive differentiation, nth derivatives of functions Leibnitz theorem and its applications Taylor's and Maclaurin's expansion of functions of single variable, Expansion of sine, cosine and exponential functions	25	15
Unit:3	Curve Tracing: Tangent and Normal, Asymptotes, Curvature, Envelops and evolutes, Tests for concavity and convexity, Points of inflexion, Multiple points, Parametric representation of curves and tracing of parametric curves, Tracing of curves in Cartesian and Polar forms.	25	15
Unit:4	Multivariable Calculus (Differentiation): Introduction to Functions of Several Variables; Limit and Continuity; Partial Derivatives; Homogeneous function, Euler's Theorem for homogeneous function, Modified Euler's Theorem	30	18

	Implicit functions, Chain Rule Applications: Jacobian: Tangent plane and Normal lines of surfaces; Maximum and Minimum Values, Lagrange's Multiplier Method, Taylor's and Maclaurin's Series for functions of two variables.		
Total		100	60

Text Book

G.B. Thomas, M.D.Weir and J. Hass, Thomas Calculus, Pearson Education India.

Reference Books

1. S. Narayan, P. K. Mittal Differential Calculus, S. Chand & Co. Ltd, New Delhi
2. H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons Inc.
3. T.M. Apostol, Calculus, Vol-II, Wiley India Pvt. Ltd.
4. N. P. Bali, Differential Calculus, New ed. New Delhi, India: Laxmi Publications (P) Ltd.
5. J. Stewart, Calculus, Publisher Thomson.

Course Name: Matrices

Course Code: 11010601DS02

Prerequisite: Basic operations of numbers and ability to adopt manipulation of these operations

Rationale: The study of matrices is essential due to their applications in representing and solving systems of linear equations, performing geometric transformations, and serving as a fundamental building block for advanced topics in linear algebra and other mathematical fields

Course Objectives:

COBJ1	Develop proficiency in matrix calculations, such as finding determinants, applying row operations, and computing matrix inverses
COBJ2	Solve practical problems involving systems of linear equations
COBJ3	Explore advanced topics in linear algebra

Course Learning Outcome:

CL01	Identify various types of matrices and perform operations such as addition, scalar and matrix multiplication, etc.
CL02	Calculate determinant of matrices and inverse of a matrix using determinant
CL03	Apply elementary row/column operations on various matrices as per the need
CL04	Solve systems of linear equations using matrices
CL05	Analyze the facts related to eigenvalues and eigenvectors of a matrix and their application

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	

4	-	-	4	20	20	-	60	-	100
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L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

	Content	Weightage	Teaching Hours
Unit:1	Matrices & Determinants Matrices: Introduction, Types of matrices and their properties, operations of matrices, Special Matrices-Symmetric and skew-symmetric matrices, Hermitian and Skew-Hermitian matrices, Orthogonal matrices. Determinants: Introduction, Value of determinant, Properties and Basic results, Minors and cofactors, Adjoint and Inverse of a matrix	20	12
Unit:2	Elementary Row/Column operations Introduction, Elementary matrices, Row echelon and Reduced Row echelon form of a matrix, Rank of a matrix, Rank of product of matrices, Invariance of rank under elementary operations	15	9
Unit:3	Application to System of Linear Equations Homogeneous and Non-homogeneous linear equations; Matrix form of the system; Consistency of the system; Solution of system of linear equations using inverse matrices; Gauss elimination and Gauss – Jordan Method	25	15
Unit:4	Eigen value and Eigen vector of a matrix Introduction and definition, Orthogonality of Eigen vectors associated with distinct Eigen values, Properties of eigen vectors of a real symmetric matrix, Cayley-Hamilton theorem and its Applications, Diagonalization, Orthogonal Transformation, Quadratic form.	40	24
Total		100	60

Text Book

Elementary Linear Algebra, Howard Anton, Chris Rorres; Wiley India

Reference Books

1. C. W. Curtis, Linear Algebra, Springer
2. S. Narayan and P. K. Mittal, A text book of Matrices, S. Chand & Co.
3. I. K. Rana, An Introduction to Linear Algebra, Ane Books Pvt. Ltd.

Course Name: Programming in Python

Course Code: 03010501DA01

Prerequisite: Basic Programming concepts

Rationale: The study of matrices is essential due to their applications in representing and solving systems of linear equations, performing geometric transformations, and serving as a fundamental building block for advanced topics in linear algebra and other

mathematical fields

Course Objectives:

OBJ1	Develop proficiency in Python, such as finding determinants, applying row operations, and computing problems.
COBJ2	Solve practical problems involving systems of linear equations
COBJ3	Explore advanced topics in Mathematics.

Course Learning Outcome:

CLO1	Write and execute python code in command line.
CLO2	Debug errors in Python Programming.
CLO3	Apply concept of object oriented programming to the real life applications.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					Total
L	T	P	C	Internal Marks			External Marks		
				T	CE	P	T	P	
3	-	-	3	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

Sr.	Content	Weightage	Teaching Hours
1	Introduction to Python: Overview of Python and its applications, Setting up the Python environment, Variables, data types, and basic operations, Control structures: if-else statements and loops	25	11
2	Functions and Modules and Data Structures in Python: Writing and using functions in Python, Introduction to modules and packages, Creating and importing custom modules, Lists, tuples, sets, and dictionaries, List comprehensions and other data manipulation techniques, Working with strings	30	13
3	File Handling: Reading and writing files in Python, Working with CSV and JSON data formats	15	9
4	NumPy for Numerical Computing and Data Manipulation with Pandas: Introduction to NumPy arrays and operations, Array slicing and reshaping, NumPy for mathematical computations, Introduction to Pandas Data Frames and Series, Data cleaning, filtering, and aggregation, Merging and joining datasets.	30	12
	Total	100	45

Reference Books

1. Fluent Python, 2nd Edition by Luciano Ramalho (TextBook)
2. Learn Python3 the Hard Way By Zed Shaw
3. Introducing Python by Lubanovic Bill, O' Reilly
4. Beginning Python: Using Python 2.6 and Python 3.1 By James Payne | Wrox Publication

Course Name: Programming in Python Lab.

Course Code: 03010501DA02

Prerequisite: Basic Programming concepts

Rationale: The study of matrices is essential due to their applications in representing and solving systems of linear equations, performing geometric transformations, and serving as a fundamental building block for advanced topics in linear algebra and other mathematical fields

Course Objectives:

OBJ1	Develop proficiency in Python, such as finding determinants, applying row operations, and computing problems.
COBJ2	Solve practical problems involving systems of linear equations
COBJ3	Explore advanced topics in Mathematics.

Course Learning Outcome:

CLO1	Write and execute python code in command line.
CLO2	Debug errors in Python Programming.
CLO3	Apply concept of object oriented programming to the real life applications.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					Total
L	T	P	C	Internal Marks			External Marks		
				T	CE	P	T	P	
-	-	2	1	-	-	20	-	30	50

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

List of Practical	Content
1	WAP to read and display the following information. Name, Address, Phone no.
2	WAP to read two numbers from the keyboard and display the larger one on the screen.
3	WAP to find, a given number is PRIME or NOT.
4	Write a Function to swap values of a pair of integers.
5	WAP to find N! Using function.
6	WAP to print Fibonacci series of 'n' numbers, where n is given by the programmer

7	WAP to read a set of numbers in an array & to find the largest of them.
8	WAP to sort a list of names in ascending order.
9	WAP to read a set of numbers from keyboard & to find the sum of all elements of the given array using a function.
10	Calculate area of different geometrical figures (circle, rectangle, square, and triangle).
11	WAP to increment the employee salaries on the basis of their designation (Manager-5000, General Manager-10000, CEO- 20000, worker-2000). Use employee name, id, designation and salary as data member and inc_sal as member function
12	Create two classes namely Employee and Qualification. Using multiple inheritance derive two classes Scientist and Manager. Take suitable attributes & operations. WAP to implement this class hierarchy.
13	WAP to read data from keyboard & write it to the file. After writing is completed, the file is closed. The program again opens the same file and reads it.

Reference Books

1. Fluent Python, 2nd Edition by Luciano Ramalho (TextBook)
2. Learn Python3 the Hard Way By Zed Shaw
3. Introducing Python by Lubanovic Bill, O' Reilly
4. Beginning Python: Using Python 2.6 and Python 3.1 By James Payne | Wrox Publication

Course Name: Introduction to MATLAB Programming

Course Code: 03010901UE01

Prerequisite: Fundamental Knowledge of Mathematics.

Rationale: An Introduction to MATLAB Programming" course is essential because MATLAB is widely used in scientific and engineering fields for data analysis, simulations, and algorithm development. Its user-friendly interface and high-level language allow beginners to quickly grasp fundamental programming concepts and focus on problem-solving. The course equips learners with valuable skills for data visualization, numerical computing, and rapid prototyping, enhancing their capabilities and employability in diverse domains.

Course Learning Objective:

CLOBJ 1	Remember foundational understanding of MATLAB syntax, data types, and basic programming concepts such as variables, arrays, and control structures.
CLOBJ 2	Explain the principles of problem-solving using MATLAB, including algorithm development, debugging techniques, and code documentation.
CLOBJ 3	Apply MATLAB programming skills to solve a variety of computational problems, including mathematical calculations, data analysis, and visualization tasks.

CLOBJ 4	Analyse and debug MATLAB code to identify errors, optimize performance, and improve code efficiency.
CLOBJ 5	Evaluate the effectiveness of different MATLAB programming techniques and strategies in solving specific types of problems, considering factors such as code readability, scalability, and computational efficiency.
CLOBJ 6	Develop their understanding of MATLAB programming concepts to design and implement their own algorithms and functions to solve complex problems.

Course Learning Outcomes:

CLO 1	Memorize the MATLAB environment with confidence, effectively utilizing its features and tools for programming and data analysis.
CLO 2	Understand matrices and arrays, perform basic operations, and visualize data using 2D and 3D plots for effective data exploration and representation.
CLO 3	Compare programming concepts like control statements, loops, and logical operations to write structured MATLAB code for problem-solving.
CLO 4	Analyse & distinguish and use user-defined functions, promoting code reusability and modular design in MATLAB programs.
CLO 5	Evaluate Work with file input/output, enabling data exchange with external sources, and utilize the Symbolic Math Toolbox for performing symbolic computation.
CLO 6	Creative ability to independently solve problems using MATLAB.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				T	CE	P	Theory	P	
2	-		2	100	100				100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Getting Started with MATLAB: Introduction to MATLAB, history, features, and uses, MATLAB desktop, basic commands, variables, and data types, performing arithmetic operations and using functions.	13	5

2	Working with Matrices and Arrays: Creating Matrices and Arrays, Array Operations and Indexing, Logical Operations and Relational Operators	18	6
3	Data Visualization in MATLAB: Visualizing data using 2D plots and 3D Plot, Customizing Plots, Enhancing plots with titles, labels, and formatting.	18	6
4	Programming with MATLAB: Conditional Statements (if else), loops (for and while), Vectorization and Logical operation	18	6
5	Working with Files and Symbolic Math: Reading from and writing to files, data import/export, performing symbolic computations using Symbolic Math Toolbox	18	6
6	Reading Skills: Define reading, Reading Strategies, Techniques of reading, Techniques to read faster	3	1
Total		100	30

Text Book and Reference Book:

1. MATLAB : PROGRAMMING FOR ENGINEERS (TextBook), By Chapman, Stephen J ., | Thomson Asia Pvt Ltd ,
2. Mastering Matlab, A Comprehensive tutorial and reference, By Duane Hanselman and Bruce Littlefield,
3. Getting Started with MATLAB-7 (TextBook), By Rudra Pratap | OXFORD University Press

Course Name: Office Automation

Course Code: 0501001UE01

Prerequisite: Basic computer literacy.

Rationale: The objective of this course is to familiarize students with concepts of fundamentals of Microsoft Office, Excel, PowerPoint and Outlook for working on computers and its application.

Course Learning Objective:

CLOBJ 1	Remember understanding of what office automation entails, including the use of technology to streamline office tasks, improve efficiency, and enhance productivity.
CLOBJ 2	Understand the advantages of office automation, such as increased accuracy, reduced manual labor, faster processing times, and improved communication and collaboration.

CLOBJ 3	Apply the role of office automation tools and technologies in contemporary workplaces, including their impact on workflow optimization, remote work, and digital transformation.
CLOBJ 4	Organize office automation systems to integrate with various business processes, including document management, workflow automation, customer relationship management, and enterprise resource planning.
CLOBJ 5	Evaluate the challenges and considerations associated with implementing office automation solutions, such as cost, compatibility, data security, and employee training.
CLOBJ 6	Develop Strategies for Successful Implementation: Students will develop strategies for successful implementation of office automation initiatives, including assessing organizational needs, selecting appropriate technologies, managing change, and evaluating outcomes.

Course Learning Outcomes:

CLO 1	Demonstrate understanding of the concept of office automation, including its components, functions, and applications in modern workplaces.
CLO 2	Understand the importance and benefits of office automation, recognizing its role in enhancing efficiency, productivity, and communication in organizations.
CLO 3	Analyse the challenges and considerations associated with office automation implementation, such as technological limitations, organizational culture, and security concerns.
CLO 4	Apply their knowledge of office automation to analyze and evaluate its integration with business processes, identifying opportunities for automation and efficiency improvements.
CLO 5	Evaluate the effectiveness of office automation solutions in addressing organizational needs and improving workflow processes, considering factors such as cost-effectiveness, user satisfaction, and return on investment.
CLO 6	Synthesize their understanding of office automation concepts to develop strategies for successful implementation, including assessing organizational needs, selecting appropriate technologies, and managing change.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to Office Automation: Overview of Office Automation, Importance and Benefits of Office Automation, Role in Modern Work Environments, Integration with Business Processes, Challenges and Considerations.	8	6
2	Introduction of Computer: Overview of Computer, Computer Input and Output devices, Operating System, hardware and Software Introduction to Ram ,Rom ,CPU and more devices.	8	6
3	Microsoft Word: Introduction to MS Word, Getting Familiar with the Interface, Creating a New Document, Basic Text Formatting, Bold, Italic, Underline), Aligning Text (Left, Centre, Right), Saving and Opening Documents, Navigate Through a Document, Insert hyperlinks, Search for text, Replace, Create bookmarks, Move to a specific location or object in a document, Apply document themes, Apply document style sets, Insert headers and footers, Insert page numbers, Format page background elements, Create a numbered or bulleted list, Change bullet characters or number formats for a list level, Define a custom bullet character or number format.	25	14
4	Microsoft Excel: Introduction to MS Excel Create a workbook, Search for data within a workbook, Change worksheet tab color, Rename a worksheet, Insert and delete columns or rows, Change workbook themes, Adjust row height and column width, Insert headers and footers, Hide or unhide worksheets, data validation, Duplicate Values, Apply styles to tables, Filter records, Sort data by multiple columns, Change sort order, Remove duplicate records, Perform calculations by using the SUM function, MIN and MAX functions, COUNT function, AVERAGE function, Create a new chart, Resize charts, Save a workbook as a template, Manage workbook versions, Protect a worksheet	25	14

5	Microsoft PowerPoint: Create a Presentation, Insert and Format Slides, Modify Slides, Handouts, and Notes, Configure a Presentation for Print, Configure and Present a Slide Show, Insert and Format Text, Insert and Format Shapes and Text Boxes, Insert and Format Images, Order and Group Objects, Insert and Format Tables, Insert and Format Charts, Insert and Format SmartArt graphics, Apply Slide Transitions, Animate Slide Content. Set Timing for Transitions and Animations.	17	10
6	Microsoft Outlook: Create messages, Create and send messages Configure message, Format messages, Format text Apply, themes and styles, Apply styles, Create hyperlinks, Insert images, Manage schedules, Insert memorized content, Insert signatures, Configure calendar settings ,Work with multiple calendars Share calendar information, Create appointments and events Create meetings Manage calendar items, Create tasks Manage tasks Create and manage notes, Create journal entries, Create and manage contacts Create and modify contact records Store contact records Share contact records and address books.	17	10
Total		100	60

List of Practicals

1	Case study on salary calculation Calculate Allowance based on given Condition. 1. HRA is 10% on Basic Salary if Salary more than 20000. 2. DA is on 25% on Basic Salary. 3. Medical Allowance (MA) = Executives get MA Rs 1000, Officers get MA Rs 700 & Assistants get MA Rs 500 4. Calculate Gross Salary. Gross Salary = Total of Basic + HRA + DA + MA 5. Calculate Professional Tax Upto 5000 = 0, upto 1000 = 60, upto 15000 = 100 & over 15000 = 150 6. Calculate Annual Salary 7. Calculate Income Tax Upto 100000 = 0, then 50000 = 10%, then 100000 = 20%, over 250000 = 30% Hint:Formula = IF (K2 <= 100000, 0, IF (K2 <= 150000, (J2 - 100000) * 10 %, IF (K2<=250000,(K2-150000)*20%+5000,(K2- 250000)*30%+25000))) 8. Calculate Net Salary Payable Annual salary - income tax
2	Formatting alignment and creating table 1. Type in the Title Microsoft Word Computer Training Manual 2. Text formatting: Times New Roman font, size 14, Bold and Blue. Paragraph formatting: Align Centre. 3. Type in the first paragraph. Text formatting: Arial font, size 11. Paragraph formatting: Align Justify, First Line Indent at 0.5 Type the notes

3	Word art and clip art Prepare visiting card for caterer service in word 2007 Prepare interactive word document (apply all formatting style)
4	Macro creating macro
5	Invitation letter format The format of invitation is as shown below: Anand Institute of Information Science, Shri. Ramkrishna Seva Mandal Opp. Town Hall, Anand 388 001 Ph. No. (02696) 266062 To, The Director/Principal, The name of Institute The address of Institute
6	Work sheet exercise 1. Insert a column Number of Teams between columns Year and Tickets sold with values Insert a row between row 3 and row 4 with values Delete column Revenue Rename the Sheet1 with name Format cells Delete Sheet3. 6. Hide row 4. 7. Insert a sheet and rename it with name
7	Table exercise Complete the following tasks: a) Widen the first column to 15. b) Add a row beneath the details on Southampton to show the average monthly rainfall. c) Add a new column after the June rainfall statistics to show the total rainfall in each city over the period. d) The rainfall in Birmingham during March should be 58. e) Insert a new row between the rows holding the London and Sheffield rainfall statistics. Enter the following details: Newcastle 65 63 57 50 39 21 f) Copy the appropriate formula to obtain the total rainfall for Newcastle during the period.
8	Table column exercises. Change the column width of column B to 15. 2. Change column width of column D to G to 20. 3. Change column width of column A and B to 14 4. Calculate Total Sales for each item and store result in column D. Hint: Total sales=Quantity * Unit Price. 5. Calculate Total Sales for all the items and store result in cell B6. 6. Copy Unit Price for PC in cell D7. Move Total sales from cell B6 to D8.
9	Insert remove columns of table Complete the following tasks: a) Add a Units Used column to show the number of units of electricity used by each customer (Hint: Subtract the Previous Reading from the Present Reading). b) The cost of one unit of electricity is Rs.0.08. Add a Unit Cost column to show the cost of one unit. (This column will contain 0.08 in all of the relevant cells). c) Add a Units Charge column to show the total cost of the units used by each customer. (Hint: Unit Cost * Units Used) d) There is a standing charge of Rs.13.60 on each customer's account. Add a column to display this Standing Charge. (This column will contain Rs.13.60 in all of the relevant cells).

10	Math functions The functions and commands required to solve the following assignment are as follows: Enter data - labels and values 1. Editing cell contents 2. Saving a spreadsheet 3. Altering column widths 4. Using the SUM function 5. Adding a new row after the last row of data 6. Adding a new column after the last column of data 7. Copying a formula 8. Using the AVERAGE, MIN, MAX function 9. Inserting a new row between existing rows Inserting a new column between existing columns
11	Table formatting using background color Format the Student Grades so that your spreadsheet looks like the one below (you can use different colours, if you like).
12	Calculate total sale and commission based on given details in table
13	Filter data of excel sheet 1. Count number of order in Boston. 2. Count number of Microwave order. 3. Count number of journeys with truck 3. 4. Count number of Peter White journeys. 5. How many times is no. of items less than 20. 6. Display sum of refrigerator items. 7. Display sum of washing machine items. 8. Display sum of items transported by truck 4. 9. Sum of items transported by trucks. 10. Number of microwave orders in Boston . 11. Number of Peter White journeys with truck 1. 12. Number of orders in Boston after 2/3/2013: 13. Number of orders between 2/3/2013 and 2/6/2013: 14. sum of microwaves transported to NY: 15. sum of items transported to Pittsburgh by truck 1: 16. sum of items ordered between 2/3/2013 and 2/6/2013: 17. Sum of items transported to NY, Baltimore and Philadelphia
14	Conditional formatting do conditional formatting on the excel sheet in given data
15	Sorting sort given data of excel sheet
16	Typing exercise aq1 qa sw2ws de3ed fr4rf gt5tg queen 11 queens 1 apple 11 apples 2 wishes 22 wishes 2 swims 22 swims eddies 33 eddies 3 deeds 33 deeds 4 roses 44 roses 4 fish 44 fish tugs 55 tugs 5 goats 55 goats
17	Water mark and header footer inserting and removing
18	Power point presentation creating presentation
19	PPT add timing and sound effects

20	Access create data base, tables create db, tables
21	Access, relations between tables relations between tables

Text Book and Reference Book:

- Digital Logic and Computer Design (TextBook), By Morris Mano | PHI
- Introduction to Information Technology, By ITL Education Solution Limited | Pearson Education | 2012
- MS OFFICE 2007, By Vikas Gupta | Wiley
- Computer Fundamentals, By Anita Goel | Pearson Education | 2011
- Digital Fundamentals, By Thomas L Floyd | Pearson

Course Name: First Aid & Life Support

Course Code: 09010101UE01

Prerequisite: Basic computer literacy. Shall have the basic knowledge about anatomy and physiology of human body.

Rationale: Will gain basic knowledge about first aid & life sciences.

Course Learning Objective:

CLOBJ 1	Remember the primary objectives of first aid, including preserving life, preventing worsening conditions, and promoting recovery.
CLOBJ 2	Explain the legal framework surrounding first aid, including Good Samaritan laws and the duty of care, and understand their responsibilities and limitations as first
CLOBJ 3	Apply skills in identifying and responding to emergencies, including performing a top-to-toe assessment, maintaining hygiene, and following an overview flow chart for providing appropriate first aid.
CLOBJ 4	Organize and manage injuries such as fractures, wounds, and bleeding, including understanding basic anatomy, recognizing different types of fractures, and applying appropriate
CLOBJ 5	Access knowledge of respiratory emergencies, including recognizing signs of difficulty breathing and performing CPR, as well as understanding the types of burns and providing appropriate care for burn injuries.
CLOBJ 6	Develop competence in lifesaving procedures such as CPR, managing head trauma and strokes, and providing first aid for gastrointestinal issues such as diarrhea, food poisoning, and diabetes.

Course Learning Outcomes:

CLO 1	Identify and prioritize different types of injuries and illnesses.
CLO 2	Understand the importance of first aid in emergency situations
CLO 3	Demonstrate the ability to assess the scene of an emergency.
CLO 4	Analyse the importance of infection control in wound care
CLO 5	Evaluate signs and symptoms of shock and how to provide first aid for different types of burns and how to assess and provide first.
CLO 6	Develop CPR techniques for adults, children, and infants and use of automated external defibrillators (AEDs) and how to use them.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to first aid: Aims of first aid The first aider First aid and the law Indian good Samaritan protection guidelines Duty of giving care Consent of the person in need Privacy Negligence Dealing with an emergency Top-to-toe assessment Hygiene and hand washing First aid overview flow chart	7	4
2	Assessment of patients with fractures, wounds, and bleeding: Brief Anatomy of the skeletal system Fractures (injuries to bones) Injuries and fractures to the head, neck and spine Injuries and fractures to the cheekbone, nose and lower jaw Fracture of the cheekbone or nose Fractures of the lower jaw Injuries to the shoulder, ribs or breastbone	10	6

	Injuries or fractures of the shoulder Injuries and fractures of the collarbone Rib injuries and fractures Fractures of the breastbone Injuries to the arm, elbow, wrist, hand or Injuries and fractures of the arm(upper arm, forearm, wrist) Injuries and fractures of hand or fingers Injuries to the pelvis, lower limbs, knee, ankle or feet Injuries and fractures of the pelvis Injuries and fractures of the leg (thigh or lower leg) or ankle Fracture of the knee cap (patella) Injuries and fractures of foot or toes Dislocations (injuries to joints) Strains and sprains (injuries to ligaments, muscles and tendons)		
3	Respiratory emergencies: Respiration The respiratory system No breathing or difficult breathing When to refer the casualty to a healthcare facility Drowning Remove the victim out of the water Strangulation and hanging Choking Swelling within the throat Suffocation by smoke or gases Asthm	10	6
4	Care of burns: The skin Burn wounds First, second and third degree burns Type of burns by origin Danger of burn Dry burns and scalds (burns from flames, hot surfaces, steam, Care of minor burns (small first and second degree burns) Specific burn locations Electrical burns and electrocution by electricity or lightning Chemical burns Sunburns, snow/welders eyes, heat exhaustion and heat stroke Heat exhaustion Heatstroke Frostbites Prevention of burns Fever Hypothermia	8	5
5	Lifesaving procedures in emergency & shock: The heart and the blood circulation, Heart and blood circulation, Blood pressure, Pulse, The blood, Chest discomfort, Bleeding, First aid for bleeding (in general), Resuscitation (basic CPR), Resuscitation of a person who is not breathing or not breathing normally, Resuscitation of baby/child (less than one year old)	8	5
6	Head trauma & stroke: The nervous system, The central nervous system, The peripheral nervous system (PNS), Unconsciousness, Head injuries, Concussion, Cerebral compression, Skull fractures, Stroke, Fits – convulsions - seizures	10	6
7	Gastrointestinal tract, diarrhea, food poisoning and diabetes: Review of anatomy and physiology of gastrointestinal tract, Diarrhoea, Prevent dehydration, Food poisoning, Diabetes, Type 1 diabetes, Type 2 diabetes, Gestational diabetes (diabetes	10	6

	during pregnancy), Diagnosis, Hyperglycaemia, Symptoms of hyperglycaemic coma or diabetic coma, Hypoglycaemia		
8	Senses, foreign bodies in eye, ear, nose or skin and swallowed foreign Objects: Review of anatomy and physiology of the special senses, Foreign body in the eye, Foreign body in the ear, Foreign body in the nose, Foreign body in the skin, Swallowed foreign objects	10	6
9	Urinary system, reproductive system and emergency childbirth: Review of anatomy and physiology of Urinary & Reproductive system, Male reproductive system, Female reproductive system, Pregnancy, Stages of labour and giving birth, Aftercare of the mother, Medical conditions and pregnancy, Diabetes, High blood pressure, Infections, Prevention of sexually transmitted diseases (STD), Sexually transmitted infections, Reducing the risk of STDS/STIS, Emergency childbirth	10	6
10	Psychological first aid: Definition of psychological first aid, Traumatic crisis, (psychological) shock phase, Reaction phase, Processing phase, Reorientation phase, Behave calmly, Listening to the affected person, Physical contact, Providing psychological first aid to all	7	4
11	Specific emergency situations and disaster management: Emergencies at school, Emergencies at work, Road and traffic accidents, Emergencies in rural area, Disasters and multiple casualty accidents Emergency triage	10	6
Total		100	60

Text Book and Reference Book:

- First aid handbook: Fast and effective emergency care (TextBook), By Dr. Pipa Keech | 3rd
- Until Medical Help Arrives: First aid Book (TextBook), By Dr. H. V. Sardesai | 1 st Edition, Pub. Year 2022
- First aid manual, (TextBook), By UK's Leading First aid providers | 11th edition:, Pub. Year 2021

Course Name: Basic Photography

Course Code: 18010201UE01

Prerequisite: 1) Understanding of Basic Computer Skills 2) Media Literacy 3) Creative Vision 4) Passion to learn

Rationale: Taking a basic photography course can be incredibly helpful for anyone looking to improve their photography skills. Not only will you learn about the technical aspects of photography, but you'll also gain a greater appreciation for the art form and discover your own unique style.

Course Learning Objective:

CLOBJ 1	Remember different focal lengths and their aesthetic uses, enabling them to choose appropriate lenses based on specific photographic needs
CLOBJ 2	Understanding of digital camera mechanisms, including aperture, shutter speed, ISO, and their significance in photography.
CLOBJ 3	Implement knowledge and skills related to marketing and promoting their photography work, including strategies for selling, exhibiting, participating in competitions, and understanding current marketing trends in the photography industry.
CLOBJ 4	Analyse about metadata and its role in photography, particularly in manipulating technical information using RAW technology and software like Photoshop to enhance image quality.
CLOBJ 5	Access various techniques and methods to express their creative vision through photography, experimenting with different styles and approaches in the digital realm.
CLOBJ 6	Develop skills in composing visually appealing photographs by understanding the principles of composition and arranging visual elements within the frame effectively.

Course Learning Outcomes:

CLO 1	Identify some component of photography and Improved technical skills: Basic photography classes will teach you the fundamentals of camera operation, exposure, and lighting.
CLO 2	To understand how to use your camera to its full potential and create images that are properly exposed and well-lit.
CLO 3	To Apply the ability to use natural and artificial light effectively to enhance the visual impact of their photographs
CLO 4	Analyse the composition, colour, and perspective, and create images that are not only technically proficient but also visually compelling.
CLO 5	Assess proficiency in operating and adjusting camera settings to achieve proper exposure.
CLO 6	Create vision and explore different styles of photography.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	20	20		60		100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Digital Camera Mechanism : A basic photography course will help you understand the features of a Digital camera Mechanism, such as aperture, shutter speed, ISO, and how to use them effectively to create the kind of photos you want. Characteristic of Lens: Different focal lengths has different aesthetical use. According to need we'll choose our Lens. Aesthetic of Composition: In terms of Visual Experience composition is a very important element. It Is the arrangement of visual elements within the frame of the photograph.	33	10
2	Experience the Metadata: Metadata is actually the technical information about the photograph, Using RAW technology we can manipulate the metadata through 'Photoshop'. Experiment on Expression: An Image is actually the expression of the photographer. How does he/she sees a particular thing or incident. In Digital era we can do various experiment on our expression and enhance the expression. Business and Marketing for Photographers : This is the most crucial part of the field, through the curriculum we'll learn how to sell or exhibit our photograph, how to take part in various competition and learn about the present marketing strategy.	33	10
3	Documentary Photography: Apart from fiction, there is the parallel world of documentary Photography. Great photographers like Kevin Carter, Danish Siddiqui has devoted there life in Documentary Photography and Photo Journalism. Students need to go out and Practically grab some images from daily livelihood of the society.	34	10

	Photographers Study : Students need to study great photographers and their work both from fiction and non-fiction genre		
Total		100	30

Text Book and Reference Book:

- a. Basic Photography, By Michael Langford | Focal Press
- b. Digital Photography complete course: Everything you need to know in 20 weeks, By Patel, N. | DK Publishers, USA, Pub. Year 2021
- c. Handbook of Photography, By James A. Folts & Ronaldo P. Lovel

Course Name: Climate change & Sustainable Environment

Course Code: 11011401VA01

Prerequisite: Shall have the basic knowledge about environmental studies.

Rationale: Will understand the basic interface between climate change and sustainability.

Course Learning Objective:

CLOBJ 1	Remember examine national and state policies related to climate change and sustainable development, as well as the roles of various stakeholders such as governments, NGOs, businesses, and communities in achieving SDGs.
CLOBJ 2	Understanding of the components and dynamics of the global climate system, including the atmosphere, hydrosphere, biosphere, and lithosphere, and how they interact to shape Earth's climate.
CLOBJ 3	Apply the Sustainable Development Goals (SDGs) outlined by the United Nations, understanding their significance in addressing climate change and promoting sustainable development worldwide.
CLOBJ 4	Analyse the causes and consequences of climate change, including global warming, ozone layer depletion, acid rain, and the greenhouse effect, through case studies of nuclear accidents, chemical disasters, and climatic episodes.
CLOBJ 5	Evaluate approaches to mitigating climate change, including energy conservation, the use of renewable energies (water, solar, wind, tidal, geothermal), water conservation techniques such as rainwater harvesting, and the importance of
CLOBJ 6	Develop the concept of sustainable human development, considering the intersection of environmental, social, and economic factors, and understanding how various religions, cultural practices, and ethical frameworks contribute to environmental conservation and sustainable development efforts.

Course Learning Outcomes:

CLO 1	Remember scientific principles behind climate change, including the greenhouse effect, and its implications for global ecosystems.
CLO 2	Explain the differences between government and governance and the various ideas and meanings attached to the goal of sustainable development.
CLO 3	Apply high-quality written and verbal communication skill.
CLO 4	Analyse policy-making processes in regard to sustainability issues.
CLO 5	Recommended the complexity and operations of governance systems and processes on international, national, and local levels.
CLO 6	Creative work effectively in a team and in tutorial or workshop situations.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to Climate Change: Global Climate System Climate Change: Causes and Consequences: Global warming, ozone layer depletion, acid rain, and greenhouse effect case studies: nuclear accidents, chemical disasters, and climatic episodes	33	10
2	Sustainable Development: Sustainable Development Goals: An overview Climate Change and Sustainable Development: National and State Policies Achieving Sustainable Development Goals: Role of Various Stakeholders Building Partnership for Climate Change and Sustainable Development	34	10
3	Sustainable Approach to Climate Change: Energy Conservation: Use of Renewable energies: Water, Solar, Wind, Tidal, Geothermal Water conservation techniques: Rain Water Harvesting. Environmental Ethics & Public Awareness: Role of various religions and cultural practices in environmental conservation Sustainable Human Development.	33	10

Total	100	30
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Text Book and Reference Book:

- Climate Change and Sustainable Development: Prospects for Developing Countries, By Anil Markandya, Kirsten Halsnæs
- Climate Change and Sustainable Development Global Prospective, By R.K.Mishra, P.s.Janki Krishna & CH. Laskhmi Kuma
- This Changes Everything: Capitalism vs The Climate, By Naomi Klein
- The Uninhabitable Earth: Life After Warming (TextBook), By David Wallace-Wells

Course Name: History of Mathematics

Course Code: 11010601SE01

Prerequisite: Basic Mathematical Knowledge, Historical Content, Critical Thinking Skills, Reading Skills

Rationale: Cultural Context, Development of Human Thought, Philosophical Insights, Connection to Other Disciplines

Course Objectives:

COBJ1	Develop proficiency in matrix calculations, such as finding determinants, applying row operations, and computing matrix inverses
COBJ2	Solve practical problems involving systems of linear equations
COBJ3	Explore advanced topics in linear algebra

Course Learning Outcome:

CL01	Students will demonstrate an understanding of key historical periods and civilizations that contributed to the development of mathematics.
CL02	Students will gain insight into the cultural, social, and political factors that influenced the development of mathematical ideas.
CL03	Students will develop analytical and critical thinking skills by evaluating historical mathematical texts and proofs.
CL04	Students will explore the philosophical foundations of mathematical concepts and gain an understanding of the relationship between mathematics and philosophy.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	-	2	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

	Content	Weightage	Teaching Hours
1	Unit 1 Introduction to Vedic Mathematics: History and origins of Vedic mathematics, Fundamental principles and sutras, Advantages over conventional math. Vedic Math for Arithmetic: Addition, subtraction, multiplication, division, Squaring, cubing, finding square roots and cube roots, Digital summation, differential calculus, etc.	50	11
2	Unit 2Algebra and Geometry with Vedic Mathematics: Factorization, fractions, simultaneous equations, Trigonometry, Mensuration, coordinate geometry, calculus.	25	11
3	Unit 3Advanced Applications of Vedic Mathematics: Cryptography, number theory, mathematical puzzles, Vedic math in real life applications.	25	8

Reference Books

- 1.An Essentials of Vedic Mathematics By Rajesh kumar Thakur | Rupa Publication
- 2.A History of Mathematics By Uta C. Merzbach and Carl B. Boyer | Isaac Asimov | Third Edition
- 3.Vedic Mathematics for All Ages: A Biggane's Guide By Vandana Singhal | Motilal Banarasidass Publishing House

Course Name: Climate change & Sustainable Environment

Course Code: 11011401VA01

Prerequisite: Shall have the basic knowledge about environmental studies.

Rationale: Will understand the basic interface between climate change and sustainability.

Course Learning Objective:

CLOBJ 1	Remember examine national and state policies related to climate change and sustainable development, as well as the roles of various stakeholders such as governments, NGOs, businesses, and communities in achieving SDGs.
CLOBJ 2	Understanding of the components and dynamics of the global climate system, including the atmosphere, hydrosphere, biosphere, and lithosphere, and how they interact to shape Earth's climate.
CLOBJ 3	Apply the Sustainable Development Goals (SDGs) outlined by the United Nations, understanding their significance in addressing climate change and promoting sustainable development worldwide.

CLOBJ 4	Analyse the causes and consequences of climate change, including global warming, ozone layer depletion, acid rain, and the greenhouse effect, through case studies of nuclear accidents, chemical disasters, and climatic episodes.
CLOBJ 5	Evaluate approaches to mitigating climate change, including energy conservation, the use of renewable energies (water, solar, wind, tidal, geothermal), water conservation techniques such as rainwater harvesting, and the importance of
CLOBJ 6	Develop the concept of sustainable human development, considering the intersection of environmental, social, and economic factors, and understanding how various religions, cultural practices, and ethical frameworks contribute to environmental conservation and sustainable development efforts.

Course Learning Outcomes:

CLO 1	Remember scientific principles behind climate change, including the greenhouse effect, and its implications for global ecosystems.
CLO 2	Explain the differences between government and governance and the various ideas and meanings attached to the goal of sustainable development.
CLO 3	Apply high-quality written and verbal communication skill.
CLO 4	Analyse policy-making processes in regard to sustainability issues.
CLO 5	Recommended the complexity and operations of governance systems and processes on international, national, and local levels.
CLO 6	Creative work effectively in a team and in tutorial or workshop situations.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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1	Introduction to Climate Change: Global Climate System Climate Change: Causes and Consequences: Global warming, ozone layer depletion, acid rain, and greenhouse effect case studies: nuclear accidents, chemical disasters, and climatic episodes	33	10
2	Sustainable Development: Sustainable Development Goals: An overview Climate Change and Sustainable Development: National and State Policies Achieving Sustainable Development Goals: Role of Various Stakeholders Building Partnership for Climate Change and Sustainable Development	34	10
3	Sustainable Approach to Climate Change: Energy Conservation: Use of Renewable energies: Water, Solar, Wind, Tidal, Geothermal Water conservation techniques: Rain Water Harvesting. Environmental Ethics & Public Awareness: Role of various religions and cultural practices in environmental conservation Sustainable Human Development.	33	10
Total		100	30

Text Book and Reference Book:

- Climate Change and Sustainable Development: Prospects for Developing Countries, By Anil Markandya, Kirsten Halsnæs
- Climate Change and Sustainable Development Global Prospective, By R.K.Mishra, P.s.Janki Krishna & CH. Laskhmi Kuma
- This Changes Everything: Capitalism vs The Climate, By Naomi Klein
- The Uninhabitable Earth: Life After Warming (TextBook), By David Wallace-Wells

Course Name: Basic English-I

Course Code: 00019301AE01

Prerequisite: Basic Knowledge of LSRW. To provide students with soft skills that complement their skills, making them more marketable when entering the workforce.

Rationale: Knowledge of LSRW is essential for students.

Course Learning Objective:

CLOBJ 1	Remember basic English language terms and concepts.
CLOBJ 2	Understand the main ideas and key details of simple English language materials.
CLOBJ 3	Apply grammar and vocabulary knowledge to construct simple sentences and paragraphs.
CLOBJ 4	Analyse the structure and organization of basic English texts.

CLOBJ 5	Evaluate the use of language in different contexts and for different purposes.
CLOBJ 6	Create original written and spoken English language content.

Course Learning Outcomes:

CLO 1	Define and recognize simple grammatical structures and rules in English sentences.
CLO 2	Understanding of basic English grammar concepts through application in context.
CLO 3	Apply listening skills to follow and respond appropriately to basic instructions and directions given in English.
CLO 4	Analyse language usage and areas for improvement in pronunciation, grammar, and vocabulary.
CLO 5	Evaluate new vocabulary and grammatical structures learned in class into their communication to demonstrate language fluency and creativity.
CLO 6	Develop the cultural relevance and appropriateness of language use in various contexts, demonstrating an understanding of cultural sensitivity and communication norms.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Listening Skills and Hearing: Listening Vs Hearing Types of listening, Traits of good listener, Barriers of listening	7	2
2	Listening Practice: Listening Practice(Audio & Video)	10	3
3	Presentation Skills: Defining the purpose of presentation Presentation strategies, How to make an effective presentation? Knowing /Analysing audience, Organizing content and preparing an outline Traits of a good speaker	3	1

4	Activity: Crazy Scientist.	7	2
5	Speaking Practice: Speaking practice (Elocution)	24	7
6	Reading Skills: Define reading, Reading Strategies, Techniques of reading, Techniques to read faster	3	1
7	Reading Practice: Reading Practice (Reading Comprehension)	13	4
8	Writing Skills: Develop Writing Skills, 7cs of communication, Techniques of writing better, Identifying common errors in writing	10	3
9	Paragraph Writing : Introduction of Paragraph Writing, Central components of paragraph development, Techniques for paragraph development	3	1
10	Writing Practice: Note making, Picture Description, Dialogue Writing, Paragraph Writing Completion of story from given points	20	6
Total		100	30

Text Book and Reference Book:

1. Understanding and Using English Grammar, By Betty Azar & Stacy Hagen | Pearson Education
2. Business Correspondence and Report Writing, By SHARMA, R. AND MOHAN, K.
3. Communication Skills, By Kumar S And Lata P | New Delhi Oxford University Press
4. Technical Communication : Principles And Practice, By Sangeetha Sharma, Meenakshi Raman | Oxford University Press
5. Practical English Usage, By MICHAEL SWAN
6. A Remedial English Grammar for Foreign Student, By F.T. WOOD
7. On Writing Well, By William Zinsser | Harper Paperbacks, 2006 | 30th anniversary edition
8. Oxford Practice Grammar, By John Eastwood | Oxford University Press

Course Name: Basic Hindi-I

Course Code: 00019301AE02

Prerequisite: Basic communication skills in Hindi

Rationale: Basic comprehensive skills Hindi.

Course Learning Objective:

CLOBJ 1	Remember key terms related to the Hindi language, such as grammar rules, vocabulary, and sentence structure.
CLOBJ 2	Understand the main ideas and themes of Hindi literary works or cultural texts.

CLOBJ 3	Apply knowledge of Hindi vocabulary to communicate in everyday situations, such as greetings, shopping, and asking for directions.
CLOBJ 4	Analyse the structure and style of Hindi literature, including poetry, short stories, or essays.
CLOBJ 5	Evaluate the appropriateness of Hindi language translations or interpretations.
CLOBJ 6	Create original content in Hindi, such as stories, poems, or dialogues..

Course Learning Outcomes:

CLO 1	Identify the sounds and symbols of the Hindi alphabet.
CLO 2	Understand simple spoken and written Hindi passages on familiar topics.
CLO 3	Apply their knowledge of Hindi in everyday situations, such as greetings, introductions, and basic conversations.
CLO 4	Analyse the structure and content of simple Hindi texts, such as stories, poems, or dialogues.
CLO 5	Create original content in Hindi, such as short stories, poems, or dialogues.
CLO 6	Evaluate the effectiveness of different language learning strategies for acquiring Hindi proficiency.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				T	CE	P	Theory	P	
2	-		2	100	100				100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1	हिंदी वर्णमाला (Hindi Alphabets) हिंदी वर्णमाला (Hindi Alphabets) Relate with English Alphabets, स्वर (Vowel), व्यंजन (Consonant)	13	4
2	हिंदी बाराखड़ी (Hindi Phonetics) हिंदी बाराखड़ी (Hindi Phonetics), संयुक्त शब्दी (Joint Words)	13	4
3	शब्द निर्माण (Word Formation)	13	4

	दो तीन अक्षर का शब्द निर्माण (Two-Three letter word formation)		
4	हिंदी व्याकरण (Hindi Grammar) संज्ञा (Noun), सर्वनाम (Pronoun), क्रिया (Verb) क्रिया विशेषण (Adverb), विशेषण (Adjective)	34	10
5	हिंदी शब्दावली (Hindi Vocabulary) संख्या (Numbers) (1 to 50), सप्ताह के दिन (Days of the Week), रंग (Colors)	27	8
Total		100	30

Text Book and Reference Book:

1. Text book of Hindi standard 1-5

Course Name: Basic Gujarati-I

Course Code: 00019301AE03

Prerequisite: Basic communication skills in Gujarati

Rationale: Basic comprehensive skills in Gujarati

Course Learning Objective:

CLOBJ 1	Remember key terms related to the Gujarati language, such as grammar rules, vocabulary, and sentence structure.
CLOBJ 2	Understand the main ideas and themes of Gujarati literary works or cultural texts.
CLOBJ 3	Apply knowledge of Gujarati vocabulary to communicate in everyday situations, such as greetings, shopping, and asking for directions.
CLOBJ 4	Analyse the structure and style of Gujarati literature, including poetry, short stories, or essays.
CLOBJ 5	Evaluate the appropriateness of Gujarati language translations or interpretations.
CLOBJ 6	Create original content in Gujarati, such as stories, poems, or dialogues.

Course Learning Outcomes:

CLO 1	Remember key terms related to the Gujarati language, such as grammar rules, vocabulary, and sentence structure.
CLO 2	Understand the main ideas and themes of Gujarati literary works or cultural texts.
CLO 3	Apply knowledge of Gujarati vocabulary to communicate in everyday situations, such as greetings, shopping, and asking for directions.

CLO 4	Analyse the structure and style of Gujarati literature, including poetry, short stories, or essays.
CLO 5	Evaluate the appropriateness of Gujarati language translations or interpretations.
CLO 6	Create original content in Gujarati, such as stories, poems, or dialogues.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				T	CE	P	Theory	P	
2	-		2	100	100				100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	ગુજરાતી મૂળાક્ષર (Gujarati Alphabets) સ્વર (Vowel), વ્યંજન (Consonant)	13	4
2	બારાક્ષરી (Phonetics) બારાક્ષરી (Phonetics), સંયુક્ત શબ્દો (Joint words)	13	4
3	શબ્દ રચના (Word Formation) બે ત્રણ અક્ષર ની શબ્દ રચના (Two three letter formation)	13	4
4	ગુજરાતી વ્યાકરણ (Gujarati Grammar) સંજ્ઞા (Noun), સર્વનામ (Pronoun), ક્રિયાપદ (Verb) ક્રિયાવિશેષણ (Adverb), વિશેષણ (Adjective)	34	10
5	શબ્દ ભંડોળ (Gujarati Vocabulary) સંખ્યાઓ (Numbers) (1 to 50), અઠવાડિયાના નામ (Days of the Week), રંગો (Colours)	27	8
Total		100	30

Text Book and Reference Book:

1. Text book of Gujarati standard 1-5

Semester – 2

Course Name: Integral Calculus

Course Code: 11010602DS01

Prerequisite: A solid understanding of single-variable calculus including derivatives

Rationale: This course extends Calculus I concepts to multivariable calculus and advanced integration techniques. Students will learn to compute volumes of complex regions and apply them in solving practical problems in geometry and physics. It also introduces improper integrals and special functions with diverse real-world applications.

Course Objectives:

COBJ1	Learn and apply integration methods such as substitution, parts, and rational/irrational fractions.
COBJ2	Perform double and triple integrals over various regions in Cartesian, polar, cylindrical, and spherical coordinates.
COBJ3	Solve problems related to areas, lengths, surfaces of revolution, and volumes of solids using integration.
COBJ4	Derive reduction formulas and solve integrals involving trigonometric functions.
COBJ5	Evaluate definite and improper integrals, and apply special functions like beta, gamma, and error functions in mathematical contexts

Course Learning Outcome:

CL01	Demonstrate a comprehensive understanding of various integration techniques, including integration by substitution, integration by parts, and integration of rational and irrational fractions
CL02	Apply integration concepts to evaluate definite integrals and compute areas between curves, lengths of plane curves, and areas of surfaces of revolution.
CL03	Proficiently apply concepts of double and triple integrals in rectangular, nonrectangular, polar, cylindrical, and spherical coordinates to compute volumes of solids and regions using the disk and washer method, cylindrical shell method, and applying triple integrals to compute volumes of complex shapes.
CL04	Apply reduction formulas for elementary and trigonometric functions to evaluate definite and indefinite integrals involving multiple trigonometric functions.
CL05	Investigate the properties of special functions, including the Beta function, Gamma function, and error function using the techniques of solving the improper integrals.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	0	0	4	20	20	0	60	0	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

	Content	Weightage	Teaching Hours
Unit:1	Introduction to Integrals: Indefinite and definite Integrals, Estimating with finite sums, Definite integrals and Properties of Definite Integrals, Integral as the Limits of a Sum, Integration by Substitution, Integration by Parts, Integration of Rational and Irrational Fractions, Trigonometric substitutions, Area and the Mean Value Theorem, The Fundamental Theorem of calculus	20	15
Unit:2	Derivation of reduction: formula for powers of elementary functions, trigonometric functions problems. Use of two or more trigonometric functions with indefinite and definite integrals and examples.	25	12
Unit:3	Double and Triple Integrals: Double integration over rectangular and nonrectangular regions, Double integrals in polar co-ordinates, Triple integral over a parallelepiped and solid regions, Volume by triple integrals, Triple integration in cylindrical and spherical coordinates, Change of variables in double and triple integrals. Applications of definite integrals: Area between curves, Lengths of Plane Curves, Areas of Surface of Revolution, Volume by slicing, Volumes of Solids of Revolution, Volume by Disk and Washer method, Cylindrical Shell	35	21
Unit:4	Improper Integral and some special functions: Evaluation of definite and improper integrals, Beta, Gamma and error function with their properties.	20	12
Total		100	60

Text Book

Shanti Narayan, P.K. Mittal, Integral Calculus, S. Chand.

Reference Books

- T.M. Apostol, Calculus Vol. II, John Wiley Publication
- H. Anton, I. Birens and S. Davis, Calculus, John Wiley and Sons, Inc.
- G.B. Thomas and R.L. Finney, Calculus, Pearson Education
- A. K Sharma, Text book of Integral Calculus, Discovery Publishing House
- Edwards Joseph, Integral Calculus, Macmillan and Co. Limited London

Course Name: Sequence and Series

Course Code: 11010602DS02

Prerequisite: Strong understanding of algebraic operations of real numbers, familiarity with sets, set notation, and basic set operations, basic of limit of a function

Rationale: This course is designed to provide students with a comprehensive understanding of the real number system and its properties. Real numbers form the foundation of mathematics and play a crucial role in various fields, including calculus, analysis, and applied sciences. By studying the properties of real numbers, sequences, and series, students will gain essential mathematical skills that are relevant in both theoretical and practical contexts.

Course Objectives:

COBJ1	Develop a thorough understanding of the real number system and its algebraic and order properties.
COBJ2	Comprehend the notions of boundedness, supremum, and infimum of a nonempty subset of real numbers and their applications.
COBJ3	Understand the completeness property of the real number system and its connection to the Archimedean property and density of rational numbers.
COBJ4	Study sequences of real numbers and their properties such as boundedness, monotonic, and convergence.
COBJ5	Introduce the concept of a series and analyse the convergence and divergence of infinite series of real numbers using various tests of convergence

Course Learning Outcome:

CLO1	Demonstrate a clear understanding of the real number system, including its algebraic and order properties and the properties of the subsets of set of real numbers such as boundedness, supremum and infimum
CLO2	Analyze intervals, recognize their properties, and apply the concept of neighborhoods to study points in the real number system.
CLO3	Determine the convergence of sequences and calculate limits using theorems and Cauchy's convergence criterion.
CLO4	Compute the limit superior and limit inferior of a sequence
CLO5	Analyze infinite series and determine their convergence or divergence as well as absolute and conditional convergence using various tests such as the integral test, comparison test, and ratio test and Leibnitz's test.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

	Content	Weightage	Teaching Hours
Unit:1	Real Numbers System	15	5

	Real Number System $\mathbb{R}$, Algebraic and order properties of $\mathbb{R}$, Absolute value of a real number, bounded above and bounded below sets, Supremum and infimum of a nonempty subset of $\mathbb{R}$.		
Unit:2	Properties of Real Numbers $\mathbb{R}$ The completeness property of $\mathbb{R}$, Archimedean property, Density of rational numbers in $\mathbb{R}$, Definition and types of intervals, Nested intervals property, Neighbourhood of a point in $\mathbb{R}$, Open and closed sets in $\mathbb{R}$.	25	15
Unit:3	Sequences in Real Number Definition of a sequence, theorems on limits of sequences, bounded and monotonic sequences, Cauchy's convergence criterion, Cauchy sequence, limit superior and limit inferior of a sequence, subsequence, Bolzano–Weierstrass theorem for sequences.	30	20
Unit:4	Series in Real Number Infinite Series Convergence and divergence of infinite series of real numbers, Necessary condition for convergence, Cauchy criterion for convergence; Tests for convergence of positive term series: Integral test, Comparison test, Limit comparison test, D'Alembert's ratio test, Cauchy's nth root test; Alternating series, Leibnitz's test, Absolute and conditional convergence.	30	20
Total		100	60

Text Book

Goldberg, R. Richard, Methods of Real Analysis, John Wiley and Sons, New York

Reference Books

- A. Ross, Kenneth, Elementary Analysis: The Theory of Calculus (2nd ed.). Undergraduate Texts in Mathematics, Springer.
 - Thomson, S. Brian, Bruckner, Andrew. M., & Bruckner, Judith B. Elementary Real Analysis, Prentice Hall
 - Agarwal, Flaut, O'Regan; An Introduction to Real Analysis, CRC Press
 - N.P.Bali, Sequence and Infinite Series, Laxmi Publications
- Goldberg, R. Richard, Methods of Real Analysis, John Wiley and Sons, New York.

Course Name: Business Analytics with Ms-Excel

Course Code: 03010502DA01

Prerequisite: Basic knowledge of office automation software concepts

Rationale: This subject will help students how to use MS-EXCEL for business analytics.

Course Objectives:

COBJ1	Analyze Excel data
COBJ2	Perform power query and power pivot with excel

Course Learning Outcome:

CLO1	Do data analysis with Excel.
CLO2	Analyze Excel data with regression.
CLO3	Perform power query and power pivot with excel.
CLO4	Design and build interactive dashboards to present key performance indicators (KPIs) and trends. Compute and interpret basic descriptive statistics such as mean, median, mode, standard deviation.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

Course Content

Sr.	Content	Weightage	Teaching Hours
1	Overview of Business Analytics and its applications: Introduction to MS Excel: Interface, navigation, and essential functions, Data types, data entry, and data formatting in Excel	10	6
2	Working with Data in Excel: Sorting and filtering data using formulas and functions for basic calculations, Introduction to data visualization in Excel (charts and graphs)	15	9
3	Data Analysis Techniques with Excel: PivotTables: Creating, customizing, and analyzing data, Pivot Charts: Visualizing data from PivotTables, Data cleaning and data validation techniques, Descriptive statistics: Measures of central tendency and dispersion, Histograms and frequency distributions, Scatter plots and trendlines for data exploration	15	9
4	Advanced Data Analysis with Excel: Advanced Excel functions (e.g., VLOOKUP, IF, SUMIF, AVERAGEIF, etc.), Using Solver for optimization problems, Goal Seek and Scenario Manager for sensitivity analysis	10	6
5	Introduction to Business Forecasting: Time series data analysis with Excel, Moving averages and exponential smoothing techniques, Forecasting using Excel's Forecast Sheet feature	5	3
6	Regression Analysis with Excel: Understanding regression analysis and its applications, Performing linear regression in Excel, Interpreting regression results and assessing model accuracy	10	6

7	Data Visualization and Dashboard Creation: Advanced charting techniques in Excel, Creating interactive dashboards using Excel features (e.g., slicers, pivot charts), Visual storytelling and effective data presentation	10	6
8	Introduction to Power Query and Power Pivot and Advanced Topics in Business Analytics with Excel: Importing and transforming data with Power Query, Creating data models and relationships using Power Pivot, Combining data from multiple sources Business Intelligence with Power BI (integration with Excel), Data analysis using Excel's add-ins (e.g., Analysis ToolPak), Introduction to macros and automation in Excel	20	12
9	Real-world Case Studies and Applications: Analyzing business datasets to derive insights, Applying various Excel techniques to solve real-world business problems	5	3
	Total	100	60

Reference Books

1. **Business Intelligence Guidebook: From Data Integration to Analytics**
By Rick Sherman | Morgan Kaufmann | 1
2. **Excel Data Analysis For Dummies by Stephen L. Nelson and E. C. Nelson (TextBook)**
3. **Microsoft Excel 2019 Data Analysis and Business Modeling" by Wayne Winston**

Course Name: Business Analytics with Ms-Excel Laboratory

Course Code: 03010502DA02

Prerequisite: Basic knowledge of office automation software concepts

Rationale: This subject will help students how to use MS-EXCEL for business analytics.

Course Objectives:

COBJ1	Analyze Excel data
COBJ2	Perform power query and power pivot with excel

Course Learning Outcome:

CLO1	Do data analysis with Excel.
CLO2	Analyze Excel data with regression.
CLO3	Perform power query and power pivot with excel.
CLO4	Design and build interactive dashboards to present key performance indicators (KPIs) and trends. Compute and interpret basic descriptive statistics such as mean, median, mode, standard deviation.

Teaching and Examination Scheme

Teaching Scheme	Evaluation Scheme
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L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
-	-	2	1	-	-	20	-	30	50

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

List of Practical	
1.	Data Entry and Formatting: Students practice entering data into Excel spreadsheets and apply formatting techniques such as cell formatting, conditional formatting, and data validation.
2.	Sorting and Filtering Data: Students sort and filter datasets to organize and analyze information effectively.
3.	Basic Formulas and Functions: Exercises involving basic Excel functions like SUM, AVERAGE, COUNT, MIN, and MAX to perform calculations on datasets.
4.	Creating Charts and Graphs: Students generate various types of charts and graphs to visualize data, such as bar charts, line charts, and pie charts.
5.	PivotTables: Practical exercises on creating PivotTables to summarize and analyze large datasets.
6.	Pivot Charts: Students create Pivot Charts based on PivotTable data to visualize trends and patterns.
7.	Data Cleaning and Validation: Exercises to clean and validate datasets, including removing duplicates, handling missing values, and correcting errors.
8.	Descriptive Statistics: Practical exercises on calculating descriptive statistics like mean, median, mode, standard deviation, and variance.
9.	Exploratory Data Analysis (EDA): Students perform EDA techniques like creating histograms, scatter plots, and box plots to explore data distributions and relationships.
10.	Forecasting Time Series Data: Exercises on using Excel's time series forecasting tools to predict future values based on historical data.
11.	Regression Analysis: Students apply regression analysis to identify relationships between variables and make predictions.
12.	Goal Seek and Scenario Manager: Practical exercises using Goal Seek and Scenario Manager for sensitivity analysis and what-if scenarios.
13.	Data Visualization and Dashboard Creation: Students design interactive dashboards using Excel features like slicers and pivot charts to present data insights.
14.	Power Query: Exercises on using Power Query to import, transform, and clean data from external sources.
15.	Power Pivot: Practical exercises using Power Pivot to create data models and relationships for more advanced data analysis.
16.	Business Intelligence with Power BI: An introduction to Power BI and its integration with Excel for advanced data visualization and analysis.
17.	Advanced Excel Functions: Exercises involving advanced functions like VLOOKUP, IF, SUMIF, AVERAGEIF, and INDEX- MATCH.
18.	Macros and Automation: Students learn to create and use Excel macros to automate repetitive tasks.
19.	Real-World Case Studies: Students work on real-world business analytics projects, applying Excel techniques to solve specific business problems.

20.	Final Project: A comprehensive project that allows students to integrate the concepts and skills learned throughout the course to analyze and present data-driven insights.
21.	By incorporating these practical exercises into the course, students can gain practical experience in using MS Excel for Business Analytics, which will help solidify their understanding and make them proficient in applying analytics techniques in real-world scenarios.

Reference

Books

1. **Business Intelligence Guidebook: From Data Integration to Analytics**
By Rick Sherman | Morgan Kaufmann | 1
2. **Excel Data Analysis For Dummies by Stephen L. Nelson and E. C. Nelson (TextBook)**
3. **Microsoft Excel 2019 Data Analysis and Business Modeling" by Wayne Winston**

Course Name: Maintenance of Household Apparatus

Course Code: 03010602UE01

Prerequisite: Knowledge of Physics and Mathematics up to 12th science level.

Course Objectives:

COBJ1	To demonstrate a thorough understanding of electrical circuits including the ability to apply concepts, perform calculations, and identify practical applications and assess electrical loads and power ratings of household appliances.
COBJ2	To exhibit the proficiency using multi-meter to measure various electrical quantities accurately, and apply measurement techniques to assess power consumption and energy efficiency of electrical appliances.
COBJ3	To exhibit a comprehensive understanding of earthing and grounding systems in residential buildings, recognizing the significance of grounding for electrical safety, and showcasing practical skills.
COBJ4	To understand various electrical wiring systems employed in households, encompassing staircase and Go down wiring, and competence in hands-on wiring connections while prioritizing safety measures.
COBJ5	To gain in-depth knowledge of household appliance components, acquire skills in maintenance, troubleshooting, and replacement of electrical company

Course Learning Outcome:

CL01	Recognizing the significance of grounding for electrical safety, and showcasing practical skills
CL02	Acquire skills in maintenance, troubleshooting, and replacement of electrical company
CL03	Identify practical applications and assess electrical loads and power ratings of household appliances.

Teaching and Examination Scheme

Teaching Scheme	Evaluation Scheme	
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L	T	P	C	Internal Marks			External Marks		Total
				T	CE	P	T	P	
3	-	2	4	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

Sr.	Content	Weightage	Teaching Hours
1	Understanding Electrical Circuits: Series and parallel circuits: concepts, calculations, and applications. Electrical loads and power ratings of household appliances. Safety considerations and working with electrical circuits and appliances.	18	12
2	Electrical Measurements : Measurement of voltage, current, and resistance using multimeters. Measurement of power consumption and energy efficiency of electrical appliances. Understanding power factor and its significance in household appliances. Comparison between AC and DC circuit. Understand the difference between various measuring instruments between AC and DC circuit.	18	12
3	Earthing and Grounding: Detailed study of earthing and grounding systems in residential buildings. Pipe earthing and plate earthing of the electrical system. Importance of grounding for electrical safety and protection of appliances. Practical demonstration and installation of earthing systems	18	12
4	Types of Wiring: Study of different types of electrical wiring systems used in households. Staircase wiring, Godown wiring. Wiring for lighting circuits, power outlets, and specialized appliances. Hands-on practice on wiring connections and safety measures.	13	6
5	Maintenance of Household Appliances: Understanding the common components of household appliances. Techniques for cleaning and maintaining refrigerators, ovens, microwaves, and dishwashers. Practice- preventive maintenance, regular cleaning, oiling, greasing of household gadgets like fans, coolers, water pump motors etc. Practice- Replacement of damaged switches, MCB, fan-capacitor, regulator, and lighting points i.e. holder, choke, starters, water coolers, and their pump & motor. Practice- Maintenance of electrical equipment's like- iron, toaster, induction-plate & cooker,ups ,gyser and inverter. Practice: Basic maintenance of AC. Practice: Basic maintenance of Refrigerator. Troubleshooting common problems in appliances and basic repairs. Concept of smart technology.	20	12

6	Safety and Precautions : Fire safety and prevention measures for electrical appliances. Identifying potential electrical hazards and safety measures. Safe handling of electrical shocks and emergency response procedures	13	6
	Total	100	60

Reference Books

1. **Electricity and Basic Electronics** By Stephen R. Matt | Goodheart-Willcox Co Inc.,U.S | Revised edition, Pub. Year 1982
2. **Home Maintenance For Dummies** By J Carey | John Wiley & Sons Inc | 2nd, Pub. Year 2009
3. **Electrical Wiring Residential (TextBook)** By Ray C. Mullin and Phil Simmons | Delmar Cengage Learning | 17th edition, Pub. Year 2011
4. **Handbook Of Repair And Maintenance Of Domestic Electronics Appliances** By Shashi Bhushan Sinha | BPB | First Edition, Pub. Year 2016
5. **Electrical Safety Handbook (TextBook)** By John Cadick | McGraw-Hill Education | 4th, Pub. Year 2012

Course Name: Human Psychology

Course Code: 15010402UE01

Rationale: Students will have basic understanding of different concepts of Psychology and various mental processes.

Course Learning Objective:

COBJ1	Remember principles of classical and operant conditioning.
COBJ2	Understand basic structure and functions of nervous system
COBJ3	Apply psychological research methods to design and conduct a simple experiment or study.
COBJ4	Analyse factor that influence human behaviour such as genetics, environment and culture
COBJ5	Evaluate effectiveness of different therapeutic approaches in treating psychological disorders
COBJ6	Design research study to investigate a new hypothesis in field of psychology.

Course Learning Outcomes:

CLO 1	Remember concepts, perform calculations, and identify practical applications and assess electrical loads and power ratings of household appliances.
CLO 2	Understanding of electrical circuits including the ability to apply concepts, perform calculations, and identify practical applications and assess electrical loads and power ratings of household appliances.

CLO 3	Apply multi-meter to measure various electrical quantities accurately, and apply measurement techniques to assess power consumption and energy efficiency of electrical appliances.
CLO 4	Analyse a comprehensive understanding of earthing and grounding systems in residential buildings, recognizing the significance of grounding for electrical safety, and showcasing practical skills.
CLO 5	Interpret various electrical wiring systems employed in households, encompassing staircase and Godown wiring, and competence in hands-on wiring connections while prioritizing safety measures.
CLO 6	Create thorough knowledge and design for using household appliances

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					Total
L	T	P	C	Internal Evaluation			ESE		
				T	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Unit I Human Development Meaning, Difference between Growth, Development, Maturation and Evolution Factors Influencing Development Overview of Developmental stages Prenatal stage Infancy Childhood Challenges of Adolescence Adulthood Old Age	17%	10

2	Unit II Sensation, Attention & Perception Sensation: Definition, types Attention: Definition, Types Perception: Figure-Ground perception, perceptual constancies: shape, size, brightness; Depth perception: monocular and binocular cues; illusions	17%	10
3	Unit III Thinking Nature and Processes Problem Solving Reasoning Decision Making Developing Creative Thinking Barriers to Creative Thinking Strategies for Creative Thinking	17%	10
4	Unit IV Intelligence Theories of Intelligence Multiple Intelligence theory Triarchic Theory of Intelligence PASS Model of Intelligence Individual Differences in Intelligence Emotional Intelligence	17%	10
5	Unit V Personality Concept of Self and Personality Major Approaches of Personality Trait & Type Approaches Five-Factor Model Psychodynamic Approach Behavioural Approach Humanistic Approach Assessment of Personality Self-report Measures Projective Techniques	16%	1
6	Unit VI Sexuality and Gender Physical and psychological side of psychology Gender theories Human sexual behavior Sexual dysfunction and problems	16%	10
	Total	100	60

Text Book and Reference Book:

1. Digital Introduction to psychology By Baron R | McGraw Hill Publishing House, New Delhi

2. Psychology By Ciccarelli, S. K. & Meyer, G. E. (2008), | Pearson Education
3. Introduction to Psychology By Clifford.T Morgan | Tata Mcgraw Hill
4. Social Psychology By Baron. R.A., Byrne, D & Bhardwaj. | New Delhi: Pearson

Course Name: Digital Health

Course Code: 19010002UE01

Prerequisite: Basic Knowledge of Healthcare Systems, Medical Science, Information Technology Literacy, Healthcare Terminology, Regulatory and Ethical Considerations.

Rationale: Emergence of Digital Health Technologies, Data-Driven Decision Making, Interdisciplinary Nature & Improved Patient Outcomes.

Course Learning Objective:

COBJ1	Remember the Interdisciplinary Nature of Digital Health: Identify the diverse disciplines and stakeholders involved in digital health, including healthcare providers, technologists, policymakers, researchers, and patients.
COBJ2	Understand the historical development and key milestones in the field of digital health, including the adoption of electronic health records (EHRs), emergence of telemedicine, and advancements in wearable technologies.
COBJ3	Apply the functionalities and significance of health information technologies such as Electronic Health Records (EHRs), Health Information Exchange (HIE), and interoperability standards in facilitating data exchange and continuity of care.
COBJ4	Analyse the capabilities and potential applications of wearable technologies and remote monitoring devices in healthcare, including monitoring vital signs, tracking physical activity, and managing chronic conditions.
COBJ5	Evaluate the effectiveness, scalability, and regulatory considerations of telemedicine and health applications for chronic disease management and remote patient monitoring.
COBJ6	Create awareness related to data privacy, patient consent, data security, and equity in access to digital health technologies, and their implications for research, development, and implementation.

Course Learning Outcomes:

CLO 1	Remember the interdisciplinary nature of digital health, recognizing the contributions of various stakeholders and disciplines such as medicine, technology, policy, and entrepreneurship.
CLO 2	Understand functionalities and significance of health information technologies, including Electronic Health Records (EHRs), Health Information Exchange (HIE), and interoperability standards, in facilitating data exchange and healthcare delivery.
CLO 3	Apply knowledge of wearable technologies and remote monitoring devices to analyse their potential applications in healthcare, including disease management, preventive care, and patient engagement.
CLO 4	Analyse the impact of health analytics and big data in healthcare, including their role in improving clinical decision-making, population health management, and personalized medicine.
CLO 5	Evaluate the future trends and emerging technologies in digital health, including Internet of Things (IoT) applications, block chain in healthcare, and other transformative technologies, in terms of their potential impact, scalability, and ethical considerations..
CLO 6	Synthesize knowledge of artificial intelligence (AI) and machine learning applications in healthcare to propose innovative solutions for diagnostics, treatment optimization, and predictive analytics.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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1	Foundations of Digital Health Overview of Digital Health Evolution and milestones in Digital Health Interdisciplinary nature of Digital Health Key stakeholders and their roles Health Information Technologies: Electronic Health Records (EHR), Health Information Exchange (HIE), Standards, and Interoperability	25%	15
2	Patient-Centric Technologies Wearable Technologies and Remote Monitoring Telemedicine and telehealth Mobile Health (mHealth) Applications Chronic disease management using mobile technologies Regulatory considerations for mobile health apps	25%	15
3	Data Analytics and Artificial Intelligence in Healthcare Health Analytics and Big Data Role of data analytics in healthcare Big data applications in health Artificial Intelligence in Healthcare Machine learning applications in diagnostics and treatment	25%	15
4	Innovation, Ethics, and Future Trends Digital Health Start ups and Innovations Case studies of successful digital health innovations Entrepreneurship in digital health Regulatory and Ethical Considerations Regulatory frameworks for digital health products Ethical considerations in digital health research and development Future Trends and Emerging Technologies Internet of Things (IoT) in healthcare Block chain applications in healthcare Emerging technologies shaping the future of digital health	25%	15
	Total	100	60

Text Book and Reference Book:

1. Digital Health: A Framework for Healthcare Transformation"By Marion J. Ball, Patricia C. Dykes, and Kathryn H. Bowles | Springer
2. **Introduction to Digital Health** By Jörg F. Debatin, Nassir Navab, Christoph Seebauer | Springer
3. **The Fourth Industrial Revolution** By Klaus Schwab | Crown Business
4. **Healthcare Information Technology Exam Guide for CompTIA Healthcare IT Technician and HIT Pro Certifications** By Kathleen A. McCormick | McGraw Hill Education
5. **Digital Health: Scaling Healthcare to the World** By Homero Rivas, Paul Cerrato, and John Mattison | CRC Press

Course Name: B.Sc. Public Health Nutrition

Course Code: 19010202UE01

Prerequisite: Basic knowledge of Nutrition and Public Health.

Rationale: Public health nutrition is the field of study that is concerned with promotion of good health through prevention of nutrition-related illnesses or deficiencies in the population, and the government policies and programmes that are aimed at solving these problems. This course aims to provide an overview of public health nutrition, nutritional problems of public health significance and programmes to tackle nutritional problems.

Course Learning Objective:

CLOBJ 1	Understand the global and national burden of nutritional deficiencies.
CLOBJ 2	the most important public health nutrition problems in high-income and low-income countries respectively, and discuss long term and short-term countermeasures
CLOBJ 3	Search and compile scientific material in the field of public health nutrition

Course Learning Outcomes:

CLO 1	Understand the global and national burden of nutritional deficiencies
CLO 2	Identify the determinants for dietary habits and relate these to individual, social, cultural and economic factors
CLO 3	Describe the most important public health nutrition problems in high-income and low-income countries respectively, and discuss long term and short-term countermeasures
CLO 4	Identify and discuss the role and impact of different policy documents, international agreements and regulations of importance for public health nutrition activities on a national and international level Search and compile scientific material in the field of public health nutrition

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	2	4	20	20	20	60	30	150

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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1	Introduction to public health nutrition History of the development of nutrition science Understanding the role of food and nutrients for health Nutrition Transition: Demographic, economic transition, poverty alleviation, food consumption patterns Determinants of nutritional status of individual & populations. The need and adequacy of nutrients including the nutritional adequacy of various physiological groups according to the life cycle (from preconception to the elderly) Nutritional status assessment –MUAC, Weight for age, Height for age, Weight for height, BMI Definitions of various nutrition and health indicators	30	12
2	Major nutrition deficiencies as public health challenge2.1 Undernutrition: global and Indian prevalence of undernutrition, risk factors consequences 2.2. Major nutritional Problems – aetiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Macro and micro nutrient deficiencies. 2.3. Other nutritional problems- aetiology, prevalence, clinical manifestations, preventive and therapeutic measures for: lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis. 2.4. Nutrition and Non-communicable diseases – Overweight, obesity and chronic degenerative diseases	30	12
3	National nutrition programmes and policies3.1. Programmes and policies on nutrition and health (National and Global) 3.2. United Nations (UN) Decade of Action on Nutrition (2016 - 2025) 3.3. Overview of Sustainable Development Goals (SDGs) – keeping Nutrition at centre stage	10	5
4	Food and nutrition security4.1. Factors affecting food security, indicators and systems (Global & national) 4.2. Identification and measurement of food insecurity (FIA, ISMAP) 4.3. Food production, access, distribution, availability, losses and consumption 4.4. Socio-cultural aspects of dietary patterns and their implications for nutrition and health	10	5
5	Approaches and Strategies for improving nutritional status and health5.1. Programmatic approaches, their advantages and demerits, feasibility, and available resources 5.2. Health-based interventions, food-based interventions including: Fortification and genetic improvement of foods, supplementary feeding, nutrition education for behaviour change 5.3. Case studies: Community-based preventive and management programmes; screening approaches, etc.	20	11

List of Practical

1.	Introduction to various electrical symbols and various measuring instruments.
2.	To learn how to measure voltage, current, and resistance using a multimeter and to understand their importance in electrical measurements.
3.	To study and perform ohm's law, series and parallel circuit.
4.	To investigate the electrical characteristics of household appliances and assess their power consumption using a millimeter.
5.	To explore the internal components and workings of the fan by safely disassembling and reassembling.
6.	To demonstrate and to understand the power consumption and comments on the various power.
7.	To understand potential electrical fire hazards and learn to use fire extinguishers effectively.
8.	To measure earth resistance with the help of an earth resistance meter.
9.	To understand the importance of MCB, ELCB, and Fuse and explain all these with the help of electrical circuits.
10.	To utilize a non-contact voltage tester to check the connectivity of the system
11.	Demonstration and maintenance of any one of the iron, toaster, induction-plate & cooker, ups, gyser and inverter.
12.	To study the various soldering techniques.

Reference Books

- 1.Sharda Gupta, Santosh Jain Passi, Rama Seth, Ranjana Mahna & Seema Puri Kumud Khanna, Nutrition and Dietetics, 2014 (TextBook)
- 2.Michael J. Gibney, Barrie M. Margetts, John M. Kearney, Lenore Arab, Public Health Nutrition, Wiley India Pvt. Ltd (TextBook)
- 3.Park Textbook of Preventive and Social Medicine, K Park, 21 st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS (TextBook)

Course Name: Mathematical Aptitude

Course Code: 00019101SE01

Prerequisite: F Basic numeracy skill

Rationale: Mathematical aptitude refers to the ability to reason, think critically, and apply mathematical principles to solve problems and make sense of the world around us.

Course Learning Objective:

CLOBJ 1	Understand and apply fundamental concepts of arithmetic, including numbers, highest common factor (HCF), lowest common multiple (LCM), square roots, and cube roots, to solve numerical problems efficiently and accurately.
CLOBJ 2	Develop proficiency in solving problems involving ratio and proportion, including applications in comparison, scaling, mixing, and distribution scenarios, to analyze and solve real-world quantitative problems effectively.

CLOBJ 3	Practise solving problems related to permutations and combinations, including applications in counting arrangements, selections, and probability calculations, to analyze and solve combinatorial problems across various domains.
CLOBJ 4	analyse concepts of percentage, average, and partnership, including shortcut techniques for calculating averages and distributing profits or expenses among partners, to analyse financial data and make informed decisions.
CLOBJ 5	Evaluate proficiency in solving problems related to time, work, distance, boats, streams, mixtures, logarithms, progressions (arithmetic mean, geometric mean, harmonic mean), and series, to solve practical problems involving time management, resource allocation, and sequence analysis.
CLOBJ 6	Develop the ability to solve problems related to interest (simple interest and compound interest), depreciation rates, profit-loss calculations, discounts, equations (linear and quadratic), and probability, to analyze financial transactions, investment decisions, and risk assessment scenarios effectively

Course Learning Outcomes:

CLO 1	Remember and differentiate between numbers, including integers, fractions, decimals, and real numbers.
CLO 2	Understand & analyse data presented in various forms, including tables, charts, and graphs, to extract meaningful information related to percentages, averages, and proportions.
CLO 3	Apply knowledge of logarithms, exponential functions, and interest rates to solve problems related to financial calculations, including compound interest, depreciation, and annuity investments.
CLO 4	Analyse and interpret data sets, including grouped and ungrouped data, to calculate measures of central tendency (mean) and dispersion (standard deviation) and draw meaningful conclusions about data distributions.
CLO 5	Evaluate and critique data interpretation methods, including the accuracy and effectiveness of tabulation, bar graphs, pie charts, and line charts in conveying information and making comparisons.
CLO 6	Synthesize information from multiple sources to solve problems related to mensuration, including calculating areas, perimeters, volumes, and surface areas of geometric shapes and solids.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	

2	-	-	2	20	20		60		100
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L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Numbers, HCF & LCM, Square Root & Cube Root, Ratio & Proportion, Permutations & Combinations, Percentage, Average-Shortcut averages, Partnership, Time -work & distance, Boats & streams, Mixtures, Logarithm	40	12
2	Progression (AM, GM, HM), Series, Interest (S.I. & C.I.) and depreciation rate, Profit-Loss & Discount, Equations (Linear & Quadratic), Probability	40	12
3	Mensuration I (Area & Perimeter), Mensuration II (Volume & Surface area), Grouped Data, Ungrouped Data (Mean and Standard Deviation) Data interpretation: (Tabulation, Bar Graph, Pie Chart, Line Chart).	20	6

Reference Book:

1. **Quantitative Aptitude for Competitive Examinations (TextBook)** By D. Khattar | Person Indian Education Service
2. **Verbal Reasoning and Non - Verbal Reasoning (TextBook)** By B. S. Sijwali and Indu Sijwali | New Delhi: Arihant
3. **Quantitative Aptitude for Competitive Examinations** By R. S. Aggarwal | S. Chand Publishing,

Course Name: IPDC Including History and Culture of India and IKS-I
Course Code: 00019302VA01

Rationale: IPDC aims to prepare students for the modern challenges they face in their daily lives. Promoting fortitude in the face of failures, Unity amongst family discord, Self-discipline amidst Distractions. and many more priceless lessons. The course focuses on morality and character development at the core of student growth, to enable students to become self-aware, sincere, and successful in their many roles - as an ambitious student, reliable employee, caring family member, and considerate citizen.

Course Objectives:

COBJ1	To provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.
COBJ2	To give the students the tools to develop effective habits, promote personal growth, and improve their well-being, stability, and productivity.
COBJ3	To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.

Course Learning Outcome:

CLO1	To provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.
CLO2	To give the students the tools to develop effective habits, promote personal growth, and improve their well-being, stability, and productivity.
CLO3	To allow students to establish a stronger connection with their family through critical thinking and development of qualities such as unity, forgiveness, empathy, and effective communication.
CLO4	To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.
CLO5	To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.
CLO6	To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.

Teaching and Examination Scheme

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	-	2	100	100	-	-	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction and Remaking Yourself Restructuring Yourself: Students learn how self-improvement enables them to secure a bright future for themselves. They will learn 6 powerful thought-processes that can develop their intellectual, physical, emotional, and spiritual quotients	7	2
2	Remaking Yourself Power of Habit: Students will undergo a study of how habits work, the habits of successful professionals, and the practical techniques that can be used to develop good habits in their life.	7	2
3	Learning from Legends Tendulkar & Tata: Students will learn from the inspirational lives of India's two legends, Sachin Tendulkar and Ratan Tata. They will implement these lessons through relatable case studies.	7	2
4	From House to Home Listening & Understanding: Active listening is an essential part of academic progress and communications. Students will learn to listen with their eyes, ears, mind, and heart.	7	2
5	Facing Failures Welcoming Challenges: This lecture enables students to revisit the way in which they approach challenges. Through the study of successful figures such as Disney, Lincoln and Bachchan, students will learn to face difficulties through a	7	2

	positive perspective.		
6	Facing Failures Significance of Failures: Failure is a student's daily source of fear, negativity, and depression. Students will be given the constructive skills to understand failure as formative learning experiences.	7	2
7	My India My Pride Glorious Past - Part 1: India's ancient Rishis, scholars, and intellectuals have made tremendous contributions to the world, they developed an advanced, sophisticated culture and civilization which began thousands of years ago. Students will learn the importance of studying India's glorious past so that they could develop a strong passion and pride for our nation.	7	2
8	My India My Pride Glorious Past - Part 2: Our ancient concepts can be used to seek revolutionary ideas and to generate inspiration. Students will develop a deeper interest in India's Glorious Past – by appreciating the need to read about it, research it, write about it, and share it.	7	2
9	Learning from Legends A.P.J. Abdul Kalam: Dr Kalam's inspirational life displayed legendary qualities which apply to students (1) Dare to Dream (2) Work Hard (3) Get Good Guidance (4) Humility (5) Use Your Talents for the Benefit of Others	7	2
10	Soft Skills Networking & Leadership: Students are taught the means of building a professional network and developing a leadership attitude.	7	2
11	Soft Skills Project Management: Students will learn the secrets of project management through the Akshardham case study. They will then practice these skills through an activity relevant to student life.	6	2
12	Remaking Yourself Handling Social Media: Students will learn how social media can become addictive and they will imbibe simple methods to take back control.	6	2
13	Facing Failures Power of Faith: Students will learn about the power and necessity of faith in our daily lives.	6	2
14	From House to Home Bonding the Family: Students will understand the importance of strong family relationships. They will learn how to overcome the generation gap and connect with their family more.	6	2
15	Selfless Service Seva: Students will learn that performing seva is beneficial to one's health, wellbeing, and happiness. It also benefits and inspires others.	6	2

Reference

Books

1. **Integrated Personality Development Course (TextBook)**
By Bochasanwasi Akshar Purushottam Swaminarayan Sanstha

Course Name: Basic English-II

Course Code: 00019302AE04

Prerequisite: Basic Knowledge of LSRW. To provide students with soft skills that complement their skills, making them more marketable when entering the workforce.

Rationale: Knowledge of LSRW is essential for students.

Course Learning Objective:

CLOBJ 1	Remember basic English language terms and concepts.
CLOBJ 2	Understand the main ideas and key details of simple English language materials.
CLOBJ 3	Apply grammar and vocabulary knowledge to construct simple sentences and paragraphs.
CLOBJ 4	Analyse the structure and organization of basic English texts.
CLOBJ 5	Evaluate the use of language in different contexts and for different purposes.
CLOBJ 6	Create original written and spoken English language content.

Course Learning Outcomes:

CLO 1	Define and recognize simple grammatical structures and rules in English sentences.
CLO 2	Understanding of basic English grammar concepts through application in context.
CLO 3	Apply listening skills to follow and respond appropriately to basic instructions and directions given in English.
CLO 4	Analyse language usage and areas for improvement in pronunciation, grammar, and vocabulary.
CLO 5	Evaluate new vocabulary and grammatical structures learned in class into their communication to demonstrate language fluency and creativity.
CLO 6	Develop the cultural relevance and appropriateness of language use in various contexts, demonstrating an understanding of cultural sensitivity and communication norms.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Listening Skills and Hearing: Listening Vs Hearing Types of listening, Traits of good listener, Barriers of listening	7	2
2	Listening Practice: Listening Practice(Audio & Video)	10	3
3	Presentation Skills: Defining the purpose of presentation Presentation strategies, How to make an effective presentation? Knowing /Analysing audience, Organizing content and preparing an outline Traits of a good speaker	3	1
4	Activity: Crazy Scientist.	7	2
5	Speaking Practice: Speaking practice (Elocution)	24	7
6	Reading Skills: Define reading, Reading Strategies, Techniques of reading, Techniques to read faster	3	1
7	Reading Practice: Reading Practice (Reading Comprehension)	13	4
8	Writing Skills: Develop Writing Skills, 7cs of communication, Techniques of writing better, Identifying common errors in writing	10	3
9	Paragraph Writing : Introduction of Paragraph Writing, Central components of paragraph development, Techniques for paragraph development	3	1
10	Writing Practice: Note making, Picture Description, Dialogue Writing, Paragraph Writing Completion of story from given points	20	6
Total		100	30

Text Book and Reference Book:

1. Understanding and Using English Grammar, By Betty Azar & Stacy Hagen
| Pearson Education
2. Business Correspondence and Report Writing, By SHARMA, R. AND

MOHAN, K.

3. Communication Skills, By Kumar S And Lata P | New Delhi Oxford University Press
4. Technical Communication : Principles And Practice, By Sangeetha Sharma, Meenakshi Raman | Oxford University Press
5. Practical English Usage, By MICHAEL SWAN
6. A Remedial English Grammar for Foreign Student, By F.T. WOOD
7. On Writing Well, By William Zinsser | Harper Paperbacks, 2006 | 30th anniversary edition
8. Oxford Practice Grammar, By John Eastwood | Oxford University Press

Course Name: Basic Hindi-II

Course Code: 00019302AE05

Prerequisite: Basic communication skills in Hindi

Rationale: Basic comprehensive skills Hindi.

Course Learning Objective:

CLOBJ 1	Remember key terms related to the Hindi language, such as grammar rules, vocabulary, and sentence structure.
CLOBJ 2	Understand the main ideas and themes of Hindi literary works or cultural texts.
CLOBJ 3	Apply knowledge of Hindi vocabulary to communicate in everyday situations, such as greetings, shopping, and asking for directions.
CLOBJ 4	Analyse the structure and style of Hindi literature, including poetry, short stories, or essays.
CLOBJ 5	Evaluate the appropriateness of Hindi language translations or interpretations.
CLOBJ 6	Create original content in Hindi, such as stories, poems, or dialogues..

Course Learning Outcomes:

CLO 1	Identify the sounds and symbols of the Hindi alphabet.
CLO 2	Understand simple spoken and written Hindi passages on familiar topics.
CLO 3	Apply their knowledge of Hindi in everyday situations, such as greetings, introductions, and basic conversations.
CLO 4	Analyse the structure and content of simple Hindi texts, such as stories, poems, or dialogues.
CLO 5	Create original content in Hindi, such as short stories, poems, or dialogues.
CLO 6	Evaluate the effectiveness of different language learning strategies for acquiring Hindi proficiency.

Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					
L	T	P	C	Internal Evaluation			External Marks		Total
				T	CE	P	Theory	P	
2	-		2	100	100				100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	उन्नत शब्दावली (Advance Vocabulary) संख्या (Numbers) 51 onwards, समय (Time), अभिवादन (Greetings)	13	4
2	श्रवण कौशल्य (Listening Skills) लघु कथा (Short Story), छोटी बातचीत (Short Conversation)	20	6
3	बोलने की कुशलताएं (Speaking Skill) आत्म परिचय (Self-introduction) दिन पर दिन बातचीत (Day to day conversation) वाम्मिता (Elocution)	27	8
4	पढ़ने के कौशल (Reading Skill) समझ बूझ कर पढ़ना (Reading Comprehension) लघु कथा (Short story) अखबार का लेख (News paper article)	20	6
5	आत्म परिचय Self introduction लघु संदेश (Short Message)	20	6
Total		100	30

Text Book and Reference Book:

- 1.Hindi for Beginners published By Up To School Worksheets
2. Hindi Abhyaas Pustika Published By Seema Verma | Trishala Learning System pvt.
3. NCERT Workbook of Hindi for Grade-2

4. Rachnatmak Vyakaran by Suresh Pant and Himani Joshi | Pearson.
5. Matra Gyan Wonder House Books
6. Amoli Hindi Vyakaran by Dr. Nirmal Dalal

Course Name: Basic Gujarati-II

Course Code: 00019302AE06

Prerequisite: Basic communication skills in Gujarati

Rationale: Basic comprehensive skills in Gujarati

Course Learning Objective:

CLOBJ 1	Remember key terms related to the Gujarati language, such as grammar rules, vocabulary, and sentence structure.
CLOBJ 2	Understand the main ideas and themes of Gujarati literary works or cultural texts.
CLOBJ 3	Apply knowledge of Gujarati vocabulary to communicate in everyday situations, such as greetings, shopping, and asking for directions.
CLOBJ 4	Analyse the structure and style of Gujarati literature, including poetry, short stories, or essays.
CLOBJ 5	Evaluate the appropriateness of Gujarati language translations or interpretations.
CLOBJ 6	Create original content in Gujarati, such as stories, poems, or dialogues.

Course Learning Outcomes:

CLO 1	Remember key terms related to the Gujarati language, such as grammar rules, vocabulary, and sentence structure.
CLO 2	Understand the main ideas and themes of Gujarati literary works or cultural texts.
CLO 3	Apply knowledge of Gujarati vocabulary to communicate in everyday situations, such as greetings, shopping, and asking for directions.
CLO 4	Analyse the structure and style of Gujarati literature, including poetry, short stories, or essays.
CLO 5	Evaluate the appropriateness of Gujarati language translations or interpretations.
CLO 6	Create original content in Gujarati, such as stories, poems, or dialogues.

Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					
L	T	P	C	Internal Evaluation			External Marks		Total
				T	CE	P	Theory	P	

2	-		2	100	100				100
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L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	અધરા શબ્દો (Advanced Vocabulary) સંખ્યાઓ (Numbers), સમય (Time), શુભેચ્છાઓ (Greetings)	13	4
2	શ્રવણ કૌશલ્ય (Listening Skill) ટુંકી વાર્તા (Short Story), ટુંકી વાતચીત (Short Conversation)	13	4
3	બોલવાની કુશળતા (Speaking Skill) પોતાનો પરિચય (Self Introduction) રોજિંદી વાતચીત (Daily Conversation) વક્તૃત્વ (Elocution)	13	4
4	વાંચન કુશળતા (Reading Skill) વાંચન સમજ (Reading Comprehension) ટુંકી વાર્તા (Short Story) અખબાર નો લેખ (News paper article)	34	10
5	લેખન કૌશલ્ય (Writing Skill) પોતાનો પરિચય Skill Introduction) ટુંકો સંદેશ (Short Message)	27	8
Total		100	30

Text Book and Reference Book:

1. Text Technical Communication : Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford

University Press

2. All in One (English-Gujarati) Manoj Publications

3. Gujarati Barakhadi by Sonika Agrawal Published by Notion Press

4. Varna Lekhan By Gujarati Books

5. My first Gujarati alphabets By Priyal J. | My first Picture Book Inc

Course Name: Introduction to MATLAB Programming**Course Code: 03010901UE01****Prerequisite:** Fundamental Knowledge of Mathematics.

Rationale: An Introduction to MATLAB Programming" course is essential because MATLAB is widely used in scientific and engineering fields for data analysis, simulations, and algorithm development. Its user-friendly interface and high-level language allow beginners to quickly grasp fundamental programming concepts and focus on problem-solving. The course equips learners with valuable skills for data visualization, numerical computing, and rapid prototyping, enhancing their capabilities and employability in diverse domains.

Course Learning Objective:

CLOBJ 1	Remember foundational understanding of MATLAB syntax, data types, and basic programming concepts such as variables, arrays, and control structures.
CLOBJ 2	Explain the principles of problem-solving using MATLAB, including algorithm development, debugging techniques, and code documentation.
CLOBJ 3	Apply MATLAB programming skills to solve a variety of computational problems, including mathematical calculations, data analysis, and visualization tasks.
CLOBJ 4	Analyse and debug MATLAB code to identify errors, optimize performance, and improve code efficiency.
CLOBJ 5	Evaluate the effectiveness of different MATLAB programming techniques and strategies in solving specific types of problems, considering factors such as code readability, scalability, and computational efficiency.
CLOBJ 6	Develop their understanding of MATLAB programming concepts to design and implement their own algorithms and functions to solve complex problems.

Course Learning Outcomes:

CLO 1	Memorize the MATLAB environment with confidence, effectively utilizing its features and tools for programming and data analysis.
CLO 2	Understand matrices and arrays, perform basic operations, and visualize data using 2D and 3D plots for effective data exploration and representation.
CLO 3	Compare programming concepts like control statements, loops, and logical operations to write structured MATLAB code for problem-solving.
CLO 4	Analyse & distinguish and use user-defined functions, promoting code reusability and modular design in MATLAB programs.
CLO 5	Evaluate Work with file input/output, enabling data exchange with external sources, and utilize the Symbolic Math Toolbox for performing symbolic computation.
CLO 6	Creative ability to independently solve problems using MATLAB.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Getting Started with MATLAB: Introduction to MATLAB, history, features, and uses, MATLAB desktop, basic commands, variables, and data types, performing arithmetic operations and using functions.	13	6
2	Working with Matrices and Arrays: Creating Matrices and Arrays, Array Operations and Indexing, Logical Operations and Relational Operators	18	8
3	Data Visualization in MATLAB: Visualizing data using 2D plots and 3D Plot, Customizing Plots, Enhancing plots with titles, labels, and formatting.	18	8
4	Programming with MATLAB: Conditional Statements (if else), loops (for and while), Vectorization and Logical operation	18	8
5	Working with Files and Symbolic Math: Reading from and writing to files, data import/export, performing symbolic computations using Symbolic Math Toolbox	18	8
6	Reading Skills: Define reading, Reading Strategies, Techniques of reading, Techniques to read faster	3	1
Total		100	30

Text Book and Reference Book:

1. MATLAB : PROGRAMMING FOR ENGINEERS (TextBook), By Chapman, Stephen J ., | Thomson Asia Pvt Ltd ,
2. Mastering Matlab, A Comprehensive tutorial and reference, By Duane Hanselman and Bruce Littlefield, 3. Getting Started with MATLAB-7 (TextBook), By Rudra Pratap | OXFORD University Press

Course Name: Office Automation

Course Code: 0501001UE01

Prerequisite: Basic computer literacy.

Rationale: The objective of this course is to familiarize students with concepts of fundamentals of Microsoft Office, Excel, PowerPoint and Outlook for working on computers and its application.

Course Learning Objective:

CLOBJ 1	Remember understanding of what office automation entails, including the use of technology to streamline office tasks, improve efficiency, and enhance productivity.
CLOBJ 2	Understand the advantages of office automation, such as increased accuracy, reduced manual labor, faster processing times, and improved communication and collaboration.
CLOBJ 3	Apply the role of office automation tools and technologies in contemporary workplaces, including their impact on workflow optimization, remote work, and digital transformation.
CLOBJ 4	Organize office automation systems to integrate with various business processes, including document management, workflow automation, customer relationship management, and enterprise resource planning.
CLOBJ 5	Evaluate the challenges and considerations associated with implementing office automation solutions, such as cost, compatibility, data security, and employee training.
CLOBJ 6	Develop Strategies for Successful Implementation: Students will develop strategies for successful implementation of office automation initiatives, including assessing organizational needs, selecting appropriate technologies, managing change, and evaluating outcomes.

Course Learning Outcomes:

CLO 1	Demonstrate understanding of the concept of office automation, including its components, functions, and applications in modern workplaces.
CLO 2	Understand the importance and benefits of office automation, recognizing its role in enhancing efficiency, productivity, and communication in organizations.
CLO 3	Analyse the challenges and considerations associated with office automation implementation, such as technological limitations, organizational culture, and security concerns.
CLO 4	Apply their knowledge of office automation to analyze and evaluate its integration with business processes, identifying opportunities for automation and efficiency improvements.
CLO 5	Evaluate the effectiveness of office automation solutions in addressing organizational needs and improving workflow processes, considering factors such as cost-effectiveness, user satisfaction, and return on investment.

CLO 6	Synthesize their understanding of office automation concepts to develop strategies for successful implementation, including assessing organizational needs, selecting appropriate technologies, and managing change.
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Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to Office Automation: Overview of Office Automation, Importance and Benefits of Office Automation, Role in Modern Work Environments, Integration with Business Processes, Challenges and Considerations.	8	4
2	Introduction of Computer: Overview of Computer, Computer Input and Output devices, Operating System, hardware and Software Introduction to Ram ,Rom ,CPU and more devices.	8	4
3	Microsoft Word: Introduction to MS Word, Getting Familiar with the Interface, Creating a New Document, Basic Text Formatting, Bold, Italic, Underline), Aligning Text (Left, Centre, Right), Saving and Opening Documents, Navigate Through a Document, Insert hyperlinks, Search for text, Replace, Create bookmarks, Move to a specific location or object in a document, Apply document themes, Apply document style sets, Insert headers and footers, Insert page numbers, Format page background elements, Create a numbered or bulleted list, Change bullet characters or number formats for a list level, Define a custom bullet character or number format.	25	11

4	Microsoft Excel: Introduction to MS Excel Create a workbook, Search for data within a workbook, Change worksheet tab color, Rename a worksheet, Insert and delete columns or rows, Change workbook themes, Adjust row height and column width, Insert headers and footers, Hide or unhide worksheets, data validation, Duplicate Values, Apply styles to tables, Filter records, Sort data by multiple columns, Change sort order, Remove duplicate records, Perform calculations by using the SUM function, MIN and MAX functions, COUNT function, AVERAGE function, Create a new chart, Resize charts, Save a workbook as a template, Manage workbook versions, Protect a worksheet	25	10
5	Microsoft PowerPoint: Create a Presentation, Insert and Format Slides, Modify Slides, Handouts, and Notes, Configure a Presentation for Print, Configure and Present a Slide Show, Insert and Format Text, Insert and Format Shapes and Text Boxes, Insert and Format Images, Order and Group Objects, Insert and Format Tables, Insert and Format Charts, Insert and Format SmartArt graphics, Apply Slide Transitions, Animate Slide Content. Set Timing for Transitions and Animations.	17	8
6	Microsoft Outlook: Create messages, Create and send messages Configure message, Format messages, Format text Apply, themes and styles, Apply styles, Create hyperlinks, Insert images, Manage schedules, Insert memorized content, Insert signatures, Configure calendar settings ,Work with multiple calendars Share calendar information, Create appointments and events Create meetings Manage calendar items, Create tasks Manage tasks Create and manage notes, Create journal entries, Create and manage contacts Create and modify contact records Store contact records Share contact records and address books.	17	8
Total		100	60

Text Book and Reference Book:

- Digital Logic and Computer Design (TextBook), By Morris Mano | PHI
- Introduction to Information Technology, By ITL Education Solution Limited | Pearson Education | 2012
- MS OFFICE 2007, By Vikas Gupta | Wiley
- Computer Fundamentals, By Anita Goel | Pearson Education | 2011
- Digital Fundamentals, By Thomas L Floyd | Pearson

Course Name: First Aid & Life Support

Course Code: 09010101UE01

Prerequisite: Basic computer literacy. Shall have the basic knowledge about anatomy and physiology of human body.

Rationale: Will gain basic knowledge about first aid & life sciences.

Course Learning Objective:

CLOBJ 1	Remember the primary objectives of first aid, including preserving life, preventing worsening conditions, and promoting recovery.
CLOBJ 2	Explain the legal framework surrounding first aid, including Good Samaritan laws and the duty of care, and understand their responsibilities and limitations as first
CLOBJ 3	Apply skills in identifying and responding to emergencies, including performing a top-to-toe assessment, maintaining hygiene, and following an overview flow chart for providing appropriate first aid.
CLOBJ 4	Organize and manage injuries such as fractures, wounds, and bleeding, including understanding basic anatomy, recognizing different types of fractures, and applying appropriate
CLOBJ 5	Access knowledge of respiratory emergencies, including recognizing signs of difficulty breathing and performing CPR, as well as understanding the types of burns and providing appropriate care for burn injuries.
CLOBJ 6	Develop competence in lifesaving procedures such as CPR, managing head trauma and strokes, and providing first aid for gastrointestinal issues such as diarrhea, food poisoning, and diabetes.

Course Learning Outcomes:

CLO 1	Identify and prioritize different types of injuries and illnesses.
CLO 2	Understand the importance of first aid in emergency situations
CLO 3	Demonstrate the ability to assess the scene of an emergency.
CLO 4	Analyse the importance of infection control in wound care
CLO 5	Evaluate signs and symptoms of shock and how to provide first aid for different types of burns and how to assess and provide first.
CLO 6	Develop CPR techniques for adults, children, and infants and use of automated external defibrillators (AEDs) and how to use them.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to first aid: Aims of first aid, The first aider First aid and the law, Indian good Samaritan protection guidelines , Duty of giving care, Consent of the person in need Privacy, Negligence, Dealing with an emergency Top-to-toe assessment, Hygiene and hand washing, First aid overview flow chart,	7	4
2	Assessment of patients with fractures, wounds, and bleeding: Brief Anatomy of the skeletal system Fractures (injuries to bones) Injuries and fractures to the head, neck and spine Injuries and fractures to the cheekbone, nose and lower jaw Fracture of the cheekbone or nose Fractures of the lower jaw Injuries to the shoulder, ribs or breastbone Injuries or fractures of the shoulder Injuries and fractures of the collarbone Rib injuries and fractures Fractures of the breastbone Injuries to the arm, elbow, wrist, hand or Injuries and fractures of the arm(upper arm, forearm, wrist) Injuries and fractures of hand or fingers Injuries to the pelvis, lower limbs, knee, ankle or feet Injuries and fractures of the pelvis Injuries and fractures of the leg (thigh or lower leg) or ankle Fracture of the knee cap (patella) Injuries and fractures of foot or toes Dislocations (injuries to joints) Strains and sprains (injuries to ligaments, muscles and tendons)	10	6
3	Respiratory emergencies: Respiration The respiratory system No breathing or difficult breathing When to refer the casualty to a healthcare facility Drowning Remove the victim out of the water Strangulation and hanging Choking Swelling within the throat Suffocation by smoke or gases Asthma	10	6
4	Care of burns: The skin Burn wounds First, second and third degree burns Type of burns by origin Danger of burn Dry burns and scalds (burns from flames, hot surfaces, steam, Care of minor burns (small first and second degree burns) Specific burn locations Electrical burns and electrocution by electricity or lightning Chemical burns Sunburns, snow/welders eyes, heat exhaustion and heat stroke Heat exhaustion Heatstroke Frostbites Prevention of burns Fever Hypothermia	8	5

5	Lifesaving procedures in emergency & shock: The heart and the blood circulation, Heart and blood circulation, Blood pressure, Pulse, The blood, Chest discomfort, Bleeding, First aid for bleeding (in general), Resuscitation (basic CPR), Resuscitation of a person who is not breathing or not breathing normally, Resuscitation of baby/child (less than one year old)	8	5
6	Head trauma & stroke: The nervous system, The central nervous system, The peripheral nervous system (PNS), Unconsciousness, Head injuries, Concussion, Cerebral compression, Skull fractures, Stroke, Fits – convulsions - seizures	10	6
7	Gastrointestinal tract, diarrhea, food poisoning and diabetes: Review of anatomy and physiology of gastrointestinal tract, Diarrhoea, Prevent dehydration, Food poisoning, Diabetes, Type 1 diabetes, Type 2 diabetes, Gestational diabetes (diabetes during pregnancy), Diagnosis, Hyperglycaemia, Symptoms of hyperglycaemic coma or diabetic coma, Hypoglycaemia	10	6
8	Senses, foreign bodies in eye, ear, nose or skin and swallowed foreign Objects: Review of anatomy and physiology of the special senses, Foreign body in the eye, Foreign body in the ear, Foreign body in the nose, Foreign body in the skin, Swallowed foreign objects	10	6
9	Urinary system, reproductive system and emergency childbirth: Review of anatomy and physiology of Urinary & Reproductive system, Male reproductive system, Female reproductive system, Pregnancy, Stages of labour and giving birth, Aftercare of the mother, Medical conditions and pregnancy, Diabetes, High blood pressure, Infections, Prevention of sexually transmitted diseases (STD), Sexually transmitted infections, Reducing the risk of STDS/STIS, Emergency childbirth	10	6
10	Psychological first aid: Definition of psychological first aid, Traumatic crisis, (psychological) shock phase, Reaction phase, Processing phase, Reorientation phase, Behave calmly, Listening to the affected person, Physical contact, Providing psychological first aid to all	7	4
11	Specific emergency situations and disaster management: Emergencies at school, Emergencies at work, Road and traffic accidents, Emergencies in rural area, Disasters and multiple casualty accidents Emergency triage	10	6
Total		100	30

Text Book and Reference Book:

- a. First aid handbook: Fast and effective emergency care (TextBook), By Dr. Pipa Keech | 3rd
- b. Until Medical Help Arrives: First aid Book (TextBook), By Dr. H. V. Sardesai | 1 st

Edition, Pub. Year 2022

c. First aid manual, (TextBook), By UK's Leading First aid providers | 11th edition;

Pub. Year 2021

Course Name: Basic Photography

Course Code: 18010201UE01

Prerequisite: 1) Understanding of Basic Computer Skills 2) Media Literacy 3) Creative Vision 4) Passion to learn

Rationale: Taking a basic photography course can be incredibly helpful for anyone looking to improve their photography skills. Not only will you learn about the technical aspects of photography, but you'll also gain a greater appreciation for the art form and discover your own unique style.

Course Learning Objective:

CLOBJ 1	Remember different focal lengths and their aesthetic uses, enabling them to choose appropriate lenses based on specific photographic needs
CLOBJ 2	Understanding of digital camera mechanisms, including aperture, shutter speed, ISO, and their significance in photography.
CLOBJ 3	Implement knowledge and skills related to marketing and promoting their photography work, including strategies for selling, exhibiting, participating in competitions, and understanding current marketing trends in the photography industry.
CLOBJ 4	Analyse about metadata and its role in photography, particularly in manipulating technical information using RAW technology and software like Photoshop to enhance image quality.
CLOBJ 5	Access various techniques and methods to express their creative vision through photography, experimenting with different styles and approaches in the digital realm.
CLOBJ 6	Develop skills in composing visually appealing photographs by understanding the principles of composition and arranging visual elements within the frame effectively.

Course Learning Outcomes:

CLO 1	Identify some component of photography and Improved technical skills: Basic photography classes will teach you the fundamentals of camera operation, exposure, and lighting.
CLO 2	To understand how to use your camera to its full potential and create images that are properly exposed and well-lit.
CLO 3	To Apply the ability to use natural and artificial light effectively to enhance the visual impact of their photographs
CLO 4	Analyse the composition, colour, and perspective, and create images that are not only technically proficient but also visually compelling.
CLO 5	Assess proficiency in operating and adjusting camera settings to achieve

	proper exposure.
CLO 6	Create vision and explore different styles of photography.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Digital Camera Mechanism : A basic photography course will help you understand the features of a Digital camera Mechanism, such as aperture, shutter speed, ISO, and how to use them effectively to create the kind of photos you want. Characteristic of Lens: Different focal lengths has different aesthetical use. According to need we'll choose our Lens. Aesthetic of Composition: In terms of Visual Experience composition is a very important element. It Is the arrangement of visual elements within the frame of the photograph.	33	10
2	Experience the Metadata: Metadata is actually the technical information about the photograph, Using RAW technology we can manipulate the metadata through 'Photoshop'. Experiment on Expression: An Image is actually the expression of the photographer. How does he/she sees a particular thing or incident. In Digital era we can do various experiment on our expression and enhance the expression. Business and Marketing for Photographers : This is the most crucial part of the field, through the curriculum we'll learn how to sell or exhibit our photograph, how to take part in various competition and learn about the present marketing strategy.	33	10

3	Documentary Photography: Apart from fiction, there is the parallel world of documentary Photography. Great photographers like Kevin Carter, Danish Siddiqui has devoted there life in Documentary Photography and Photo Journalism. Students need to go out and Practically grab some images from daily livelihood of the society. Photographers Study : Students need to study great photographers and their work both from fiction and non- fiction genre	34	10
Total		100	30

Text Book and Reference Book:

1. Basic Photography, By Michael Langford | Focal Press
2. Digital Photography complete course: Everything you need to know in 20 weeks, By Patel, N. | DK Publishers, USA, Pub. Year 2021
3. Handbook of Photography, By James A. Folts & Ronaldo P. Lovel

Semester-3

Course: Ordinary Differential Equation (11010603DS01)

Prerequisite: Proficiency in calculus, linear algebra, and fundamental concepts of physics/engineering.

Rationale: ODEs serve as a vital mathematical framework for modeling dynamic systems across scientific and engineering disciplines, offering predictive power crucial for technological innovation and scientific research.

Course Learning Objective:

CLOBJ 1	Solve First-Order Differential Equations: Understand and apply methods for solving first-order differential equations, including separable variables, homogeneous equations, linear equations, Bernoulli's equations, and exact differential equations.
CLOBJ 2	Analyze Higher-Order Differential Equations: Solve higher-order ordinary differential equations (ODEs), focusing on linear ODEs with constant coefficients, Euler-Cauchy equations, nonhomogeneous ODEs, and apply methods such as undetermined coefficients and variation of parameters.
CLOBJ 3	Apply Series Solution Methods: Use power series methods to solve differential equations, including regular and singular points, and apply the Frobenius method for series solutions of second-order differential equations.

Course Learning Outcomes:

CLO 1	1. Formulate ODE from the given relation between the variables.
CLO 2	2. Classify ODE based on their characteristic as homogeneous/Non-homogeneous, Linear/Non-linear, First/Higher order, First/Higher degree ODE

	with constant/variable coefficient.
CLO 3	3.Develop proof of various results related to Ordinary Differential Equations and their solution.
CLO 4	4.Solve ODE using a suitable direct method. Construct a mathematics model using ODE to solve real world problem.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Unit 1 First order first degree differential equations Formation of differential equations, Geometric meaning of a Differential equation, Equations of first order and first degree, solutions by – separable variables and Reducible to separable variable, homogeneous equations; linear equations, Bernoulli's equation; Exact Differential, Necessary and sufficient condition for the differential equations to be exact, reducible to Exact Differential Equations.	25	10
2	Unit 2 First order higher degree differential equations Equation solvable for x, y, p, Clairaut's equation and singular solutions, Orthogonal trajectories (cartesian and polar)	20	15
3	Unit 3 Higher-order ordinary differential equations: Ordinary differential equations of higher orders, Homogeneous Linear ODEs of Higher Order, Homogeneous Linear ODEs with Constant Coefficients, Euler–Cauchy Equations, Nonhomogeneous ODEs, Method of Undetermined Coefficients, Solution by Variation of Parameters, Applications. (Electrical Network Models, Spread of Epidemic (SI, SIS, SIR), Newton's law of cooling, Single Compartmental Modelling, Bending of beam Models)	30	20
4	Unit 4 Power series solution Regular/Ordinary point, Singular point, Series solutions of differential equations of second order with variable coefficient, Regular singular point, Irregular singular point, Frobenius method, Series solution of Legendre's	25	15

	polynomial and Bessel's equations		
	Total	100	60

Reference Books

1. S.L.Ross, Differential Equations, John Wiley & Sons. (TextBook)
2. D.A. Murray, Introductory Course in Differential Equations. Orient Longman (India).
3. An Introduction to Ordinary Differential Equation By E. A. Coddington | Dover Publications
4. Ordinary and Partial differential equations By M.D. Raisinghania | S. Chand and Co. Pvt. Ltd
5. Differential Equations By N.P. Bali | Laxmi Publication Ltd

Course: Linear Algebra (11010603DS02)

Prerequisite: : a strong foundation in algebra, trigonometry, and geometry

Rationale: Linear algebra provides essential tools for understanding and manipulating vector spaces and linear transformations, forming the foundation for applications across mathematics, science, and engineering.

Course Learning Objective:

CLOBJ 1	Understand Vector Spaces and Subspaces: Define and explore the concepts of vector spaces, subspaces, linear combinations, spans, and dimensions. Analyze their properties and relationships, including basis, linear independence, and the various spaces associated with matrices (null space, column space, row space).
CLOBJ 2	Explore Linear Transformations: Define linear transformations, and understand their kernel, range, rank, and nullity. Learn to represent linear transformations with matrices, and study their properties such as isomorphisms, invertibility, and coordinate changes.
CLOBJ 3	Apply Concepts of Inner Product and Adjoint Operators: Study inner product spaces, norms, and related inequalities. Learn orthogonality and the Gram-Schmidt process. Explore adjoint operators, and understand their role in least-squares approximation and properties of special operators (normal, self-adjoint, unitary, orthogonal).

Course Learning Outcomes:

CLO 1	Explain the fundamental principles and properties of vector spaces.
CLO 2	Identify the basis of various vector spaces and subspaces such as row space, column space and null space.
CLO 3	Elaborate various properties of linear transformations.

CLO 4	Interpret the fundamental concept and the properties of inner product space.
CLO 5	Apply the Gram-Schmidt process to construct the orthogonal set.
CLO 6	Apply the concept of Adjoint operator in various fields such as functional analysis.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Vector Space Definition of Vector Spaces, Subspaces, Theorems, intersection, Union, addition, direct sums of subspaces, Linear combination of vectors, Linear span, Linear independence, Basis and dimension, Null Space, Column Space, Row Space, Dimension of subspaces.	29	17
2	Linear Transformation Definition of Linear transformations and examples, Kernel and Range of Linear Transformation, Rank and nullity of a linear transformation, Matrix representation of a linear transformation, Algebra of linear transformations, one-one and onto Linear Transformation, Isomorphisms, Isomorphism theorems, Invertibility and the change of coordinate matrix. 29 17	29	17
3	Inner Product Space Definition of Inner product spaces and examples, norm of a vector, Cauchy-Schwarz's inequality, triangular inequality, Pythagoras theorem, Orthonormal basis, Gram-Schmidt orthogonalization process, Orthogonal complements. 29 17	29	17
4	Adjoint Operator and its Properties Adjoint of a linear operator, Least-squares approximation, Minimal solutions to systems of linear equations, Normal, self-adjoint, unitary and orthogonal operators and their properties.	13	09
	Total	100	60

Reference Books

1. Elementary Linear Algebra with Application (TextBook) By Howard Anton, Chris Rorres
2. Linear Algebra (2ndEdition) By V. Sahai & V. Bist | Narosa Publishing
3. Vector Calculus and Linear Algebra By P. Baxandall and H. Liebeck | Dover Publications
4. An Introduction to Linear Algebra By V Krishnamurthy, V P Mainra, J L Arora | Affiliated East-West P
5. Elementary Linear AlgebraApplications version By Haward Anton, Chris Rorres | Willey India Education | 9th Edition

Course: Linear Programming Problem and its Variants (11010603DS03)

Prerequisite: Proficiency in algebra, calculus, and basic optimization concepts is required for the Linear Programming course.

Rationale: Linear programming offers powerful mathematical techniques for optimizing resource allocation and decision-making in diverse fields such as operations research, economics, logistics, and engineering, enabling efficient solutions to complex real-world problems.

Course Learning Objective:

CLOBJ 1	Understand Operations Research Fundamentals: Learn the origins, definitions, phases, scope, and limitations of operations research, and apply mathematical modeling to real-life problems.
CLOBJ 2	Master Linear Programming Techniques: Understand linear programming problem formulations, including standard, canonical, and matrix forms, and solve problems using graphical methods and advanced techniques.
CLOBJ 3	Apply Problem-Solving Techniques for LPP: Utilize the Simplex method, Big-M method, and Two-Phase method to solve linear programming problems, including formulating and interpreting solutions.

Course Learning Outcomes:

CLO 1	Formulate real-world problems as linear programming models, identifying decision variables, objective functions, and constraints.
CLO 2	Utilize a suitable method to solve linear programming problems depending on the number of decision variables and constraints.
CLO 3	Understand and apply duality theory to interpret and analyse linear programming solutions.
CLO 4	Demonstrate proficiency in sensitivity analysis to assess the impact of changes in problem parameters on the optimal solution.
CLO 5	Solve Transportation and Assignment problems using a suitable method.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme		
L	T	P	C	Internal Evaluation	ESE	Total

				MSE	CE	P	Theory	P	
4	-		4	20	20		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to Operations Research Origin & Development of Operational Research, Definition and Meaning of Operational Research, Different Phases of an Operational Research Study, Scope and Limitations of Operational Research, Mathematical Modelling of Real-life problems.	15	09
2	Linear Programming Problem The Linear Programming Problem: Standard, Canonical and matrix forms, Graphical solution. Hyperplanes, Extreme points, Convex and polyhedral sets. Basic solutions; Basic Feasible Solutions; Reduction of any feasible solution to a basic feasible solution; Correspondence between basic feasible solutions and extreme points	20	12
3	Problem Solving Techniques for LPP Basic definitions to use Simplex method, Simplex method, Big-M method (Penalty method), Two phase method to solve LPP (without alternative solution and unbounded solution) Formulation techniques of LP problems (Only Examples), Simplex method for solving LPP, Big-M (Penalty) method, Two-Phase method	20	12
4	4 Unit 4 Duality and Dual Simplex Method Introduction, Definition of the dual problem, General rules for converting any primal problem into its dual, how to interpret the solution of the dual from its primal and vice versa, Comparison of the solution of the primal and its dual. Find initial solution for dual simplex table, Mathematical procedure to find solution by dual simplex method.	20	12
5	Transportation Problems Introduction, Mathematical formulation, Tabular representation, Definitions, Methods for finding initial basic feasible solution (North West Corner Rule, Least Cost Method, Vogel's Approximation Method), Optimality test (MODI method), Degeneracy In Transportation Problem, Unbalanced Transportation Problem.	15	9
6	Assignment Problems Introduction of Assignment problem, Mathematical formulation of Assignment problem, Method for solving Assignment problem (Hungarian Method), Unbalanced Assignment problem, Examples	10	6

	Total	100	60
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Reference Books

1. Mathematical models in Operations Research (TextBook) By J. K. Sharma | Tata-McGraw Hills book-company
2. Introduction to Operations Research By Barry Render, Ralph M. Stair | TMH
3. Operations Research By Hamdy Taha | Pearson
4. Introduction to Operations Research By Hillier F S and Lieberman G J | McGraw Hill | 7th, Pub. Year 2001
5. Principles of Operations Research: By Harvey M Wagner | Prentice Hall of India, Pub. Year 2010.

Course: Artificial Intelligence (03010503SE01)

Prerequisite: Data structure, Probability and Statistics, Linear Algebra, Mathematics

Rationale: : This course provides a broad introduction to Artificial Intelligence. AI techniques for search and knowledge representation also apply knowledge of AI planning and machine learning techniques to real-world problems

Course Learning Objective:

CLOBJ 1	Understand AI and ML Concepts: Grasp the fundamental concepts and algorithms of machine learning, including supervised, unsupervised, and reinforcement learning techniques.
CLOBJ 2	Develop Programming Skills in Python: Gain proficiency in Python programming, focusing on syntax, data structures, and libraries essential for AI and ML applications.
CLOBJ 3	Apply Data Processing and Analysis Techniques: Learn to preprocess, analyze, and visualize data using Python libraries to prepare datasets for model training and evaluation.

Course Learning Outcomes:

CLO 1	Proficient in ML Algorithms: Demonstrate understanding and application of various machine learning algorithms, including supervised, unsupervised, and reinforcement learning methods.
CLO 2	Effective Model Training and Evaluation: Apply data processing, model training, and evaluation techniques on real-world datasets, including implementing metrics and validation methods for accurate model performance.
CLO 3	Skilled in Python Programming: Show competence in Python programming, utilizing its syntax, functions, and libraries for data manipulation and analysis.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	40	40		60		100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to AI and ML concepts Machine Learning algorithms Supervised Linear Regression, Logistic Regression, Decision Trees, Random Forest, Support Vector Machines (SVM), Naive Bayes, k-Nearest Neighbours (k-NN) Unsupervised K-Means Clustering, Hierarchical Clustering, Density Based Clustering, Anomaly Detection Techniques, Reinforcement Learning.	20	07
2	Programming fundamentals in Python Syntax, Variables and Data Types, Operators, Control Structures, Functions, Data Structures, Input and Output, Modules and Packages	20	06
3	Data pre-processing and Data analysis Using Python Library (Pandas, NumPy). Data exploration and Visualization Using Python Library (Matplotlib, Seaborn)	20	07
4	Model Evaluation Classification Metrics, Regression Metrics Model Selection Train-Test Split, Cross-Validation Methods (K-Fold, Random Sampling, Leave-one out ,Hold-Out) Ethical considerations in AI and ML	20	05
5	Training and evaluating models on real-world datasets (e.g., image classification, text analysis)	20	05
	Total	100	60

Reference Books

1. "Artificial Intelligence: A Modern Approach" Author: Stuart Russell and Peter Norvig |Publisher: Pearson (TextBook)
2. "Python Machine Learning" Author: Sebastian Raschka and Vahid Mirjalili | Publisher: Packt
3. "Machine Learning Yearning" Author: Andrew Ng | Publisher: Deeplearning.ai
4. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" Author: Aurélien Géron | Publisher: O'Reilly

Course: IPDC including History and Culture of India and IKS-II (00019303VA01)**Prerequisite: IPDC Including History and Culture of India and IKS-I**

Rationale: IPDC aims to prepare students for the modern challenges they face in their daily lives. Promoting fortitude in the face of failures, Unity amongst family discord, Self-discipline amidst Distractions and many more priceless lessons. The course focuses on morality and character development at the core of student growth, to enable students to become self-aware, sincere, and successful in their many roles - as an ambitious student, reliable employee, caring family member, and considerate citizen.

Course Learning Objective:

CLOBJ 1	Visualize and Achieve Future Goals: Students will learn to set and achieve personal goals by visualizing their future and using SMART goals to structure their path forward.
CLOBJ 2	Overcome Addictions and Embrace Wellness: Students will understand the impacts of addictions and develop strategies to live an addiction-free, healthier life.
CLOBJ 3	Develop Values for Effective Citizenship and Leadership: Students will explore and adopt core values such as responsibility, integrity, loyalty, sincerity, and punctuality to become ideal citizens and leaders.

Course Learning Outcomes:

CLO 1	To provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.
CLO 2	To give the students the tools to develop effective habits, promote personal growth, and improve their well-being, stability, and productivity.
CLO 3	To allow students to establish a stronger connection with their family through critical thinking and development of qualities such as unity, forgiveness, empathy, and effective communication.
CLO 4	To provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce.
CLO 5	To enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.
CLO 6	To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.

Teaching & Examination Scheme:

Teaching Scheme	Evaluation Scheme
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L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	100	100				100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Remaking Yourself : Begin with the End in mind Students will learn to visualize their future goals and will structure their lives through smart goals to give themselves direction and ultimately take them to where they want to go.	6	2
2	Remaking Yourself: Being Addiction-Free Students will explore the detrimental effects of addictions on one's health, personal life, and family life. They will learn how to take control of their life by becoming addiction free.	6	2
3	Selfless Service: Case Study: Disaster Relief Students will apply previous lessons of seva, to analyse the case study of the Bhuj earthquake relief work.	6	2
4	Soft Skills: Teamwork & Harmony Students will learn the six steps of teamwork and harmony that are essential for students' professional and daily life.	6	2
5	My India My Pride: Present Scenario To implement the transformation of India from a developing country into a developed country it is necessary to have a value-based citizen. Students will see how the transformation to a greater India relies on the vision and efforts of themselves as a youth.	6	2
6	Learning from Legends: Leading Without Leading Students will explore a new approach to leadership, through humility.	7	2
7	My India My Pride: An Ideal Citizen – 1 Students will learn that to become value-based citizens, they must first develop good values in their lives. They start by exploring the values of responsibility and integrity.	7	2
8	My India My Pride: An Ideal Citizen – 2 Students will learn that by developing the values of loyalty, sincerity, and punctuality; they become indispensable and can leave a strong impression. They will start developing these values by trying to keep perfection in every small task and by looking at the bigger picture.	7	2

9	Facing Failures: Timeless Wisdom for Daily Life Students will learn the role wisdom plays in finding long-term stability. They will use ancient wisdom to solve their modern-day challenges.	7	2
10	From House to Home: Forgive & Forget Students will understand the importance and benefits that forgiveness plays in their personal and professional life. They will learn to apply this knowledge in realistic situations.	7	2
11	Remaking Yourself: Stress Management Students will learn to cope with current and future causes of stress.	7	2
12	Remaking Yourself: Better Health Better Future A healthy body prevents disease and stress; increases positivity, productivity, and brainpower. Students will learn to maintain good health through regular exercise, healthy eating habits, and regular and sufficient sleep.	7	2
13	Learning from Legends: Words of Wisdom A panel of learned and experienced mentors will personally answer practical questions that students face in their daily life.	7	2
14	Soft Skills: Financial Planning Students will develop a variety of practical financial skills that prepare them to become financially stable throughout their future careers.	7	2
15	Remaking Yourself: Impact of Company and Life After IPDC Students will understand that the type of company that we keep, has a crucial role in determining who we are and who we will become. They will develop the ability to	7	2
	Total	100	30

Course Name: Advanced English – 1 (AEC-3)

Course Code: 00019303AE01

Prerequisite: Basic Knowledge of Commercial Communication and provide students with soft skills that complement their hard skills, making them more marketable when entering the workforce. To inspire students to strive for a higher sense of character by learning from role models who have lived principled, disciplined, and value-based lives.

Rationale: Advanced Communication Skills of English Language.

Course Learning Objective:

CLOBJ 1	Enhance Public Speaking Skills: Develop the ability to deliver effective and engaging speeches using proven public speaking techniques.
CLOBJ 2	Differentiate Debate and Group Discussion Techniques: Understand and apply distinct strategies for debating and participating in group discussions.

CLOBJ 3	Improve Writing and Vocabulary Proficiency: Strengthen skills in writing reports, memos, and narratives while expanding vocabulary and mastering grammar concepts.
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Course Learning Outcomes:

CLO 1	Confident Public Speakers: Demonstrate improved public speaking skills with clear, persuasive, and well-structured presentations.
CLO 2	Effective Debaters and Discussion Participants: Exhibit the ability to engage effectively in debates and group discussions, utilizing appropriate techniques for each format.
CLO 3	Skilled Writers and Advanced Vocabulary Users: Produce high-quality reports, memos, and narratives, with enhanced vocabulary and grammar proficiency.

Teaching & Examination Scheme:

Teaching & Examination Scheme:									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	-	2	50	50	-	-	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	ABCD	5	2
2	Public Speaking Define Public Speaking Importance of Public speaking Types of Public speaking Techniques to master public speaking	10	5
3	Activity – Speaking World’s best public speakers (activity based)	5	1
4	Debate Vs Group Discussion Define Debate vs GD Importance of debate Techniques to master debate	10	5
5	Activity – Debate Debate activity	10	2
6	Vocabulary Building Advanced vocabulary building Homophones Homonyms Analogies	10	2

7	Reading Comprehension Reading Comprehension	10	5
8	Grammar - Error Analysis Para- jumble sentence completion confusable sentences Incorrectly spelt words One word substitute Cloze Passages	10	2
9	Report Writing Report Writing	10	2
10	Memo Writing Memo Writing	10	2
11	Narrative Story Writing Narrative Story Writing	10	2
12	Activity - Tourism Pitch Activity - Tourism Pitch	5	2
	Total	100	30

Text Book and Reference Book:

1. Business Correspondence and Report Writing By SHARMA, R. AND MOHAN, K.
2. Communication Skills By Kumar S and Lata P | New Delhi Oxford University Press
3. Practical English Usage By MICHAEL SWAN
4. A Remedial English Grammar for Foreign Student By F.T. WOOD
5. On Writing Well By William Zinsser | Harper Paperbacks, 2006 | 30th anniversary edition
6. Oxford Practice Grammar By John Eastwood | Oxford University Press
7. Quantitative Aptitude for Competitive Examinations By Dr. R.S. Aggarwal

Course Name: Intellectual Property

Course Code: 17010103UE01

Prerequisite: Students should have a basic understanding of creative and innovative

processes, familiarity with different types of intellectual property (such as copyrights, trademarks, and patents), and awareness of the significance of IP rights in promoting innovation and protecting creators.

Rationale: Studying Intellectual Property (IP) is crucial for students as it helps them

understand how IP rights incentivize creativity and innovation, equips them with

knowledge to protect their own intellectual contributions, and fosters an appreciation

for the legal and economic impacts of IP in various industries.

Course Learning Objective:

CLOBJ 1	Understand IPR Basics: Describe fundamental concepts of patents, copyrights, trademarks, and other IPR types.
CLOBJ 2	Apply IPR Procedures: Outline the processes for obtaining and registering intellectual property rights.
CLOBJ 3	Address IPR Issues: Identify infringement cases and apply appropriate remedies.

Course Learning Outcomes:

CLO 1	Master IPR Concepts: Demonstrate a clear understanding of various intellectual property types and their protections.
CLO 2	Navigate IPR Processes: Effectively apply for and manage patents, copyrights, and trademarks.
CLO 3	Resolve IPR Disputes: Address and resolve issues related to infringement with suitable legal actions.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	PATENT Introduction to Intellectual Property Law (IPR) Meaning of patent Patentable inventions Procedure for obtaining patent Rights of patent holder Infringement and remedies of patent	25	15
2	COPYRIGHT Introduction, meaning and characteristics of copyright Rights of copyright owner Infringement and remedies of copyright	25	15

3	TRADEMARK Introduction and meaning of trademark Types of trademark Procedure for registering trademark Infringement and remedies of trademark		
4	OTHER IPR Geographical Indications: Overview on Geographical Indication Act Designs: Overview on Design Act, 2000 Semiconductor Integrated Circuits Layout: Overview on Semiconductor Integrated Circuits Layout Design Act, 2000 Plant Varieties and Farmers' Rights: Overview on Protection of Plant Varieties and Farmers' Rights Act, 2001	25	15
	Total	100	60

Text Books

1. Law Relating to Intellectual Property Rights By V K Ahuja | Lexis Nexis
2. Intellectual Property Rights By P. Narayanan | , Eastern Law House Private Ltd, Pub. Year 2001
3. The Global Regime for the Enforcement of Intellectual Property Rights By X. Seuba | Cambridge University Press, Pub. Year 2017
4. Globalizing Intellectual Property Rights By D. Matthews | Routledge, Pub. Year 2003

Course Name: Cyber Security, Tools, Techniques and Counter Measures

Course Code: 06010103UE02

Prerequisite: Knowledge of operating systems including Windows • Understanding of computer architecture and components • Awareness of common security threats and attack vectors • Understanding of cybersecurity laws and regulations

Rationale: This course is aimed at providing a comprehensive overview of the different facets of Cyber Security. In addition, the course will detail into specifics of Cyber Security with Cyber Laws both in Global and Indian Legal environments.

Course Learning Objective:

CLOBJ 1	Understand Cybersecurity Concepts: Explain the fundamental concepts of cybersecurity, including internet architecture and cyberspace regulation.
CLOBJ 2	Identify and Address Cybercrime: Classify various types of cybercrimes and apply appropriate mitigation strategies.
CLOBJ 3	Apply Security Best Practices: Implement effective security measures for digital platforms, including e-commerce, digital payments, and social media.

Course Learning Outcomes:

CLO 1	Grasp Cybersecurity Fundamentals: Demonstrate a solid understanding of key cybersecurity concepts and regulations.
CLO 2	Analyze Cybercrime and Mitigation: Identify different cybercrimes and apply remediation techniques to prevent and respond to threats.
CLO 3	Implement Security Strategies: Apply best practices to secure digital transactions and online activities effectively.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weight age	Teaching Hrs
1	Introduction to Cyber security Concept of Internet, World wide web and Cyberspace Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber Security. Cyber terrorism, Cyber Defamation	15	10
2	Cybercrime Classification of cybercrimes, Common cybercrimes- cyber crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi ,Reporting of cyber crimes, Remedial and mitigation measures.	15	12
3	Cyber law Need for Cyber Law, Cyber Jurisprudence at International and Indian Level Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offenses, Laws regarding posting of inappropriate content, Relevant provisions of Payment Settlement Act,2007, Organizations dealing with Cyber crime and Cyber security in India, Case studies.	15	13
4	Social Media Overview and Security Introduction to Social networks. Types of Social media platforms, Social media monitoring, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related	25	15

	to social media, Flagging and reporting of inappropriate content,, Best practices for the use of Social media, Case studies.		
5	E - C o m m e r c e and Digital Payments, Digital Devices S e c u r i t y ,Tools and Technologies for Cyber Security Definition of E- Commerce,, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Introduction to digital payments, Components of digital payment and stakeholders, Digital payments related common frauds and preventive measures. Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD) Aadhar enabled payments,. RBI guidelines on digital payments and customer protection in unauthorized banking transactions. End Point device and Mobile phone security, Password policy, Data backup, Downloading and management of third party software, Device security policies, Significance and Management of Ant-virus, of Antivirus, Wi-Fi security, Configuration of basic security policy and permissions.	30	20
	Total	100	60

Text Books

1. Information Security Principles and Practice By Deven Shah, | Wiley-India
2. Cryptography and Network Security (TextBook) By Atul Kahate, TMH
3. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives. By Nina Godboleand Sunit Belpure | Wiley

Course Name: Artificial intelligence Application in People Management

Course Code: 05010103UE01

Prerequisite: understanding AI applications in people management includes foundational knowledge in human resources management, familiarity with basic concepts of artificial intelligence, and an understanding of data analysis and interpretation

Rationale: AI applications in people management is to optimize HR processes, enhance employee experiences and drive organizational effectiveness through automation, data-driven decision-making, and personalized interventions.

Course Learning Objective:

CLOBJ 1	Identify AI Applications: Students will be able to identify and describe how AI is used in different HR functions, such as recruitment, performance management, and employee engagement.
CLOBJ 2	Apply AI Tools: Students will learn to apply AI tools and techniques to real-world HR problems, including optimizing recruitment processes, enhancing employee engagement, and developing personalized learning paths.

CLOBJ 3	Address Ethical Issues: Students will be able to evaluate and address ethical considerations related to AI in HR, including bias mitigation, data privacy, and fairness in AI-driven decision-making.
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Course Learning Outcomes:

CLO 1	Enhanced Understanding: Participants will be able to explain key AI technologies and their applications in various aspects of HR and people management, including recruitment, performance management, and employee engagement.
CLO 2	Practical Implementation: Participants will be equipped to design and implement AI-driven solutions for talent acquisition, employee development, and well-being initiatives within their organizations.
CLO 3	Ethical Awareness: Participants will identify and address ethical challenges and biases associated with AI in HR, ensuring that AI-driven practices are fair, transparent, and compliant with relevant regulations.

Teaching & Examination Scheme:

Teaching & Examination Scheme									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Introduction to AI in people management Overview of artificial intelligence and its applications in HR and people Management Historical perspective and current trends in AI adoption in HR ethical considerations and Challenges in AI-driven HR practices	16	10
2	Recruitment and Talent Acquisition AI- powered talent sourcing and candidate screening Application tracking systems (ATS) and resume parsing using AI algorithms Bias mitigation and fairness in AI-driven recruitment process	20	12
3	Employee engagement and Retention AI applications for measuring and analyzing employee engagement and satisfaction Predictive analytics for identifying flight risks and retention strategies Personalized career development and learning pathways using AI-driven	20	8

	recommendations		
4	Performance management AI based performance evaluation and feedback systems continuous performance monitoring and feedback loops Data-driven insights for goal setting and performance improvement	22	10
5	Learning and Development Adaptive learning platforms and personalized training recommendations AI-driven content curation and course recommendations Gamification and micro learning applications in employee development	11	12
6	Employee wellbeing and Workforce Analytics AI-enabled well-being assessments and interventions Predictive analytics for identifying burnout and mental health risks Workforce planning and optimization using predictive workforce analytics	11	8
	Total	100	60

Text Books

1. AI for HR: A Book of ideas for HR Professionals By By Nigel Guenole/Jonathan Ferrar/and Sheri Feinzig
2. Artificial Intelligence in Human Resources Management: Theory and Practice By Raghvendra Kumar and Kamal Kant (Springer, 2020)

Course: Basics of Event Management

Course Code: 21010101UE02

Prerequisite: The students should have the basic knowledge about the events management.

Rationale: The course provides theoretical knowledge about the concept of management in event sector

Course Learning Objective:

CLOBJ 1	Identify and Explain Key Management Concepts in Events
CLOBJ 2	Apply Management Theories to Event Scenarios
CLOBJ 3	Develop Effective Strategies for Planning and Decision Making

Course Learning Outcomes:

CLO 1	Understand & describe the functions of event management
CLO 2	Describe the managerial functions in events
CLO 3	Elaborate the importance of motivation & incentivization.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	NATURE & FUNCTIONS OF MANAGEMENT IN EVENTS Importance, Definition, Functions in Events, Role of an Event Manager, Management Skills for event management.	16	10
2	DEVELOPMENT OF MANAGEMENT THOUGHT Early Classical Approaches, Neo Classical Approaches, Modern Approaches.	8	4
3	INTRODUCTION TO PLANNING & DECISION MAKING IN EVENTS Nature & Importance of Planning, Types of Plans, Meaning of Decision, Types of Decisions, Steps in Rational Decision making.	15	10
4	CONCEPT OF ORGANISING IN EVENT Concept, nature, significance of organizing, Formal and informal organization, Organization chart of event company, Types of organization, functional , Line and staff relationship, Delegation and Authority, Centralization and Decentralization, Recruitment – internal and external sources, Steps in the process of selection, recruitment Vs selection.	20	12
5	DIRECTING & LEADING IN EVENTS Meaning, nature, significance, characteristics of directing, chain of command, authority – responsibility-accountability relationship, Elements of Direction – supervision, communication, training and development, leadership, motivation, Leadership – meaning, importance, theories and styles, Communication – meaning, significance, types, process and barriers to communication, Supervision – Meaning, nature and significance of supervision.	15	10
6	MANAGERIAL CONTROL IN EVENTS Meaning of Managerial Control, Steps in Control Process, Need for Control System, Benefits of Control, Control Techniques.	18	10
7	MOTIVATION Meaning, nature and importance of motivation, morale incentives, Motivation and productivity relationship, Types of motivation, theories of motivation – Herzberg's hygiene-motivation (two factor) theory, Maslow's theory of need hierarchy, Mc Gregory's theory 'X' and theory 'Y'.	14	8
	Total	100	60

Reference Books

1. Principles of Management By Tripathy PC and Reddy PN | Tata McGraw-Hill
2. Principles of Management By BS Moshal
3. Special Events By Joe Goldblatt
4. The Event Manager's Bible - The Complete Guide to Planning and Organising a Voluntary or Public Event By D G Conway
5. Secrets to Successful Events By Lynn Fuhler

Semester 4:

Course: Partial Differential Equations (11010604DS01)

Prerequisite A solid foundation in calculus (single and multivariable), ordinary differential equations, and linear algebra is essential for understanding partial differential equations and their applications.

Rationale: This syllabus equips students with both the theoretical framework and practical techniques to model and solve real-world problems, emphasizing the interdisciplinary connections between mathematics, physics, and engineering. By mastering these concepts, students enhance their analytical and problem-solving skills crucial for advanced studies and professional applications.

Course Learning Objective:

CLOBJ 1	Basic concepts, classification, and geometrical interpretation, formation of Partial differential equations by elimination of arbitrary constants and functions, Solution of Partial Differential equations- Lagrange's linear equations of the form $Pp+Qq=R$
CLOBJ 2	Cauchy problem for a first-order PDE, Canonical forms of first-order linear equations; Method of separation of variables, The integrals of the non-linear equation by Charpit's method.
CLOBJ 3	Classification of second-order partial differential equations, solutions of second-order linear PDEs; higher order linear partial differential equations with constant coefficients.
CLOBJ 4	Applications: The vibrating string, vibrating membrane, conduction of heat in solids, wave equation (using separation of variables)

Course Learning Outcomes:

CLO 1	Proficiency in PDE Fundamentals: Demonstrate a solid understanding of the basic concepts, classifications, and formation techniques of PDEs, including solving first-order PDEs using standard methods.
CLO 2	Effective Use of Solution Methods: Apply various methods to solve first-order PDEs and classify and solve second-order linear PDEs, employing techniques such as separation of variables and understanding canonical forms.
CLO 3	Application of PDE Solutions: Use the solutions of PDEs to model and solve

	real-world problems, including wave equations, heat conduction, and vibrations, demonstrating practical application of theoretical knowledge.
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Teaching & Examination Scheme:

Teaching & Examination Scheme:									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Basic concepts, classification, and geometrical interpretation, formation of Partial differential equations by elimination of arbitrary constants and functions, Solution of Partial Differential equations- Lagrange's linear equations of the form $Pp+Qq=R$	26	15
2	Cauchy problem for a first-order PDE, Canonical forms of first-order linear equations; Method of separation of variables, The integrals of the non-linear equation by Charpit's method.	30	18
3	Classification of second-order partial differential equations, solutions of second-order linear PDEs; higher order linear partial differential equations with constant coefficients.	25	15
4	Applications: The vibrating string, vibrating membrane, conduction of heat in solids, wave equation (using separation of variables)	20	12
	Total	100	60

Reference Books

1. S.L.Ross, Differential Equations, John Wiley & Sons. (TextBook)
2. D.A. Murray, Introductory Course in Differential Equations. Orient Longman (India).
3. An Introduction to Ordinary Differential Equation By E. A. Coddington | Dover Publications
4. Ordinary and Partial differential equations By M.D. Raisinghania | S. Chand and Co. Pvt. Ltd
5. Differential Equations By N.P. Bali | Laxmi Publication Ltd

Course: Integral Transforms (11010604DS02)

Prerequisite A solid foundation in calculus (single and multivariable), ordinary differential equations, and linear algebra is essential for understanding partial differential equations and their

applications.

Rationale: This syllabus equips students with both the theoretical framework and practical techniques to model and solve real-world problems, emphasizing the interdisciplinary connections between mathematics, physics, and engineering. By mastering these concepts, students enhance their analytical and problem-solving skills crucial for advanced studies and professional applications.

Course Learning Objective:

CLOBJ 1	Basic concepts, classification, and geometrical interpretation, formation of Partial differential equations by elimination of arbitrary constants and functions, Solution of Partial Differential equations- Lagrange's linear equations of the form $Pp+Qq=R$
CLOBJ 2	Cauchy problem for a first-order PDE, Canonical forms of first-order linear equations; Method of separation of variables, The integrals of the non-linear equation by Charpit's method.
CLOBJ 3	Classification of second-order partial differential equations, solutions of second-order linear PDEs; higher order linear partial differential equations with constant coefficients.
CLOBJ 4	Applications: The vibrating string, vibrating membrane, conduction of heat in solids, wave equation (using separation of variables)

Course Learning Outcomes:

CLO 1	Proficiency in PDE Fundamentals: Demonstrate a solid understanding of the basic concepts, classifications, and formation techniques of PDEs, including solving first-order PDEs using standard methods.
CLO 2	Effective Use of Solution Methods: Apply various methods to solve first-order PDEs and classify and solve second-order linear PDEs, employing techniques such as separation of variables and understanding canonical forms.
CLO 3	Application of PDE Solutions: Use the solutions of PDEs to model and solve real-world problems, including wave equations, heat conduction, and vibrations, demonstrating practical application of theoretical knowledge.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Laplace Transform Definition, Basic Properties. Laplace transforms of some standard functions. Laplace transforms of Periodic functions. Laplace transform of derivative and integral of a function. Convolution theorem. Inverse Laplace transforms and its properties. Solution of differential equations by using Laplace transforms.	30	18
2	Fourier Series and Integrals Piecewise continuous functions and periodic functions, Systems of orthogonal functions, Fourier series: Convergence, examples and applications of Fourier series, Fourier cosine series and Fourier sine series, Fourier series on an arbitrary interval and Fourier integrals.	30	18
3	Fourier Transform Basic Concepts and Definitions of Fourier Transform, Fourier Sine Transform and Fourier Cosine Transform, Convolution Theorem (Statement only). Inverse Fourier Transform.	20	12
4	Application of Fourier Transform Applications of Fourier Transforms to solve Ordinary Differential Equations, Solutions of Partial Differential Equations. Applications of Fourier Cosine and Sine Transforms to Partial Differential Equations.	20	12
	Total	100	60

Reference Books

1. "Integral Transforms and Their Applications" by N. G. C. S. Rajasekaran and G. S. R. Rao
2. "The Laplace Transform: Theory and Applications" by Robert G. Bartle and Donald R. Sherbert
3. "Fourier Analysis and Partial Differential Equations" by David P. Williams

Course: Integral Transforms (11010604DS02)

Prerequisite : Calculus: Understanding of single and multivariable calculus, including integration and differentiation. Ordinary Differential Equations (ODEs): Familiarity with solving first-order and higher-order ODEs. Linear Algebra: Basic concepts such as matrices, determinants, and vector spaces.

Rationale: This course is essential for equipping students with powerful mathematical tools for analyzing complex systems in engineering and physical sciences. Understanding integral transforms enhances problem-solving capabilities and provides insights into the behavior of dynamic systems.

Course Learning Objective:

CLOBJ 1	Conceptual Foundation: To provide students with a comprehensive understanding of the definitions, properties, and applications of Laplace and Fourier transforms.
CLOBJ 2	Analytical Techniques: To develop students' ability to employ various techniques for solving differential equations using integral transforms.

CLOBJ 3	Application Focus: To explore practical applications of integral transforms in areas such as signal processing, heat conduction, and wave phenomena.
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Course Learning Outcomes:

CLO 1	Problem-Solving Skills: Students will be able to apply Laplace and Fourier transforms to solve ordinary and partial differential equations effectively.
CLO 2	Theoretical Understanding: Students will demonstrate a solid understanding of the properties and applications of integral transforms, including inverse transforms and convolution theorems.
CLO 3	Practical Applications: Students will analyze and solve real-world problems in engineering and physics using integral transforms, enhancing their analytical skills.

Teaching & Examination Scheme:

Teaching & Examination Scheme:									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Laplace Transform Definition, Basic Properties. Laplace transforms of some standard functions. Laplace transforms of Periodic functions. Laplace transform of derivative and integral of a function. Convolution theorem. Inverse Laplace transforms and its properties. Solution of differential equations by using Laplace transforms.	30	18
2	Fourier Series and Integrals Piecewise continuous functions and periodic functions, Systems of orthogonal functions, Fourier series: Convergence, examples and applications of Fourier series, Fourier cosine series and Fourier sine series, Fourier series on an arbitrary interval and Fourier integrals.	30	18
3	Fourier Transform Basic Concepts and Definitions of Fourier Transform, Fourier Sine Transform and Fourier Cosine Transform, Convolution Theorem (Statement only). Inverse Fourier Transform.	20	12
4	Application of Fourier Transform Applications of Fourier Transforms to solve Ordinary Differential Equations, Solutions of Partial Differential Equations. Applications of Fourier Cosine and Sine Transforms to Partial Differential Equations.	20	12

	Total	100	60
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Reference Books

1. "Laplace Transforms" by G. B. Folland
2. "Fourier Analysis: An Introduction" by Elias M. Stein and Rami Shakarchi
3. "Advanced Engineering Mathematics" by Erwin Kreyszig

Course: Integral Transforms (11010604DS02)

Prerequisite : Calculus: Understanding of single and multivariable calculus, including integration and differentiation. Ordinary Differential Equations (ODEs): Familiarity with solving first-order and higher-order ODEs. Linear Algebra: Basic concepts such as matrices, determinants, and vector spaces.

Rationale: This course is essential for equipping students with powerful mathematical tools for analyzing complex systems in engineering and physical sciences. Understanding integral transforms enhances problem-solving capabilities and provides insights into the behavior of dynamic systems.

Course Learning Objective:

CLOBJ 1	Conceptual Foundation: To provide students with a comprehensive understanding of the definitions, properties, and applications of Laplace and Fourier transforms.
CLOBJ 2	Analytical Techniques: To develop students' ability to employ various techniques for solving differential equations using integral transforms.
CLOBJ 3	Application Focus: To explore practical applications of integral transforms in areas such as signal processing, heat conduction, and wave phenomena.

Course Learning Outcomes:

CLO 1	Problem-Solving Skills: Students will be able to apply Laplace and Fourier transforms to solve ordinary and partial differential equations effectively.
CLO 2	Theoretical Understanding: Students will demonstrate a solid understanding of the properties and applications of integral transforms, including inverse transforms and convolution theorems.
CLO 3	Practical Applications: Students will analyze and solve real-world problems in engineering and physics using integral transforms, enhancing their analytical skills.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme		
L	T	P	C	Internal Evaluation	ESE	Total

				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Laplace Transform Definition, Basic Properties. Laplace transforms of some standard functions. Laplace transforms of Periodic functions. Laplace transform of derivative and integral of a function. Convolution theorem. Inverse Laplace transforms and its properties. Solution of differential equations by using Laplace transforms.	30	18
2	Fourier Series and Integrals Piecewise continuous functions and periodic functions, Systems of orthogonal functions, Fourier series: Convergence, examples and applications of Fourier series, Fourier cosine series and Fourier sine series, Fourier series on an arbitrary interval and Fourier integrals.	30	18
3	Fourier Transform Basic Concepts and Definitions of Fourier Transform, Fourier Sine Transform and Fourier Cosine Transform, Convolution Theorem (Statement only). Inverse Fourier Transform.	20	12
4	Application of Fourier Transform Applications of Fourier Transforms to solve Ordinary Differential Equations, Solutions of Partial Differential Equations. Applications of Fourier Cosine and Sine Transforms to Partial Differential Equations.	20	12
	Total	100	60

Reference Books

1. "Laplace Transforms" by G. B. Folland
2. "Fourier Analysis: An Introduction" by Elias M. Stein and Rami Shakarchi
3. "Advanced Engineering Mathematics" by Erwin Kreyszig

Course: Data Science using Python (03010504DA01)

Prerequisite: Basic knowledge of programming concepts

Rationale: This course introduces students to the fundamentals of data science using the Python programming language. Students will learn how to manipulate and analyze data, visualize data, and build predictive models using popular Python libraries such as NumPy, Pandas, Matplotlib, and Scikit-learn.

Course Learning Objective:

CLOBJ 1	Introduction to Data Science: To provide a comprehensive overview of data science, its applications, and the foundational knowledge of Python programming.
CLOBJ 2	Data Manipulation and Visualization: To equip students with skills in data manipulation using Pandas and NumPy, and to introduce data visualization techniques.
CLOBJ 3	Machine Learning Fundamentals: To familiarize students with machine learning concepts, algorithms, and practical implementation using Python.

Course Learning Outcomes:

CLO 1	Work with Python proficiently.
CLO 2	Manipulate datasets using Python Library.
CLO 3	Understand various Data Exploratory Techniques.
CLO 4	Apply various data handling techniques using Python.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	-	3	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	1 Introduction to Data Science and Python Basics: What is Data Science and its applications, Setting up Python environment (Anaconda, Jupyter Notebook), Python fundamentals: Variables, data types, operators, and basic I/O 10 3	10	3
2	2 Data Manipulation with Python and Data Visualization with Python: Working with NumPy: Arrays, operations, and indexing, Handling data using Pandas: DataFrames, data cleaning, and data preprocessing, Data Visualization with Python Introduction to data visualization libraries (Matplotlib, Seaborn), Creating basic plots: Line plots, bar plots, scatter plots, and histograms 15 5	15	5
3	3 Exploratory Data Analysis (EDA): Techniques for EDA: Descriptive statistics and data distribution, Advanced visualization: Box plots, violin plots, pair plots, and heatmaps Data Cleaning and Preprocessing Dealing with missing data	15	8

	and outliers, Feature scaling and normalization, Handling categorical data and feature engineering 15 8		
4	4 Introduction to Machine Learning: Understanding supervised and unsupervised learning, Overview of popular machine learning algorithms: Linear Regression, Logistic Regression, k-Nearest Neighbors, Decision Trees, and Clustering algorithms 10 5	10	5
5	5 Supervised Learning with Python: Implementing Linear Regression and Logistic Regression in Python, Model evaluation and performance metrics Unsupervised Learning with Python: Implementing k-Nearest Neighbors and Decision Trees in Python, Introduction to clustering algorithms (K-means, Hierarchical clustering) 15 9	15	9
6	Dimensionality Reduction: Principal Component Analysis (PCA) for feature reduction, Visualization of high-dimensional data 10 4	10	4
7	Introduction to Natural Language Processing (NLP): Text preprocessing and tokenization, Sentiment analysis using Python.	10	4
8	Introduction to Deep Learning: Basics of neural networks and their components, Building a simple neural network using TensorFlow/Keras, ANN Model, RNN Models, CNN Models.	15	7
	Total	100	60

Reference Books

1. Python for Data Analysis by Wes McKinney (TextBook)
2. Python Data Science Handbook by Jake VanderPlas
3. PyFlo - A Free, Interactive Guide to Python Programming BY Benjamin Dicken

Course: Data Science using Python Lab (03010504DA02)

Prerequisite: Basic knowledge of programming concepts

Rationale: This course introduces students to the fundamentals of data science using the Python programming language. Students will learn how to manipulate and analyze data, visualize data, and build predictive models using popular Python libraries such as NumPy, Pandas, Matplotlib, and Scikit-learn.

Course Learning Objective:

CLOBJ 1	Introduction to Data Science: To provide a comprehensive overview of data science, its applications, and the foundational knowledge of Python programming.
CLOBJ 2	Data Manipulation and Visualization: To equip students with skills in data manipulation using Pandas and NumPy, and to introduce data visualization techniques.
CLOBJ 3	Machine Learning Fundamentals: To familiarize students with machine learning concepts, algorithms, and practical implementation using Python.

Course Learning Outcomes:

CLO 1	Work with Python proficiently.
CLO 2	Manipulate datasets using Python Library.
CLO 3	Understand various Data Exploratory Techniques.
CLO 4	Apply various data handling techniques using Python.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
-	-	2	1	-	-	20		30	50

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Reference Books

1. Python for Data Analysis by Wes McKinney (TextBook)
2. Python Data Science Handbook by Jake VanderPlas
3. PyFlo - A Free, Interactive Guide to Python Programming BY Benjamin Dicken

SEMESTER-4**Course: 11010604DS01 - Partial Differential Equations****Prerequisites:**

Fundamental understanding of calculus, ordinary differential equations, and basic algebra, along with an introductory knowledge of series and integrals.

Rationale:

This syllabus introduces partial differential equations (PDEs) and Fourier series, equipping students with analytical tools to solve mathematical models of physical phenomena like vibrations, heat conduction, and wave propagation. By mastering these concepts, students can bridge theoretical mathematics with real-world engineering and scientific applications.

Course Learning Objective:

COBJ 1	Understanding Basics Develop a fundamental understanding of partial differential equations (PDEs), their classification, geometrical interpretation, and formation by eliminating arbitrary constants and functions.
COBJ 2	Solution Techniques Learn techniques for solving PDEs, including Lagrange's linear equations, Cauchy problems, and canonical forms. Familiarize students with separation of variables and Charpit's method for nonlinear equations.

COBJ 3	Second-Order PDEs Understand the classification and solutions of second-order PDEs, with a focus on higher-order PDEs with constant coefficients.
COBJ 4	Applications of PDEs Apply PDE concepts to physical phenomena such as vibrating strings and membranes, heat conduction in solids, and wave propagation using methods like separation of variables.

Course Learning Outcomes:

CLO 1	Comprehension of PDE Formation Students will be able to derive partial differential equations by eliminating arbitrary constants and functions and understand their geometrical interpretation.
CLO 2	Ability to Solve First-Order PDEs Demonstrate proficiency in solving first-order PDEs using Lagrange's linear equations, canonical forms, and Charpit's method for nonlinear cases.
CLO 3	Mastery of Second-Order PDEs Classify and solve second-order PDEs and apply methods to tackle higher-order linear PDEs with constant coefficients.
CLO 4	Application to Real-World Problems Apply mathematical models involving PDEs to solve problems in wave equations, heat conduction, and vibration phenomena using separation of variables and other relevant techniques.
CLO 5	Critical Thinking in Problem Solving Develop analytical and critical thinking skills by exploring various solution methods and applying them to diverse physical systems modeled by PDEs.

Teaching & Examination Scheme:

Teaching & Examination Scheme:									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Basic concepts, classification, and geometrical interpretation, formation of Partial differential equations by elimination of arbitrary constants and functions, Solution of Partial Differential equations- Lagrange's linear equations of the form $Pp+Qq=R$	25	15

2	Cauchy problem for a first-order PDE, Canonical forms of first-order linear equations; Method of separation of variables, The integrals of the non-linear equation by Charpit's method.	30	18
3	Classification of second-order partial differential equations, solutions of second-order linear PDEs; higher order linear partial differential equations with constant coefficients.	25	15
4	Applications: The vibrating string, vibrating membrane, conduction of heat in solids, wave equation (using separation of variables) Fourier Series and Integrals Piecewise continuous functions and periodic functions, Systems of orthogonal functions, Fourier series: Convergence, examples and applications of Fourier series, Fourier cosine series and Fourier sine series, Fourier series on an arbitrary interval and Fourier integrals.	20	12
	Total	100	60

Reference Books

1. **"Fourier Series and Boundary Value Problems"**, Author: *James Brown and Ruel Churchill*, Publisher: McGraw Hill
2. **"Advanced Engineering Mathematics"**, Author: *Erwin Kreyszig*, Publisher: Wiley
3. **"Applied Partial Differential Equations"**, Author: *J. David Logan*, Publisher: Springer

Course: 11010604DS02 - Integral Transforms

Prerequisites:

Basic knowledge of calculus, ordinary differential equations, and linear algebra is required, along with familiarity with elementary functions and introductory concepts in complex numbers.

Rationale:

This course equips students with powerful mathematical tools like Laplace and Fourier transforms to simplify and solve differential equations, enabling them to model and analyze real-world problems in engineering, physics, and applied sciences.

Course Learning Objective:

COBJ 1	Laplace Transform Mastery Develop a thorough understanding of Laplace transforms, their properties, and applications in solving differential equations.
COBJ 2	Fourier Series and Integrals Understand the construction and applications of Fourier series, with a focus on convergence and representation of periodic functions.
COBJ 3	Second- Fourier Transform Understanding Gain insight into the fundamentals of Fourier transforms, their properties, and their use in analyzing continuous functions.
COBJ 4	Applications of Fourier Transform Apply Fourier transforms to solve ordinary and partial differential equations, with a focus on practical and engineering applications.

Course Learning Outcomes:

CLO 1	Proficiency in Laplace Transforms Students will be able to compute Laplace transforms for various functions, including derivatives and integrals, and solve differential equations using Laplace transform techniques.
CLO 2	Understanding Fourier Series Demonstrate the ability to represent periodic and piecewise continuous functions using Fourier series, including sine and cosine series.
CLO 3	Fourier Transform Application Solve problems involving Fourier transforms and their inverses, including convolution and analysis of continuous signals.
CLO 4	PDE and ODE Solutions Apply Fourier transforms and their sine and cosine counterparts to solve partial and ordinary differential equations.
CLO 5	Practical Problem-Solving Develop critical thinking and mathematical modeling skills by applying Laplace and Fourier methods to real-world problems in science and engineering.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Basic concepts, classification of Laplace Transform Definition, Basic Properties. Laplace transforms of some standard functions. Laplace transforms of Periodic functions. Laplace transform of derivative and integral of a function. Convolution theorem. Inverse Laplace transforms and its properties. Solution of differential equations by using Laplace transforms.	30	18
2	2 unit-2 Fourier Series and Integrals Piecewise continuous functions and periodic functions, Systems of orthogonal functions, Fourier series: Convergence, examples and applications of Fourier series, Fourier cosine series and Fourier sine series, Fourier series on an arbitrary interval and Fourier integrals.	30	18
3	3 unit-3 Fourier Transform Basic Concepts and Definitions of Fourier Transform, Fourier Sine Transform and Fourier Cosine Transform, Convolution Theorem (Statement only). Inverse Fourier Transform	20	12

4	4 unit-4Application of Fourier Transform Applications of Fourier Transforms to solve Ordinary Differential Equations, Solutions of Partial Differential Equations. Applications of Fourier Cosine and Sine Transforms to Partial Differential Equations. ation, and geometrical interpretation, formation of Partial differential equations by elimination of arbitrary constants and functions, Solution of Partial Differential equations- Lagrange's linear equations of the form $Pp+Qq=R$	20	12
	Total	100	60

Reference Books

1. **"Advanced Engineering Mathematics"**, Author: *Erwin Kreyszig*, Publisher: Wiley
2. **"Integral Transforms and Their Applications"**, Author: *Lokenath Debnath and Dambaru Bhatta*, Publisher: Chapman and Hall/CRC
3. **"Laplace Transforms and Fourier Series"**, Author: *Dyke P. P. G.*, Publisher: Springer
4. **"Fourier Series and Boundary Value Problems"**, Author: *James Brown and Ruel Churchill*, Publisher: McGraw Hill
5. **"Fourier and Laplace Transforms"**, Author: *R.G. Bartle*, Publisher: Cambridge University Press

Course: 11010604DS03 – Real Analysis

Prerequisites:

A basic understanding of algebra, elementary calculus, and introductory set theory is required for this course.

Rationale:

This course provides a rigorous foundation in real analysis, covering the properties of real numbers, limits, continuity, differentiation, integration, sequences, and series. It equips students with essential analytical tools for advanced mathematics and theoretical understanding crucial for applications in physics, engineering, and economics.

Course Learning Objective:

COBJ 1	Understand Real Number System Properties Learn the algebraic, order, and completeness properties of the real number system and their applications.
COBJ 2	Develop Set Theory Concepts Understand finite, infinite, countable, and uncountable sets, including theorems like Cantor's and Schroder-Bernstein.
COBJ 3	Explore Limits and Continuity Grasp the epsilon-delta definition of limits, properties of continuous functions, and their extensions.
COBJ 4	Study Functions and Differentiation Apply theorems like Intermediate Value, Rolle's, and Mean Value, and develop skills in Taylor series and optimization problems.
COBJ 5	Analyze Sequences and Series Understand the convergence of sequences and series, apply convergence tests, and explore advanced concepts like Cauchy sequences and monotone convergence.

Course Learning Outcomes:

CLO 1	Master Real Number Properties Demonstrate a deep understanding of the real number system's completeness and order properties, including supremum and infimum concepts.
CLO 2	Apply Set Theory in Analysis Classify sets as countable or uncountable and apply Cantor and Schroder-Bernstein theorems to problems in analysis.
CLO 3	Evaluate Limits and Continuity Use the epsilon-delta approach to compute limits and analyze the behavior of continuous functions.
CLO 4	Solve Function Problems Apply key theorems (e.g., Rolle's, Mean Value) and Taylor expansions to solve problems involving differentiation and optimization.
CLO 5	Sequence and Series Analysis Identify convergence properties of sequences and series, apply relevant tests, and use advanced criteria like the Bolzano-Weierstrass theorem.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Basic concepts, classification of unit-1 Laplace Transform Definition, Basic Properties. Laplace transforms of some standard functions. Laplace transforms of Periodic functions. Laplace transform of derivative and integral of a function. Convolution theorem. Inverse Laplace transforms and its properties. Solution of differential equations by using Laplace transforms.	30	18
2	2 unit-2 Fourier Series and Integrals Piecewise continuous functions and periodic functions, Systems of orthogonal functions, Fourier series: Convergence, examples and applications of Fourier series, Fourier cosine series and Fourier sine series, Fourier series on an arbitrary interval and Fourier integrals.	30	18
3	3 unit-3 Fourier Transform Basic Concepts and Definitions of Fourier Transform, Fourier Sine Transform and Fourier Cosine	20	12

	Transform, Convolution Theorem (Statement only). Inverse Fourier Transform		
4	4 unit-4Application of Fourier Transform Applications of Fourier Transforms to solve Ordinary Differential Equations, Solutions of Partial Differential Equations. Applications of Fourier Cosine and Sine Transforms to Partial Differential Equations. ation, and geometrical interpretation, formation of Partial differential equations by elimination of arbitrary constants and functions, Solution of Partial Differential equations- Lagrange's linear equations of the form $Pp+Qq=R$	20	12
	Total	100	60

Reference Books

1. **"Principles of Mathematical Analysis"**, Author: *Walter Rudin*, Publisher: McGraw-Hill
2. **"Introduction to Real Analysis"**, Authors: *Robert G. Bartle and Donald R. Sherbert* Publisher: Wiley
3. **"Understanding Analysis"**, Author: *Stephen Abbott*, Publisher: Springer
4. **"Real Analysis"**, Author: *H.L. Royden and Patrick Fitzpatrick*, Publisher: Pearson
5. **"Elementary Analysis: The Theory of Calculus"**, Author: *Kenneth A. Ross*, Publisher: Springer
6. **"A First Course in Real Analysis"**, Authors: *Murray H. Protter and Charles B. Morrey* Publisher: Springer
7. **"Mathematical Analysis"**, Author: *Tom M. Apostol*, Publisher: Addison-Wesley

Course: 03010504DA01 - Data Science using Python

Prerequisite: Basic knowledge of programming concepts

Rationale: This course introduces students to the fundamentals of data science using the Python programming language. Students will learn how to manipulate and analyze data, visualize data, and build predictive models using popular Python libraries such as NumPy, Pandas, Matplotlib, and Scikit-learn.

Course Learning Objective:

COBJ 1	Develop Python Proficiency: Equip students with the skills to work proficiently with Python, focusing on its application in data analysis and manipulation.
COBJ 2	Master Data Manipulation: Teach students how to handle and manipulate datasets effectively using Python libraries such as Pandas and NumPy.
COBJ 3	Explore Data Analysis Techniques: Introduce various data exploratory techniques to enable insightful analysis and interpretation of datasets.
COBJ 4	Apply Data Handling Methods: Provide practical experience in implementing data handling techniques, including cleaning, transforming, and visualizing data using Python.

Course Learning Outcomes:

CLO 1	Work with Python proficiently.
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CLO 2	Manipulate datasets using Python Library.
CLO 3	Understand various Data Exploratory Techniques.
CLO 4	Apply various data handling techniques using Python.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	-	3	20	20	-	45	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Introduction to Data Science and Python Basics: What is Data Science and its applications, Setting up Python environment (Anaconda, Jupyter Notebook), Python fundamentals: Variables, data types, operators, and basic I/O.	10	3
2	2 Data Manipulation with Python and Data Visualization with Python: Working with NumPy: Arrays, operations, and indexing, Handling data using Pandas: DataFrames, data cleaning, and data preprocessing, Data Visualization with Python Introduction to data visualization libraries (Matplotlib, Seaborn), Creating basic plots: Line plots, bar plots, scatter plots, and histograms	15	5
3	3 Exploratory Data Analysis (EDA): Techniques for EDA: Descriptive statistics and data distribution, Advanced visualization: Box plots, violin plots, pair plots, and heatmaps Data Cleaning and Preprocessing Dealing with missing data and outliers, Feature scaling and normalization, Handling categorical data and feature engineering	15	8
4	4 Introduction to Machine Learning: Understanding supervised and unsupervised learning, Overview of popular machine learning algorithms: Linear Regression, Logistic Regression, k-Nearest Neighbors, Decision Trees, and Clustering algorithms	10	5
5	5 Supervised Learning with Python: Implementing Linear Regression and Logistic Regression in Python, Model evaluation and performance metrics Unsupervised Learning with Python: Implementing k-Nearest Neighbors and Decision Trees in Python, Introduction to clustering algorithms (K-means, Hierarchical clustering)	15	9

6	6 Dimensionality Reduction: Principal Component Analysis (PCA) for feature reduction, Visualization of high-dimensional data	10	4
7	7 Introduction to Natural Language Processing (NLP):Text preprocessing and tokenization, Sentiment analysis using Python	10	4
8	8 Introduction to Deep Learning: Basics of neural networks and their components, Building a simple neural network using TensorFlow/Keras, ANN Model, RNN Models, CNN Models	15	7
	Total	100	45

Reference Books

1. Python for Data Analysis by Wes McKinney (TextBook)
2. Python Data Science Handbook by Jake VanderPlas
3. PyFlo - A Free, Interactive Guide to Python Programming BY Benjamin Dicken

Course: 03010504DA02 - Data Science using Python Lab

Prerequisite: Basic knowledge of programming concepts

Rationale: This course introduces students to the fundamentals of data science using the Python programming language. Students will learn how to manipulate and analyze data, visualize data, and build predictive models using popular Python libraries such as NumPy, Pandas, Matplotlib, and Scikit-learn.

Course Learning Objective:

COBJ 1	Develop Python Proficiency: Equip students with the skills to work proficiently with Python, focusing on its application in data analysis and manipulation.
COBJ 2	Master Data Manipulation: Teach students how to handle and manipulate datasets effectively using Python libraries such as Pandas and NumPy.
COBJ 3	Explore Data Analysis Techniques: Introduce various data exploratory techniques to enable insightful analysis and interpretation of datasets.
COBJ 4	Apply Data Handling Methods: Provide practical experience in implementing data handling techniques, including cleaning, transforming, and visualizing data using Python.

Course Learning Outcomes:

CLO 1	Work with Python proficiently.
CLO 2	Manipulate datasets using Python Library.
CLO 3	Understand various Data Exploratory Techniques.
CLO 4	Apply various data handling techniques using Python.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
	-	2	1	-	-	20	-	30	50

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

List of Practical

Sr.	Practical
1	1. Python Basics: - Writing Python programs to perform simple calculations and print results. - Working with variables, data types, and basic input/output operations. - Implementing loops and conditional statements to solve problems.
2	2. Data Manipulation with NumPy and Pandas: - Creating NumPy arrays and performing basic array operations. - Using Pandas to load and manipulate data from CSV files. - Data cleaning and preprocessing, handling missing values, and duplicates
3	3. Data Visualization with Matplotlib and Seaborn: - Creating line plots, scatter plots, and bar charts to visualize data. - Customizing plots with labels, titles, and different styles. - Using Seaborn for advanced visualizations like box plots and pair plots.
4	4. Exploratory Data Analysis (EDA): - Performing EDA on datasets to understand data distributions and relationships. - Calculating summary statistics and visualizing distributions. - Identifying outliers and anomalies in data.
5	5. Data Preprocessing and Feature Engineering: - Preprocessing data for machine learning: scaling and normalization. - Feature engineering: creating new features from existing data to improve model performance.
6	6. Machine Learning Basics: - Implementing supervised learning algorithms (e.g., Linear Regression, Logistic Regression) on sample datasets. - Evaluating model performance using metrics like Mean Squared Error (MSE) and accuracy.
7	7. Model Selection and Validation: - Splitting data into training and testing sets for model validation. - Performing k-fold cross-validation to assess model performance
8	8. Data Visualization for Machine Learning: - Using visualization techniques to analyze model predictions and residuals. - Visualizing decision boundaries for classification algorithms
9	9. Introduction to Deep Learning: - Building a simple neural network using Keras/TensorFlow to classify data. - Training the neural network and evaluating its performance

10	10. Unsupervised Learning: Implementing clustering algorithms (e.g., K-means clustering) on datasets to group similar data points.
11	11. Natural Language Processing (NLP): 1. Tokenizing and preprocessing text data for sentiment analysis. 2. Building a basic sentiment analysis model using NLP techniques.

Reference Books

1. Python for Data Analysis by Wes McKinney (TextBook)
2. Python Data Science Handbook by Jake VanderPlas
3. PyFlo - A Free, Interactive Guide to Python Programming BY Benjamin Dicken

Course: 00019404VA01 - Foundations of Yoga

Prerequisite: An open mind, basic health, consistency, a quiet space, comfortable clothing, a yoga mat, proper guidance, and a willingness to connect with your body, breath, and mind.

Rationale: The foundation of yoga promotes physical flexibility, mental clarity, emotional resilience, and spiritual growth, fostering a holistic approach to well-being that enhances overall health and encourages a deeper connection between mind, body, and spirit.

Course Learning Objective:

COBJ 1	1. To introduce students to the basic principles and philosophy of yoga.
COBJ 2	2. To provide an understanding of the physical and mental benefits of yoga.

Course Learning Outcomes:

CLO 1	3. To teach foundational yoga postures, breathing techniques, and meditation practices.
CLO 2	4. To cultivate a personal yoga practice that promotes well-being and stress management.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	-	20	20	20	20	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Introduction to Yoga: Definition and History of Yoga Different Paths of Yoga (Hatha, Raja, Karma, Bhakti, Jnana) Importance and relevance of Yoga in modern life	20	6
2	Philosophy of Yoga: The Eight Limbs of Yoga (Ashtanga Yoga) Basic concepts of Patanjali's Yoga Sutras Concept of Mind, Body, and Spirit connection	15	4
3	Basic Anatomy and Physiology for Yoga: Understanding the Musculoskeletal System Respiratory and Circulatory Systems in relation to Yoga Physiological and Anatomical Effects of Asanas on the Human Body	20	6
4	Introduction to Pranayama and Meditation: Basics of Pranayama (Breathing Techniques) Introduction to Meditation: Importance and Benefits Techniques for Developing Concentration and Mindfulness	20	6
5	Shat chakras	5	2
6	Yoga and Health: Physical and Mental Health Benefits of Yoga Yoga for Stress Management Yoga and Lifestyle Diseases (e.g., Hypertension, Diabetes)	20	6
	Total	100	30

Reference Books

1. A Text book of Sports and Exercise Physiology, By Dey, Swapan Kumar | Jaypee Brothers Medical publishers
2. Competition Level Book of Sports and Games, By Dr. A. Mahaboojan, and etal | Lakshya Publisher and Distributor
3. Exercise, Physiology, Fitness and sports Nutrition, By B. Srilakshmi,V.Suganthi and G. Kalaivani Ashok | New AgeInternational Publisher
4. Health and Physical Education, By Puri & Chandra S S | Surjeet Publications
5. Rules of Games and Sports, Updated Version 2024, By Shrivastava, Singh and Kumar | KSK Publishers and Distributors, Delhi
6. Sports Nutrition and Weight Management, By Prof. V. Satyanarayana | Sports Publications, Delhi
7. Swasthya Shiksha, By Dixit, Suresh | Sports Publications, Delhi
8. Principles and History of Physical Education, By Kamlesh, M.L | New Delhi: Friends Publication
9. Light on Yoga (TextBook), By B.K.S. Iyengar
10. The Yoga Sutras of Patanjali (TextBook), By Swami Satchidananda
11. The Heart of Yoga (TextBook), By T.K.V. Desikachar
12. Yoga Anatomy (TextBook), By Leslie Kaminoff and Amy Matthews

Course: 00019404VA02 - Physical Education and Sports

Prerequisite: Basic understanding of physical fitness concepts and a willingness to actively participate in physical activities and team-based sports.

Rationale: The objective of this course is promoting physical health, enhancing mental well-being, fostering social skills, and encouraging lifelong habits of fitness and teamwork, ultimately

contributing to holistic personal development and community cohesion.

Course Learning Objective:

COBJ 1	1. Learning of New Skills in Games and Sports.
COBJ 2	2. Develop healthy life style practices.
COBJ 3	3. Acquire Knowledge of well- being and physical fitness.

Course Learning Outcomes:

CLO 1	Maintain physical fitness through sports.
CLO 2	Improve skills of critical thinking, creative-thinking, problem-solving, team-work leadership, cooperative
CLO 3	Behaviour and technical competencies.
CLO 4	Acquire information of sports initiatives of the Government.

Teaching & Examination Scheme:

Teaching & Examination Scheme:									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	-	20	20	20	20	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	History and Basic Concept of Sports and Fitness: Concept of Sports and Fitness Aims and Objectives, Importance of Sports and Fitness Difference between Games and Sports History of Sports Ancient and Modern Olympics Asian Games and Common Wealth Games functioning	33	10
2	Concepts of Physical Fitness and Rules and Techniques of Games: Concepts of Physical Fitness Fitness Components Meaning and development of strength, speed and accuracy in different physical activities Sports Nutrition Importance of a Balanced Diet	34	10

	Rules and Techniques(games like Football, Athletics, Kho Kho, Kabaddi, Hockey etc.) Basic concepts and rules of different sports Fundamental Skills of Games and Sports		
3	3 Trends in Sports and Fitness: Personality Development through Sports Team building through Group games General Sports Policies Role of Khel Mahakumbh in Gujarat to promote Sports Careers in Physical Education and Sports	33	10
	Total	100	30

List of Practical

Sr.	Practical
1	Fundamental Skill Development Activities: Marking fields or courts on ground, Group Games or Relay Race, Outdoor Games, Fundamental Skill Development Activities: • Practicing general warm-up, stretching • Practicing cardio and respiratory fitness • Walking, Skipping and Running Participate and match practice in Game and Sports.

Reference Books

1. A Text book of Sports and Exercise Physiology, By Dey, Swapan Kumar | Jaypee Brothers Medical publishers
2. Competition Level Book of Sports and Games, By Dr. A. Mahaboojan, and etal | Lakshya Publisher and Distributor
3. Exercise, Physiology, Fitness and sports Nutrition, By B. Srilakshmi,V.Suganthi and G. Kalaivani Ashok | New AgeInternational Publisher
4. Health and Physical Education, By Puri & Chandra S S | Surjeet Publications
5. Rules of Games and Sports, Updated Version 2024, By Shrivastava, Singh and Kumar | KSK Publishers and Distributors, Delhi
6. Sports Nutrition and Weight Management, By Prof. V. Satyanarayana | Sports Publications, Delhi
7. Swasthya Shiksha, By Dixit, Suresh | Sports Publications, Delhi
8. Principles and History of Physical Education, By Kamlesh, M.L | New Delhi: Friends Publication

Course: 00019404VA03 - National Cadet Corps (NCC)

Prerequisite: Student who opt for this course should be physically fit and free from any major ailment **Rationale:** The objective of the NCC as a value-added course is to develop character, comradeship, secular outlook, discipline, leadership, and a spirit of adventure among youth.

Course Learning Objective:

COBJ 1	Demonstrate the ability to work effectively in teams with mutual respect, fostering camaraderie and teamwork.
COBJ 2	Exhibit self-discipline and adhere to established rules and regulations in various activities, promoting an organized and disciplined approach.
COBJ 3	Develop leadership qualities, including decision-making, problem-solving, and the ability to inspire and motivate others.

Course Learning Outcomes:

CLO 1	Understand and respect diverse cultures and religions, promoting unity, harmony, and a secular outlook in all interactions.
CLO 2	Engage in activities that enhance physical fitness, environmental awareness, and resilience, fostering a spirit of adventure and sustainable living.
CLO 3	Actively participate in community service initiatives, demonstrating social responsibility, empathy, and a commitment to societal well-being.

Teaching & Examination Scheme:

Teaching & Examination Scheme									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	-	20	20	20	20	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	Introduction to NCC:History and significance of NCC, Organizational structure and functioning	14	4
2	2 Leadership and Personality Development:Leadership qualities and styles, Communication skills, Team building and management	16	6
3	3 National Integration and Awareness :Importance of national integration, Cultural diversity and unity	14	4
4	4 Health and Hygiene:Basic health and hygiene practices, First aid and emergency response	14	4
5	5 Environmental Awareness: Conservation and sustainable practices, Role of NCC in environmental protection	14	4
6	6 Disaster Management:Types of disasters and their impact, Preparedness and response strategies	14	4
7	7 Social Service and Community Development:Role of NCC in community service, Planning and executing social service activities	14	4
	Total	100	30

List of Practical

Sr.	Practical
1	Drill: Basic drill movements, Marching and parade techniques

2	Physical Fitness: Physical training exercises, Endurance, strength building, and Yogasana
3	Community Service Projects: Participation in local community service projects, Planning and execution of social activities

Reference Books

1. Cadet's Hand Book Common Subject, All Wings (in English, DGNCC, New Delhi)
2. Cadet's Hand Book Common Subject, All Wings (in Hindi), (DGNCC, New Delhi)
3. Cadet's Hand Book Specialized Subject, All Wings, DGNCC, New Delhi

Course: 00019304AE01 - Advanced English-II

Prerequisite: Student who opt for this course should be physically fit and free from any major ailment
Rationale: The objective of the NCC as a value-added course is to develop character, comradeship, secular outlook, discipline, leadership, and a spirit of adventure among youth.

Course Learning Objective:

COBJ 1	After Learning the course the students shall be able to: 1. Develop advanced communication skills.
COBJ 2	Become more proficient in formal writing.

Course Learning Outcomes:

CLO 1	Apply interpersonal communication skills to be more productive at the workplace.
CLO 2	Identify, set and achieve the goals with the help of public speaking.
CLO 3	Use wide range of vocabulary to communicate effectively.

Teaching & Examination Scheme:

Teaching & Examination Scheme:									
Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-		2	60	60	-	60	-	100

L- Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation

Course Content:

Sr.	Topic	Weightage	Teaching Hrs
1	1 Corporate Etiquettes 1. Tips and guide to develop personality and gain various etiquettes manners, case studies and activities. 2. Telephone etiquettes 3 1	3	1
2	2 Etiquette for foreign business trips 3 1	3	1
3	3 Etiquette for small talks 3 1	3	1

4	4 Respecting privacy Learning to say 'No' 3 1	3	1
5	5 Presentation Skills Introduction to Presentation Skills and Audience Analysis Planning and Structuring Your Presentation Visual Aids, Body Language, and Non-Verbal Communication Voice Control, Delivery, and Overcoming Nervousness Engaging Your Audience and Handling Questions 33 10	33	10
6	6 Email etiquettes & Writing 7	7	2
7	7 Article writing 7 2	7	2
8	8 Poster making 7 2	7	2
9	9 Advertisement designing 7 2	7	2
10	10 Convincing skills 7 2	7	2
11	11 Insane inventor 7 2	7	2
12	12 Picture perception 4 1	4	1
13	13 Book review 3 1	3	1
14	14 Movie review 3 1	3	1
15	15 Critical thinking 3 1	3	1
	Total	100	30

Reference Books

1. Business Correspondence and Report Writing SHARMA, R. AND MOHAN, K.
By SHARMA, R. AND MOHAN, K.
2. Communication Skills 2011
By Kumar S and Lata P | Oxford University Press
3. Practical English Usage
By MICHAEL SWAN
4. A Remedial English Grammar for Foreign Student
By F.T. WOOD
5. On Writing Well
By William Zinsser | Harper Paperbacks, 2006 | 30th anniversary edition
6. Oxford Practice Grammar,
By John Eastwood | Oxford University Press