Three-Year Undergraduate Program

Bachelor of Science

B.Sc. Biotechnology (3 Year)

Faculty of Applied Sciences

Parul University

Vadodara, Gujarat, India

Faculty of Applied Sciences

Bachelor of Science in Biotechnology (3 Year)

1. **Vision of the Department:** Create and nurture a vibrant learning environment built on core values of science, with knowledge of advances in biological sciences is created and disseminated, with satisfaction in teaching and learning.

2. **Mission of the Department:**

M1	To offer best quality mentoring of Graduate, Post-graduate and Doctoral studies students.
M2	To provide research facilities to lead scientific discoveries making global impact.
M3	To create skilled human resource to meet the demand of biological industry.
M4	To establish collaborations with industries, all other stakeholders and closely work with them to develop most sought-of curriculum, improve the skills of students.

3. **Program Educational Objectives**

The statements below indicate the career and professional achievements that the B.Sc. Biotechnology**(hons)** curriculum enables graduates to attain.

PEO 1	To develop technical skills (critical investigation, communication, analytical and computer) and human relations skills (group dynamics, team building, organization and delegation) to enable students to transform the acquired knowledge into action.
PEO 2	To inculcate critical analysis and communication skills into students to effectively present their views, both in writing and through oral presentations.
PEO 3	To provide an environment for exploring the Research & Development attitude, to help the students in Research and Development field.

4. **Program Learning Outcomes**

Program Learning outcomes are statements conveying the intent of a program of study.

PLO 1	**Knowledge**	Utilize foundational scientific principles to address intricate challenges through diverse solutions.
PLO 2	**Problem Analysis**	Evaluate and interpret experimental results, drawing conclusions based on acquired data, while also identifying, formulating, and analyzing scientific problems to arrive at solutions using diverse scientific principles.

PLO 3	**Designing Solutions**	Develop solutions and execute experiments that showcase their comprehension of the methods and processes involved.
PLO 4	**Modern tool usage**	Create, select, and apply appropriate techniques, resources and IT tools in the analysis and synthesis of data within limitations.
PLO 5	**Communication Development**	Skilled at clear communication through both written and oral formats, capable of explaining complex concepts in understandable terms, learners will effectively engage with the scientific community and society on scientific matters.
PLO 6	**Employability**	Considering our learners' diverse career goals, including scientific, technical, and quantitative roles, the institution informs them about relevant job opportunities through the Placement cell, offering skill enhancement and value-added courses in addition to science subjects to give them a competitive advantage in the job market.
PLO 7	**Ethics**	Cultivate a sense of healthy competition among students while also nurturing a strong ethical foundation, including an appreciation for scientific principles and their impact on societal, economic, and environmental issues, understand and practice ethical values in both professional and personal spheres, contributing to a responsible society.
PLO 8	**Environment and Sustainability**	Understand the impact of scientific solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PLO 9	**Soft-Skill Development**	Develop soft skills like leadership, teamwork, and effective communication to excel in various roles and contribute to societal progress, enhancing academic, professional, and personal growth for self-improvement and collective advancement.
PLO 10	**Science and Society**	Apply logical thinking, knowledge, and skills in designing solutions for societal issues, including health, safety, and scientific responsibilities.
PLO 11	**Life-long learning**	Encouraging learners to seek knowledge for personal or professional growth includes promoting volunteering, self-motivation, societal values, and lifelong learning for enhanced competitiveness and employability amidst technological advancements.

PLO 12	**Data Analysis and Interpretation**	Analyzing and interpreting scientific data, drawing meaningful conclusions, and communicating results effectively.

5. Program Specific Learning Outcomes

PSO 1	**Demand as per recent trends**	Design the solutions as per the recent industry defined problems.
PSO 2	**Software skill**	Test any apparatus and system with appropriate usage of software tools, and gather data for modelling system.
PSO 3	**Analytical skill**	Test any apparatus and system with appropriate usage of instruments, and gather data for analytical and research purpose.

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
Total Credits:	**132**

Category wise Credit distribution of the programme	
Category	**Credit**
Major Core	88
Minor Stream	00
Multidisciplinary	12
Ability Enhancement Course	10
Skill Enhancement Courses	10
Value added Courses	8
Summer Internship*	04
Total Credits:	**132**

7. Program Curriculum

Semester 1						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
1	00019301AE01/ 00019301AE02/ 00019301AE03	Basic English-I/ Basic Hindi-I/ Basic Gujarati-I	2	2	0	0
2	11010101SE01	SEC-1 (Laboratory Best Practices) (Decided by dean)	2	1	2	0
3	11011401VA01	VAC-1 (Climate change & sustainable environment)	2	2	0	0
4	09010101UE01	First Aid and Life Support	4	4	0	0
5	11010201DS01	Cell Biology	4	4	0	0
6	11010301DS02	Chemistry	4	4	0	0
7	11010201DS03	Lab-I Cell Biology	2	0	4	0
8	11010301DS04	Lab-II Chemistry	2	0	4	0
		Total	**22**	**17**	**10**	**00**

Semester 2						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
9	00019302AE04/ 00019302AE05/ 00019302AE06	Basic English-II/ Basic Hindi-II/ Basic Gujarati-II	2	2	0	0
10	00019101SE01	SEC-2 (Mathematical Aptitude)	2	2	0	0
11	00019302VA01	VAC-2 (IPDC including history and culture of India and IKS-I)	2	2	0	0
12	19010002UE01	Digital Health	4	4	0	0
13	11010302DS01	Biomolecules	4	4	0	0

14	11010102DS02	Fundamentals of Microbiology	4	4	0	0
15	11010302DS03	Lab-I Biomolecules	2	0	4	0
16	11010102DS04	Lab-II Fundamentals of Microbiology	2	0	4	0
		Total	**22**	**18**	**8**	**0**

Semester 3						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
17	00019303AE01 00019303AE02 00019303AE03	Advanced English I Basic German I Basic French I	2 2 2	2 2 2	0 0 0	0 0 0
18	03010503SE01	SEC-3 (AI/Web Development and Design)	2	2	0	0
19	00019303VA01	VAC-3 (IPDC including history and culture of India and IKS - 2)	2	2	0	0
20	05010103UE01	Artificial Intelligence	4	4	0	0
21	11010203DS01	Molecular Biology	4	4	0	0
22	11010203DS02	Immunology	4	4	0	0
23	11010203DS03	Lab-I Molecular Biology	2	0	4	0
24	11010203DS04	Lab - II Immunology	2	0	4	0
Total			**22**	**18**	**8**	**00**

Semester 4						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
25	00019304AE04	Advanced English II Basic German II Basic French II	2 2 2	2 2 2	0 0 0	0 0 0
26	11010004SE01	SEC-4 Bioinstrumentation (decided by Dean)	2	2	0	0
27	19010204VA01 00019404VA01	VAC-4 (Positive Mental Health/ Physical Education: Yoga/	2	2 1	0 2	0

	00019404VA02 00019404VA03	Physical Education: NCC Physical Education: Sports		1 1	2 2	
28	11011604DS03	Principles of Genetics	4	4	0	0
29	11010304DS02	Biochemical Pathways	4	4	0	0
30	11010304DS01	Enzymology	4	4	0	0
31	11010304DS04	Lab-I Enzymology	2	0	4	0
32	11010304DS05	Lab-II Genetics	2	0	4	0
		Total	**22**	**17**	**10**	**0**

Semester 5						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
33	06010105SE01 06010105SE02	SEC-5 (Digital Literacy/ Finance for Everyone	2	2	0	0
34	11010205DS01	Genetic Engineering	4	4	0	0
35	11010205DS02	Animal and Plant physiology	4	4	0	0
36	11010205DS03	Immunotechnology	4	4	0	0
37	11010205DS30 11010205DS31	Molecular Virology / Developmental Biology	4	4	0	0
38	11010205DS04	Lab-I Genetic Engineering	2	0	4	0
39	11010205DS05	Lab-II Animal and plant physiology & Immunotechnology	2	0	4	0
		Total	**22**	**18**	**8**	**0**

Semester 6						
Sr. No.	**Subject Code**	**Subject Name**	**Credit**	**Lect**	**Lab**	**Tut**
40	00019306AE01	AEC-5 (Professional Ethics & Communication)	2	0	0	0

41	11010206DS33 11010206DS32	Food and Agri Biotechnology Environmental and Medical Biotechnology	4	4	0	0
42	11010206DS01	Plant and Animal Biotechnology	4	4	0	0
43	11010206DS02	Genomics and Proteomics	4	4	0	0
44	11010206DS03	Lab-I Plant and Animal Biotechnology	4	0	4	0
45	11010206DS04	Lab-II Genomics and Proteomics	4	0	4	0
46	11010206IN01	Internship/Mini Project	4	0	0	0
		Total	**22**	**12**	**8**	**4**

8. Detailed Syllabus

SEMESTER 1

(1)

a. **Course Name:** Basic English-I

b. **Course Code:** 00019301AE01

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

d. **Rationale:** Knowledge of LSRW is essential for students.

e. **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.

f. **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.

g. **Teaching & Examination Scheme:**

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

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

h. **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

i. **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

(2)

a. **Course Name:** Basic Hindi-I

b. **Course Code:** 00019301AE02

c. **Prerequisite:** Basic communication skills in Hindi

d. **Rationale:** Basic comprehensive skills Hindi

e. **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.

f. **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.

g. **Teaching & Examination Scheme:**

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

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

h. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	**Hindi Alphabets:** Hindi Alphabets Relate with English Alphabets, vowel, consonant.	13%	4
2	**Hindi Phonetics:** Hindi Phonetics, Joint words kha, sva etc	13%	4
3	**Word Formation: T**wo/three letter word formation	13%	4
4	**Hindi Grammar:** Noun, Pronoun, Verb, Adverb, Adjective.	34%	10
5	**Hindi Vocabulary:** Number from 1 to 50, Days of week, Colors	27%	8
	Total	100%	30

(3)

a. **Course Name:** Basic Gujarati-I

b. **Course Code:** 00019301AE03

c. **Prerequisite:** Basic communication skills in Gujarati

d. **Rationale:** Basic comprehensive skills in Gujarati.

e. **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.

f. **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.

g. **Teaching & Examination Scheme:**

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

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

h. **Course Content:**

Sr. No.	**Content**	**Weightage**	**Teaching Hours**
1	**Gujarati Alphabets:** Gujarati Alphabets relate with English Alphabets, vowel, consonant.	**13%**	**4**
2	**Gujarati Phonetics:** Gujarati Phonetics, Joint words kha, sva etc	**13%**	**4**
3	**Word Formation: T**wo/three letter word formation	**13%**	**4**
4	**Gujarati Grammar:** Noun, Pronoun, Verb, Adverb, Adjective.	**34%**	**10**
5	**Gujarati Vocabulary:** Number from 1 to 50, Days of week, Colors	**27%**	**8**
	Total	**100%**	**30**

(4)

a. **Course Name:** Introduction to MATLAB Programming

b. **Course Code:** 03010901UE01

c. **Prerequisite:** Fundamental Knowledge of Mathematics.

d. **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.

e. **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.

f. **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.

g. **Teaching & Examination Scheme:**

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

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

h. **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	**Writing Functions in MATLAB**: User-defined Functions, Creating and using anonymous functions	15%	7
6	**Working with Files and Symbolic Math:** Reading from and writing to files, data import/export, performing symbolic computations using Symbolic Math Toolbox	18%	8
	Total	100%	45

Sr. No.	List of Practical's
1.	**Basic Arithmetic Operations:** Write a MATLAB script that takes two user-input numbers, **performs** basic arithmetic operations (addition, subtraction, multiplication, division), and displays the results.
2.	**Matrix Manipulation:** Create a 3x3 matrix with random integers. Implement a function that takes this matrix as input and returns the sum, mean, and maximum value of its elements.
3.	**Plotting Data and Interpretation:** Generate a set of x and y values using MATLAB. Plot the data as a line graph, add appropriate labels, and customize the plot appearance.
4.	**Control Statements:** Write a MATLAB script that takes a user-input number and checks if it's positive, negative, or zero using if-else statements. Display the result accordingly.
5.	**Fibonacci sequence and usages:** Create a MATLAB function that generates the first n elements of the Fibonacci sequence and returns them in an array
6.	**File Input/Output and application:** Read data from a CSV file into MATLAB, perform some data manipulation (e.g., finding the average), and save the results in a new CSV file.
7.	**Symbolic Math:** Use the Symbolic Math Toolbox to solve a simple algebraic equation and display the result in symbolic form.

i. **Text Book and Reference Book:**

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

(5)

a. **Course Name:** Office Automation

b. **Course Code:** 05010101UE01

c. **Prerequisite:** Basic computer literacy

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

e. **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.

f. **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.

g. **Teaching & Examination Scheme:**

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

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

h. **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, Center, 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	25%	10

	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		
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%**	**45**

Sr. No.	**List of Practical's**
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
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 center. 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. d) 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. e) Copy the appropriate formula to obtain the total rainfall for Newcastle during the period.
8.	Table column exercises. 1. 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 D. 7. 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 Filter data of excel sheet: 1. Count number of orders 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.

13.	Conditional formatting do conditional formatting on the excel sheet in given data. 1) Sorting sort given data of excel sheet. 2) 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.
14.	Water mark and header footer inserting and removing
15.	Power point presentation: creating presentation, PPT add timing and sound effects.
16.	Access create data base, tables create database, tables. Access, relations between tables relations between tables.

i. **Text Book and Reference Book:**

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

(6)

a. **Course Name:** First Aid & Life Support

b. **Course Code:** 09010101UE01

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

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

e. **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.

f. **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.

g. **Teaching & Examination Scheme:**

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

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

h. 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	**10%**	**6**

	cap (patella) Injuries and fractures of foot.		
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 transmitte diseases (STD), Sexually transmitted infections, Reducing the risk of STDS/STIS, Emergency childbirth.		
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**

i. Text Book and Reference Book:

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

(7)

a. Course Name: Basic Photography

b. Course Code: 18010201UE01

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

d. 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.

e. 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.

f. Course Learning Outcomes:

CLO 1	Remember some component of photography and Improved technical skills: Basic photography classes will teach you the fundamentals of camera operation, exposure, and lighting.
CLO 2	Understand how to use your camera to its full potential and create images that are properly exposed and well-lit.

CLO 3	Apply the ability to use natural and artificial light effectively to enhance the visual impact of their photographs
CLO 4	Analyse By learning about composition, colour, and perspective, you'll be able to 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.

g. Teaching & Examination Scheme:

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

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

h. 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 have 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.	**34%**	**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**
	Documentary Photography: Apart from the fiction, there is 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	**33%**	**10**
	Total	**100%**	**30**

Sr. No.	List of Practical's
1.	Landscape
2.	A picture that reflects you
3.	A photostory with 3 pictures and 5 pictures
4.	Photos on a particular topic
5.	Assignments for photography

i. 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

(8)

a. Course Name: Climate change & Sustainable Environment

b. Course Code: 11011401VA01

c. Prerequisite: Shall have the basic knowledge about environmental studies.

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

e. 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.

f. 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.

g. Teaching & Examination Scheme:

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

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

h. 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	**34%**	**10**

	Climate Change and Sustainable Development		
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**

i. Text Book and Reference Book:

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

(9)

a. Course Name: Cell Biology

b. Course Code: 11010201DS01

c. Prerequisite: Basic knowledge of biology and cells.

d. Rationale: The curriculum will provide a general understanding of the related disciplines with holistic knowledge generation in cells, organelles, and transport systems.

e. Course Learning Objective:

CLOBJ 1	Understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.
CLOBJ 2	Remember the cellular components are used to generate and utilize energy in cells.
CLOBJ 3	Evaluate the cellular components underlying mitotic cell division.
CLOBJ 4	Apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

f. Course Learning Outcomes:

CLO 1	Understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
CLO 2	Understand a strong foundation on the basic unit of life
CLO 3	Remember a strong foundation for the functions of the cell.
CLO 4	Apply their knowledge of cell biology to selected examples of changes or losses in cell function
CLO5	Analyze knowledge about the cellular components underlying mitotic cell division

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Basics of cell structure and function:** Origin of lifetime scale of cell biology, Introduction and classification of organisms by cell structure, cytosol, compartmentalization of Prokaryotic and eukaryotic cells (Plant & Animal). Cell biology by numbers Cell Membrane and Permeability: Organization of Fluid Mosaic model, Cytoskeleton and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments	**25%**	**15**
2	**Cell organization:** Structure, functions of cell organelles: Endoplasmic reticulum, Golgi complex, Microbodies (Lysosomes, Peroxisome, vesicles) Ribosomes, Vacuoles, Mitochondria, Chloroplasts, Nucleus, PXo bodies, apoplast	**25%**	**15**
3	**Cell division and cell cycle:** Cell division and Cell Cycle: Amitosis, Mitosis, Meiosis: a special type of cell division, phases and components of the cell cycle. Regulation of cell cycle (Check points). Cancer cell & its types, Properties. Cell senescence, apoptosis and necrosis, Cellular ageing and cell death.	**25%**	**15**
4	**Membrane transport and cell signaling:** Membrane transport: Active and passive transport, transport of small molecules:, ATP powered pump, symporters, antiporters, ion channels, non-gated ion channels and resting potential, voltage gated ion channel and action potential, gap junctions. Basics of Cell signaling-introduction, types-autocrine, paracrine and endocrine, Cell signaling pathways -Jak/STAT and receptor tyrosine kinase.	**25%**	**15**
	Total	**100%**	**45**

i. Text Book and Reference Book:

1. Campbell Biology. 9th edition
2. Molecular biology of cells: Lodish
3. "Molecular Biology of the Cell" by Bruce Alberts et al.
4. "Essential Cell Biology" by Bruce Alberts et al.
5. "Cell Biology" by Thomas Pollard, William Earnshaw, and Jennifer Lippincott-Schwartz.

6. "The Cell: A Molecular Approach" by Geoffrey Cooper.

(10)

a. Course Name: Lab-II Cell Biology

b. Course Code: 11010201DS03

c. Prerequisite: Basic knowledge of biology and cells

d. Rationale: The curriculum will provide a general understanding of the related disciplines with holistic knowledge generation in cells, organelles, and transport systems.

e. Course Learning Objective:

CLOBJ 1	Teach the students safety handling and regulation of laboratory facility.
CLOBJ 2	Learn to record, keep and analyze laboratory data with accuracy.
CLOBJ 3	Practice minimization of Errors related with handling of laboratory accessories and equipment's.
CLOBJ 4	Learn Standard Operating Procedures (SOPs) Laboratory equipment's.

f. Course Learning Outcomes:

CLO 1	Apply basics of equipment to observe cells and its organelle
CLO 2	Execute basic experiments to understand cellular mechanisms
CLO 3	Evaluate different cell and tissue from various living sources
CLO 4	Analyse the organelle and cellular components practically

g. Teaching & Examination Scheme:

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
-	**-**	**4**	**2**	**-**	**-**	**40**	**-**	**60**	**100**

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

h.

Sr. No.	**List of Practical's**
1	Structure and working of microscopes (Simple microscope, Compound microscope)
2	To study plant and animal cell from permanent slide mount.

3	To study the structure of plant cell through temporary mounts (Monocot/Dicot).
4	To study the structure of animal cells by temporary mounts-squamous epithelial cell from cheek
5	Effect of hypotonic and hypertonic salt solutions on onion cells
6	To prepare temporary stained squash from root tips of Allium cepa /Pisum sativum and to study the various stages of mitosis.
7	Study the effect of temperature, organic solvent on semi permeable membrane.
8	Study of plasmolysis and deplasmolysis on Rhoeo leaf.
9	Cell cycle halt.
10	Preparation meiotic chromosomes from datura /hibiscus pollen grain/gonads of insects.
11	Spotting -Cell organelles

i. Text Book and Reference Book:

1. Celis JE (ed) (1998) Cell Biology: A Laboratory Handbook, 2nd edn. San Diego: Academic Press.
2. Lacey AJ (ed) (1999) Light Microscopy in Biology: A Practical Approach, 2nd edn. Oxford: Oxford University Press.
3. Paddock SW (ed) (1999) Methods in Molecular Biology, vol 122: Confocal Microscopy Methods and Protocols. Totowa, NJ: Humana Press.
4. Boon ME & Driver JS (1986) Routine Cytological Staining Methods. London: Macmillan 5. Hayat MA (1989) Cytochemical Methods. New York: Wiley-Liss

(11)

a. Course Name: Basics of Chemistry

b. Course Code: 11010501DS02

c. Prerequisite: Basic math skills & foundational science knowledge

d. Rationale: Fundamental goal to understand the properties, composition, structure, behavior, and changes of matter. Chemistry is a central science that serves as a bridge between physics and biology, providing insights into the molecular and atomic foundations of the physical world.

e. Course Learning Objective:

CLOBJ 1	Remember fundamental principles of atomic structure, including the arrangement of electrons, protons, and neutrons.
CLOBJ 2	Understand the organization of the periodic table and the trends in atomic and physical properties across periods and down groups.
CLOBJ 3	Apply the chemistry of main group elements, including trends in reactivity and the formation of compounds.
CLOBJ 4	Analyse various types of chemical bonding, including ionic, covalent, and metallic bonding.
CLOBJ 5	Evaluate basics of coordination compounds, including ligands, metal-ligand bonding, and isomerism in coordination complexes.
CLOBJ 6	Develop systematic understanding for the properties and reactions of common inorganic compounds, including acids, bases, and salts.

f. Course Learning Outcomes:

CLO 1	Remember list the fundamental concepts of atom and wave mechanics, including de-Broglie's equation, Heisenberg's Uncertainty Principle, Aufbau Principle, Pauli's Exclusion Principle, and Hund's Rule for electron configuration.
CLO 2	Understanding of the quantum mechanical model of the atom, Schrödinger wave equation, and the concept of orbitals, quantum numbers, radial and angular wave functions, and Slater rule.
CLO 3	Apply knowledge of periodic properties to explain trends in atomic and ionic radii, ionization potential, electronegativity, and electron affinity. Apply the concepts to describe the general characteristics of group 1 and group 2 elements, including their occurrence, extraction, and production.

CLO 4	Analyze the significance of periodicity in chemistry, as well as the reactions and properties of alkali metals and alkaline earth metals. Analyze the applications of alkali metal and alkaline earth metal compounds in everyday life.
CLO5	Evaluate the limitations of the valence bond theory and understand the directional characteristics of chemical bonds, including ionic bonds, covalent bonds, coordinate covalent bonds, metallic bonds, and hydrogen bonds.
CLO6	Synthesize information on valence bond theory, directional characteristics of covalent bonds, and shapes of inorganic molecules using the Valence Shell Electron Pair Repulsion (VSEPR) theory, applying it to molecules like NH3, H3O+, SF4, ClF3, ICl-2, and H2O.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	**Content**	**Weightage**	**Teaching Hours**
1	**Unit -1** Atomic structure: Atomic models: Dalton, Thomson, Rutherford, Bohr, and the quantum mechanical model, Modern view of atoms and subatomic particles (protons, neutrons, and electrons), Atomic Number, Mass Number, and Isotopes, Electronic Configuration 33 10	**33%**	**10**
2	**Unit - 2** IUPAC nomenclature: Importance of systematic nomenclature, Role of IUPAC in standardizing naming conventions, Introduction IUPAC nomenclature of alkanes, alkenes,alkynes haloalkanes, alcohol, ether, aldenydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones.	**33%**	**10**

3	**Unit – 3** chemical bonding: Introduction to Chemical Bonding, Ionic bonding, covalent bonding, metallic bonding, intermolecular forces, Van der Waals forces and Hydrogen bonding and its role in certain compounds, Hybrid orbitals and their role in explaining molecular shapes, sp, sp2, sp3 hybridization	**34%**	**10**
Total		**100%**	**30**

i. Text Book and Reference Book:

1. “Essential of Physical Chemistry”; B.S. Bhal, G.D. Tuli and Arun Bhal, S. Chand and Company Ltd. 23rd Edition,1996. (TextBook)Inorganic Chemistry By P. L. Soni and Katyal | Sultan Chand and Sons, New Delhi
2. Organic chemistry by I.L. Finar, Volume-I & II. Longmans
3. "Chemistry: The Central Science" By Theodore L. Brown, H. Eugene LeMay, Bruce E. Bursten:Principles of Inorganic Chemistry by B. R. Puri, L. R. Sharma; K. C. Kalia | S Chand and

4. Principles of Modern Chemistry By David W. Oxtoby, H. Pat Gillis, and Laurie J. Butler
5. Text book of practical organic chemistry- A.I.Vogel

(12)

a. Course Name: Lab-II Chemistry

b. Course Code: 11010501DS04

c. Prerequisite: Proficiency in basic laboratory skills

d. Rationale: The course emphasizes the application of titration techniques to real-world scenarios

e. Course Learning Objective:

CLOBJ 1	Develop the ability to determine the concentration of weak acids against strong bases (e.g., HCl and NaOH) and weak bases against strong acids (e.g., H2SO4) using titration techniques.
CLOBJ 2	Understand mechanism of titration and role of indicator in titration.
CLOBJ 3	Apply iodometric methods to estimate the amount of Cu+2 and Fe+3 ions in solutions containing CuSO4.5H2O and FeCl3.6H2O, respectively.
CLOBJ 4	Analyze mixtures of acids and bases, determining the concentrations of both weak and strong components in the mixture
CLOBJ 5	Learn the techniques of complexometric titration to estimate the hardness of water by determining the concentrations of Ca+2 and Mg+2 ions.
CLOBJ6	Develop the ability to determine the amounts of Ca+2, Mg+2, Zn+2, and ZnSO4 through complexometric titration, understanding the principles of chelation with EDTA.

f. Course Learning Outcomes:

CLO 1	Remember principles of titration and recognize the procedures involved in determining the concentration of weak bases against strong acids (HCl, H2SO4) and weak acids against strong bases (NaOH).
CLO 2	Understanding of the chemical reactions involved in the titration experiments, including the neutralization reactions between acids and bases.
CLO 3	Apply titration techniques to determine the concentrations of both weak and strong acids and bases in various experimental setups, showcasing practical application skills.
CLO 4	Analyze mixtures of acids and bases, distinguishing and quantifying the concentrations of individual components, such as weak acid with strong acid and weak base with strong base.
CLO5	Evaluate the accuracy and precision of the results obtained in the estimation of metal ions (Cu+2, Fe+3, Zn+2, Pb+2) using iodometric and complexometric titrations.

CLO6	Synthesize knowledge and skills in complexometric titration to determine the amounts of Ca+2 and Mg+2 ions in a given sample and to estimate chloride ions using Mohr's and Fajan's methods.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
-	-	4	2	-	-	40	-	60	100

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

h.

Sr. No.	List of Practical's
1	To determine the concentration of weak base against HCl
2	To determine the concentration of weak base against H2SO4
3	To determine the concentration of weak acid against NaOH
4	To determine the concentration of weak acid and strong acid from the mixture of the acids
5	To determine the concentration of weak base and strong base from the mixture of the bases
6	To estimate the amount of Cu+2 and CuSO4.5H2O in the given solution iodometrically.
7	To estimate the amount of Fe+3 and FeCl3.6H2O in given solution using internal and external Indicators.
8	To determine amount of Ca+2 and Mg+2 in given sample using complexometric titration.
9	To estimate amount of chloride ions in given sample of Mohr's and Fajan's method.
10	To determine amount of Zn+2 and ZnSO4 by complexometric titration
11	Determination of the concentration of a metal ion by titration with EDTA
12	To determine the concentration of NaOH and Na2CO3 solution in mixture by using 0.05 M H2SO4 solution
13	To determine the concentration of FeSO4 (NH4)2 SO46H2O and K2Cr2O7 solutions using 0.02 M KMnO4 solution by using diphenylamine as an internal indicator.

14	To estimate the amount of Pb+2 in the given solution iodometrically.
15	To determine hardness of water by complexometric titration.

i. Text Book and Reference Book:

1) Advanced Practical Physics for Students by B.L. Flint & H.T. Worsnop | Asia Publishing House.
2) Advanced Level Physics Practicals by Michael Nelson and Jon M. Ogborn | Heinemann Educational Publishers.
3) Text Book of Practical Physics (TextBook) By, Indu Prakash and Ramakrishna Kitab Mahal, New Delhi. |, 11th Edition, 2011,

(15)

a. Course Name: Laboratory Best Practices

b. Course Code: 11010001SE01

c. Prerequisite: Basic knowledge of Biology, Physics and Chemistry

d. Rationale: Curriculum will provide a general understanding of the required laboratory ethics and practices.

e. Course Learning Objective:

CLOBJ 1	Develop an understanding of the fundamental safety protocols in a Biology, Physics and chemistry laboratory, including the proper usage of Personal Protective Equipment (PPE), knowledge of first aid procedures, and familiarity with the use of fire extinguishers.
CLOBJ 2	Acquire proficiency in identifying and coding different types of glassware and chemicals used in laboratory experiments.
CLOBJ 3	Perform pH determination using various methods such as litmus paper, pH strips, and pH meter for water samples.
CLOBJ 4	Perform experiments to learn Standard Operating Procedures (SOPs) Laboratory equipment's.
CLOBJ 5	Conduct qualitative analysis of organic compounds, specifically detecting special elements (N, S, and halogens) using the Lassaigne test.
CLOBJ 6	Demonstrate safe storage and handling practices for chemicals and glassware, including proper labeling, storage conditions, and awareness of compatibility issues.

f. Course Learning Outcomes:

CLO 1	Students will demonstrate a high level of safety proficiency in the laboratory, including the correct selection and use of Personal Protective Equipment (PPE), first aid procedures, and efficient utilization of fire extinguishing equipment.
CLO 2	Students will exhibit competence in identifying, coding, and handling various glassware and chemicals commonly used in laboratory experiments.
CLO 3	Acquire advanced analytical skills by accurately determining pH levels in water samples using litmus paper, pH strips, and pH meters.

CLO 4	Develop hands-on experimental skills by successfully implementing SOPs.
CLO5	Develop ethical awareness and responsibility by identifying and addressing potential hazards, fostering a culture of safety and responsibility within the laboratory setting.
CLO6	Demonstrate proficiency in safe storage practices, including proper labeling, storage conditions, and the implementation of compatibility guidelines for chemicals and glassware.

g. Teaching & Examination Scheme:

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
1	**-**	**2**	**2**	**20**	**20**	**-**	**60**	**-**	**100**

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

h. **Course content**

Sr. No.	**Content**	**Weightage**	**Teaching Hours**
1	**Unit 1 Introduction to Good Laboratory Practices (GLP) and Standard Operating Procedures (SOP)** History, Scope, and Fundamental Points of GLP (Rules and results, Quality assurance, Quality Control, Quality engineering), Laboratory hierarchy and SOP Levels of Laboratories, Log Book Maintenance, Basic SOPs for instrument handling and Maintenance, Personal Protective Equipment (PPE), record technical and administrative improvements.	**33%**	**10**
2	**Unit 2 Laboratory rules and Protocols** General Rules/Protocols for Lab Safety measures (laboratory safety showers, eyewash stations, and fire extinguishers, exit routes), Precaution and Safety in handling of chemicals (chemical inventory list, applicable safety data sheets (SDS), departmental laboratory safety manual), Laboratory tools (records of certification, maintenance, or repairs), Glassware and instruments.	**33%**	**10**

3	**Unit 3 Record Keeping and Interpretation** Keeping data records, its analysis by using statistical and mathematical tools. Result analysis and its interpretation (Raw data and Data Collection, Final report, summary of findings, discussion and reference.	**34%**	**10**
	Total	**100%**	**30**

i. Text Book and Reference Book:

1. Handbook Good Laboratory Practices-World health organization (WHO)
2. Life science protocol manual (2018)-DBT star college scheme
3. Guidelines for good laboratory practices-Indian council of medical research, New Delhi (2021)

j.

Sr. No.	List of Practical's
1	Basic knowledge of analytical chemistry (Molarity, Normality, Solution preparation, sample collection, labelling).
2	Micropipette handling and calibration.
3	Use of Weighing balance and its calibration and maintenance.
4	Storage and Transport of Chemicals Safely.
5	Applicable safety data sheets Personal Protective Equipment (PPE).
6	Sample/Chemical/E-waste disposal.
7	Introduction to BSL.

k. Text Book and Reference Book:

1) Advanced Practical Chemistry & Resource Pack By Thompson & Atteshlis, John Murray, 1990.Organic chemistry by I.L. Finar, Volume-I & II. Longmans
2) A Level Practical Chemistry, Students' Guide & Teachers' Guide, (0-521-37899-0 & 0-521-38696-9), Brian Ratcliff Cambridge, 1990.
3) Vogel, Arthur I. (Arthur Israel). Vogel's Textbook of Quantitative Chemical Analysis. Harlow, Essex, England: New York: Longman Scientific & Technical; Wiley, 1989.

SEMESTER 2

(14)

a. Course Name: Basic English-II

b. Course Code: 00019302AE04

c. Prerequisite: Knowledge of Basic English-I

d. Rationale: Knowledge of Communication is essential for students

e. Course Learning Objective:

CLOBJ 1	Understand the definition of communication and recognize its significance in various contexts.
CLOBJ 2	Explain the process of communication and its components.
CLOBJ 3	Identify the levels and flow of communication within different organizational structures.
CLOBJ 4	Recognize common barriers to effective communication and develop strategies to overcome them.
CLOBJ 5	Define non-verbal communication and distinguish between its various forms, including kinesics, proxemics, paralinguistic, and chronemics.
CLOBJ6	Perform error analysis in written and spoken communication, focusing on tense usage, voice variations, and reported speech.

f. Course Learning Outcomes:

CLO 1	Define communication and articulate its importance in various personal, professional, and societal contexts.
CLO 2	Understanding of the process of communication, including its different levels and the flow of information within different communication structures.
CLO 3	Solve barriers to effective communication and apply strategies to overcome these barriers in real-life scenarios.
CLO 4	Analyse error analysis in written and spoken communication, focusing on tense usage, voice variations, and reported speech to identify areas for improvement.

CLO 5	Evaluate own communication skills through activities such as reading comprehension, vocabulary building, idioms, phrases, synonyms, antonyms, theatrics (role-play), extempore speaking, application writing, and letter writing, focusing on elements, layouts, inquiries, complaints, and adjustments.
CLO6	Develop and apply effective communication skills, including non-verbal communication techniques such as kinesics, proxemics, paralinguistic, and chronemics, to convey messages accurately and appropriately in various situations.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No	Topic	Weightage	Teaching Hrs.
1	Definition of Communication & Importance of Communication, Definition and process of communication	7%	2
2	Levels of Communication, Flow of Communication	7%	2
3	Barriers to effective Communication, Features of effective Communication	7%	2
4	Define non-verbal communication, Kinesics	3%	1
5	Proxemics, Paralinguistic, Chronemics	3%	1
6	Error Analysis (Tenses, voices & reported speech)	7%	2
7	Reading Comprehension	3%	1
8	Vocabulary Building, Idioms, Phrases, Synonyms, Antonyms	7%	2
9	Theatrics (Role Play)	16%	5
10	Extempore	16%	5
11	Application writing	10%	3
12	Letter writing (Elements, Layouts, Inquiry, Complain, & Adjustment,)	14%	4
	Total	**100%**	**30**

i. Reference Books:

1) Sanjay Kumar, Pushp Lata, Communication Skills, Oxford University Press
2) Business Correspondence and Report Writing By SHARMA, R. AND MOHAN, K.
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) Technical Communication: Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford University Press Printed

(15)

a. Course Name: Basic Hindi-II

b. Course Code: 00019302AE05

c. Prerequisite: Knowledge of Hindi-I

d. Rationale: Basic comprehensive skills and Hindi-I

e. 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.

f. 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	Evaluate the effectiveness of different language learning strategies for acquiring Hindi proficiency
CLO 6	Create original content in Hindi, such as short stories, poems, or dialogues

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Advanced vocabulary:** Number 51 onwards, Telling tine, Greetings.	13%	4
2	**Listening skills:** Short story, Short Conversation.	20%	6
3	**(Speaking Skills):** Self Introduction, Day to Day Conversation, Elocution.	27%	8
4	**Reading skills:** Reading Comprehension, Short Story, Newspaper.	20%	6
5	**Writing skills:** Self-Introduction, Short message.	20%	6
	Total	100%	30

i. Reference Books:

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

a. **Course Name:** Basic Gujarati-2

b. **Course Code:** 00019302AE06

c. **Prerequisite:** Knowledge of Gujarati-I

Rationale: Basic comprehensive skills and Gujarati-I

d. Rationale: Basic comprehensive skills and Gujarati-I

e. 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.

f. Course Learning Outcomes:

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

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Advanced vocabulary:** Number 51 onwards, Telling tine, Greetings	13%	4
2	**Listening skills:** Short story, Short Conversation.	20%	6
3	**(Speaking Skills):** Self-Introduction, Day to Day Conversation, Elocution	27%	8
4	**Reading skills** Reading Comprehension, Short Story, Newspaper.	20%	6
5	**Writing skills:** Self-introduction, short message	20%	6
	Total	100%	30

i. Reference Books:

1) 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

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a. Course Name Mathematical Aptitude

b. Course Code: 00019101SE01

c. Prerequisite: Basic numeracy skill

d. 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.

e. 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

f. 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.

g. Teaching & Examination Scheme:

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

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

h. 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
	Total	100%	30

i. Reference Books:

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,

(18)

a. Course Name: IPDC including history and culture of India and IKS-I

b. Course Code: 00019302VA01

c. Prerequisite: 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.

d. 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.

e. Course Learning Objective:

CLOBJ 1	Remember key event, figures and date in history of India
CLOBJ 2	Understand diversity of Indian culture, including language, religions and customs.
CLOBJ 3	Apply principles of Indian philosophy to analyse complementary issues.
CLOBJ 4	Analyse influence of Indian philosophy various aspects of life such as ethics politics and art.
CLOBJ 5	Evaluate impact of globalization on Indian culture and philosophy.
CLOBJ 6	Create innovative solutions on cultural diversity based on principles of India

f. Course Learning Outcomes:

CLO 1	Remember key events, figures and periods in history of India
CLO 2	Describe basic tenets and principles of prominent Indian philosophy schools
CLO 3	Apply concepts of Indian philosophy and culture to analyse contemporary issues and phenomenon
CLO 4	Compare and contrast different philosophical schools within Indian traditions
CLO 5	Evaluate relevance of Indian knowledge system in modern world.
CLO 6	Develop strategy for integrating Indian knowledge system into contemporary educational framework.

g. Teaching & Examination Scheme:

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

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

h. 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**
	Total	**100%**	**30**

i. Textbook and Reference Books:

1) Integrated Personality Development Course (TextBook) - By Bochasanwasi Akshar Purushottam Swaminarayan Sansth

(19)

a. Course Name: Public Health Nutrition

b. Course Code: 19010202UE01

c. Prerequisite: Basic knowledge of Nutrition and Public Health

d. 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 programmed 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 programmed to tackle nutritional problems.

e. Course Learning Objective:

CLOBJ 1	Remember major nutritional deficiency and their consequences in different populations
CLOBJ 2	Understand relationship between diet, lifestyle and risk of chronic diseases.
CLOBJ 3	Apply nutritional assessment methods to evaluate nutritional status of individuals and communities.
CLOBJ 4	Analyse effectiveness of public health and nutrition programs and policies.
CLOBJ 5	Evaluate outcomes of nutrition interventions on population health.
CLOBJ 6	Develop educational materials om nutrition for diverse populations.

f. Course Learning Outcomes:

CLO 1	Remember the global and national burden of nutritional deficiencies
CLO 2	Understand dietary habits and relate these to individual, social, cultural and economical factors
CLO 3	Apply public health nutrition problems in high-income and low-income countries respectively, and discuss long term and short-term countermeasures
CLO 4	analyse role and impact of different policy documents, international agreements and regulations of importance for public health nutrition activities on a national and international level
CLO 5	Evaluate & compile scientific material in the field of public health nutrition
CLO 6	Apply nutritional health in daily life.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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 challenge Undernutrition:** Global and Indian prevalence of undernutrition, risk factors consequences Major nutritional Problems – etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: Macro and micro nutrient deficiencies. Other nutritional problems- etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis. Nutrition and Non-communicable diseases – Overweight, obesity and chronic degenerative diseases	**30**	**12**

3	**National nutrition programmes and policies:** Programs and policies on nutrition and health (National and Global). United Nations (UN) Decade of Action on Nutrition (2016 - 2025). Overview of Sustainable Development Goals (SDGs) - keeping Nutrition at center stage.	**10**	**5**
4	**Food and nutrition security:** Factors affecting food security, indicators and systems (Global & national). Identification and measurement of food insecurity (FIA, ISMAP). Food production, access, distribution, availability, losses and consumption. Socio-cultural aspects of dietary patterns and their implications for nutrition and health.	**10**	**5**
5	**Approaches and Strategies for improving nutritional status and health:** Programmatic approaches, their advantages and demerits, feasibility, and available resources Health-based interventions, food-based interventions including: Fortification and genetic improvement of foods, supplementary feeding, nutrition education for behavior change. Case studies: Community- based preventive and management programs; screening approaches, etc.	**20**	**11**
	Total	**100%**	**45**

i.

Sr. No.	List of Practical's
1	Public health nutrition Nutritional status assessment –MUAC, Weight for age, Height for age, Weight for height, BMI
2	Nutrition deficiencies as public health challenge 1. Global and Indian prevalence of undernutrition, risk factors consequences. 2. Nutritional problems- etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis 3. Nutrition and Non-communicable diseases – Overweight, obesity and chronic degenerative diseases.
3	Nutrition programs and policies 1. Sustainable Development Goals (SDGs) - keeping Nutrition at center stage programs and policies on nutrition and health
4	Food and nutrition security 1. Visit to Public Health Lab, VMC.
5	Approaches and Strategies for improving nutritional status and health 1.Health-based interventions, food-based interventions 2.Case studies: Community-based preventive and management programs; screening approaches

j. Textbook and 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)

(20)

a. Course Name: Maintenance of Household Apparatus

b. Course Code: 03010602UE01

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

d. Rationale: This course provides maintenance details of household appliances essential to prolong their lifespan, ensure their function efficiently, and prevent costly repairs or replacements

e. Course Learning Objective:

CLOBJ 1	Remember common household apparatus and their functions.
CLOBJ 2	Explain Principles behind the operation of household apparatus
CLOBJ 3	Demonstrate proper maintenance techniques for different household apparatus.
CLOBJ 4	Evaluate performance of household apparatus to identify area for improvement.
CLOBJ 5	Assess effectiveness of maintenance procedures on the performance of household apparatus.
CLOBJ 6	Develop comprehensive maintenance plans for specific household apparatus.

f. 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

g. 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

h. Course Content:

Sr. No.	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%	8
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%	8
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%	8
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%**	**9**
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%**	**45**

i.

Sr. No.	List of Practical's
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.

j. Textbook and 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

(21)

a. Course Name: Human Psychology

b. Course Code: 15010402UE01

c. Prerequisite: Shall have the basic knowledge of human biology and English language

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

e. Course Learning Objective:

CLOBJ 1	Remember principles of classical and operant conditioning.
CLOBJ 2	Understand basic structure and functions of nervous system.
CLOBJ 3	Apply psychological research methods to design and conduct a simple experiment or study.
CLOBJ 4	Analyse factor that influences human behavior such as genetics, environment and culture.
CLOBJ 5	Evaluate effectiveness of different therapeutic approaches in treating psychological disorders.
CLOBJ 6	Design research study to investigate a new hypothesis in field of psychology.

f. 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

g. **Teaching & Examination Scheme:**

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

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

h. **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 behavioral approach humanistic approach refrigerator. Troubleshooting common problems in	**16%**	**10**

	appliances and basic repairs. Concept of smart technology.		
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**

i. Textbook and Reference Books:

1. Introduction to psychology By Baron R | McGraw Hill Publishing House, New Delhi
2. Psychology By Ciccarelli, S. K. & Meyer, G. E. (2008), | Pearson Education

(22)

a. Course Name: Digital Health

b. Course Code: 19010002UE01

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

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

e. Course Learning Objective:

CLOBJ 1	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.
CLOBJ 2	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.
CLOBJ 3	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.
CLOBJ 4	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.
CLOBJ 5	Evaluate the effectiveness, scalability, and regulatory considerations of telemedicine and health applications for chronic disease management and remote patient monitoring.
CLOBJ 6	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.

f. 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.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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**

i. 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

(23)

a. Course Name: Biomolecules

b. Course Code: 11010302DS01

c. Prerequisite: Basic knowledge of biological molecules and its chemistry

d. Rationale: Curriculum will provide a general understanding of the related disciplines with a holistic knowledge generation in biological sciences.

e. Course Learning Objective:

CLOBJ 1	Knowledge of biomolecules for living systems.
CLOBJ 2	Provide basic concepts of structural organization and characterization of proteins
CLOBJ 3	Learn about Oligosaccharides and lectin interactions in biochemical processes
CLOBJ 4	Understand the structure of DNA and RNA and their types

f. Course Learning Outcomes:

CLO 1	Create interest in Biochemistry and appreciation for chemical basis of biological processes.
CLO 2	Provide an in-depth understanding of chemical reaction mechanisms in biological processes.
CLO 3	Develop problem solving and analytical skills through case studies, research papers and hands on- experience.
CLO 4	Bridge the knowledge and skill gap between academic out and industry requirements.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Unit:1. Introduction to Biochemistry** Chemistry of Life: Elements of Life, Atomic structure of molecules, A detailed description of chemical bonds with respect to biology. Water and Life: Properties of water contributing to earth's suitability for life (Cohesion, Moderation of temperature, floating of ice on liquid water, Water-The solvent of life) Hydrophobic interactions . Acid-base and Buffers: Introduction to acid and bases, pH Scale, Strong and weak acid-bases, Buffers & Its biological importance.	**25%**	**15**
2	**Unit:2. Carbohydrates** Structure and general features of carbohydrates (Mono-di and polysaccharides), Physical, chemical and optical properties of carbohydrates, Structure and role of biologically important polysaccharides (Proteoglycan, glycoprotein and glycolipids).	**25%**	**15**
3	**Unit: 3. Proteins** Structure and classification of amino acids, Physical chemical and optical properties of amino acids, Different level of structural organization of protein, Denaturation and renaturation of protein, Fibrous and globular proteins.	**25%**	**15**
4	**Unit:4. Lipids and Nucleic Acids** Lipids: Structure and classification of Fatty acids, Physical and chemical properties of fatty acids, Introduction to lipids- TAG, Wax, Structural lipids in membranes Nucleic Acids: General introduction to nucleic acid (DNA&RNA) and nucleotides, Structure of double stranded DNA and its organization in nucleus, DNA- A genetic material.	**25%**	**15**
	Total	**100%**	**60**

i. Text Book and Reference Book:

1. Campbell Biology. 9th edition
2. Molecular biology of cells: Lodish
3. "Molecular Biology of the Cell" by Bruce Alberts et al.
4. "Essential Cell Biology" by Bruce Alberts et al.
5. "Cell Biology" by Thomas Pollard, William Earnshaw, and Jennifer Lippincott-Schwartz.
6. "The Cell: A Molecular Approach" by Geoffrey Cooper.

(24)

a. Course Name: Lab-I Biomolecules

b. Course Code: 11010302DS03

c. Prerequisite: Basic knowledge of lab techniques in biology and chemistry.

d. Rationale: Curriculum will provide an in-depth understanding of chemical reaction mechanisms in biological processes.

e. Course Learning Objective:

CLOBJ 1	Understand the basic knowledge of biomolecules and its structure.
CLOBJ 2	Know about the biomolecules and their function.
CLOBJ 3	Know about different biochemical pathways
CLOBJ 4	Conduct experiments at biomolecular level.

f. Course Learning Outcomes:

CLO 1	Understand the concepts of cellular structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles
CLO 2	Analyze the foundation on the basic unit of life.
CLO 3	Remembering biomolecules and their function
CLO 4	Apply biomolecular aspects in life processes.

g. Teaching & Examination Scheme:

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**Theory**	**CE**	**P**	**Theory**	**P**	
-	**-**	**4**	**2**	**-**	**-**	**40**	**-**	**60**	**100**

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

h.

Sr. No.	List of Practical's
1	Preparations of solutions: molar, normal, ppm, percent.
2	Preparation of buffer.
3	Qualitative tests for macromolecules (Proteins, Carbohydrates, Lipids)
4	Proteins-ninhydrin, biuret
5	Carbohydrates-Molisch's test, Benedict, Iodine,Seliwanoffs ,Barfoed'test
6	Lipids-solubility tests, Sudan III
7	Verification of Beer lambert's law using Bromophenol blue and KMnO4.
8	Protein estimation by Folin Lowry Method
9	Estimation of total carbohydrates by Anthrone method
10	Estimation of Reducing sugars by DNS method

i. Text Book and Reference Book:

1. Biochemistry (2015) J.M. Berg, J.L. Tymoczko and L. Stryer, pub. W.H. Freeman.

2. Biochemistry (2011) D. Voet and J.G. Voet, pub. Wiley.

3. Molecular Cell Biology (2012) H. Lodish, et al, pub. W.H. Freeman.

4. Molecular Biology of the Cell (2014) B. Alberts et al., pub. Garland.

5. Practical Skills in Biomolecular Sciences (2012) R. Reed, D. Holmes, J. Weyers and A. Jones, pub. Prentice Hall.

(25)

a. Course Name: Fundamentals of Microbiology

b. Course Code: 11010102DS02

c. Prerequisite: Basic concept and essential of microbes

d. Rationale: Microbiology will give the fundamental concept on each topic. Unit covers the basics of microbes, their structure, habitat, growth, essential lab practices and experiment conditions.

e. Course Learning Objective:

CLOBJ 1	Acquaint students with basic concepts of microbial diversity and how the microbe concept emerged
CLOBJ 2	Complement the students with the basic knowledge about microbial growth and microscopy
CLOBJ 3	Introduce various microorganisms present in the ecosystem and acquaint with Common equipment used in routine microbiology laboratory

f. Course Learning Outcomes:

CLO 1	Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes
CLO 2	Know general characteristics of bacteria, their reproduction & nutritional requirement
CLO 3	Analyze the architecture of viruses, virus classification & their replication strategies.
CLO 4	Differentiate various culture media and their applications and also evaluate various means of sterilization

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Unit- 1 Introduction to Microbiology:** History of microbiology, Spontaneous generation & non spontaneous generation**.** Difference between prokaryotic and eukaryotic organisms. Endosymbiotic theory. Golden era of microbiology -Contributions of scientists in the field microbiology, Establishment of Koch's postulates. Whittaker's five kingdom of classification, Carl Woese's three kingdom of classification. Prions & Viroid. Scope of microbiology in industries & research. Economic importance of microbes.	**25%**	**15**
2	**Unit -2 Bacteria:** General characteristics of eubacteria and archaebacteria (bacterial cell wall, lipopolysaccharide layer, plasma membrane, cytoplasm, flagella, pili, fimbriae, capsules, slime layer). Bacterial endospores. Difference between endospore cells & vegetative cells. Modes of reproduction in bacteria (transformation, transduction & conjugation), Bacterial nutritional requirement (based on carbon, energy & electron sources).	**30%**	**20**
3	**Unit- 3 Techniques in Microbiology:** Microscopy- light and compound microscopes, staining techniques, culture media, sterilization techniques, disinfectant, sanitization, good laboratory practices for microbiology**.**	**20%**	**10**
4	**Unit- 4 Algae, fungi, protozoa and virus:** General characteristics of algae, fungi, protozoa and virus. classification of virus on the basis of shape/symmetry, Baltimore system of classification, Bacteriophage, Lytic cycle & lysogenic cycle. Economic importance of algae and fungi	**25%**	**15**
	Total	**100%**	**60**

i. Text Book and Reference Book:

1. Pelczar Jr, M J, Chan E C S, Krieg N R, (1986), *Microbiology: An Application Based Approach*, 5th edn. McGraw-Hill Book Company, NY.
2. Ingraham J L and Ingraham C A Introduction to Microbiology: Thomson Brooks/Cole.
3. Atlas R M, (2015), Principles of Microbiology 2nd Edition, McGraw Hill education, Mumbai.
4. Surinder Kumar, Essentials of Microbiology, JP Medical Ltd, 30-Nov-2015 - Medical - 642 pages.
5. Gerard J. Tortora, Berdell R. Funke, Christine L. Case, The Twelfth Edition of Tortora, Funke, and Case's Microbiology: An Introduction.
6. Joanne M. Willey, Linda M. Sherwood, Christopher J. Woolverton, Prescott's Microbiology, McGraw-Hill Education, 17-Nov-2019 - Medical - 976 pages.
7. Patricia M. Tille Bailey & Scott's Diagnostic Microbiology.
8. A Textbook of Microbiology by R C Dubey (Author), D K Maheshwari (Author).
9. Microbial Ecology: Organisms, Habitats, Activities, by Heinz Stolp (Author).

(26)

a. Course Name: - Lab-II Fundamentals of Microbiology

b. Course Code: 11010102DS04

c. Prerequisite: Basic handling and culturing of microbes.

d. Rationale: This curriculum will give the fundamental concept on each topic. Each practical is providing knowledge of importance of sterilization, and media preparation, staining, culturing and growth of different microbes

e. Course Learning Objective:

CLOBJ 1	Understand the basics of microbiology and biochemistry.
CLOBJ 2	Study microbial growth and different biochemical pathways used for the same.
CLOBJ 3	Apply the growth of different types of microorganisms based on various environmental factors.

f. Course Learning Outcomes:

CLO 1	Understand the basics of microbiology and biochemistry.
CLO 2	Analyze microbial growth and different biochemical pathways used for the same.
CLO 3	Understand about the growth of different types of microorganisms based on various environmental factors.
CLO 4	Understand the basics of microbiology and biochemistry.

g. Teaching & Examination Scheme:

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
-	**-**	**4**	**2**	**-**	**-**	**40**	**-**	**60**	**100**

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

h.

Sr. No.	List of Practical's
1	Principle and working of -Microscope, Hot air oven, Autoclave, Laminar Air flow system, water bath, Incubator.
2	Media preparation -Types of culture media -Nutrient Broth, Nutrient Agar, Potato dextrose Agar, Semisolid media preparation.
3	Maintenance of culture media-Techniques (Agar slant, stabs, mineral oil, parafilm) Inorganic qualitative Analysis: CdCl2.
4	Preparation of pure culture-Streak plate method.
5	Preparation of pure culture-Pour plate method (Serial dilution)
6	Preparation of pure culture-Spread plate method (Serial dilution)
7	Staining techniques -Simple staining (positive and negative), Differential staining, endospore staining.
8	Microscopic examination of bread mold.
9	Wet mount of water protozoa.
10	Study of Bacterial growth curve.

i. Text Book and Reference Book:

1) **Introduction to Microbiology**: Thomson Brooks/Cole.

2) **Practical Microbiology** by R.C. Dubey and Maheshwari D.K. (Author)

3) **Practical Microbiology**, 4th Edition | By S. Chand's by Dr. R.C. Dubey (Author), D K Maheshwari (Author).

4) **Essentials of Practical Microbiology** by Apurba Sankar Sastry and Sandhya Bhat K.

SEMESTER 3

(27)

a. Course Name: Advanced English-I

b. Course Code: 00019303AE01

c. 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.

d. Rationale: Advanced Communication Skills of English Language

e. Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					Total
				Internal Marks			External Marks		
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Credit	Theory	CE	P	Theory	P	
2	-	-	2	-	100	-	-	-	100

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

f. Course Content:

Sr. No.	Topics	Weightage	Teaching Hours
1	abcd	**5%**	**2**
2	**Public Speaking:** Define Public Speaking Importance of Public speaking Types of Public speaking Techniques to master public speaking		
3	**Activity – Speaking** World's best public speakers (activity based)	**10%**	**5**
4	**Debate Vs Group Discussion** Define Debate vs GD Importance of debate Techniques to master debate	**5%**	**1**
5	**Activity – Debate**	**10%**	**5**
6	**Vocabulary building** Advanced Vocabulary Building Homophones Homonyms Analogies	**10%**	**2**

7	**Reading Comprehension** Reading Comprehension	**10%**	**2**
8	**Grammar - Error Analysis** Para- jumble sentence completion confusable sentences Incorrectly spelt words,One word substitute Cloze Passages	**10%**	**5**
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	**10%**	**2**
	Total	**100%**	**30**

g. 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. Quantitative Aptitude for Competitive Examinations by Dr. R.S. Aggarwal

(28)

a. Course Name: - Basic French-I

b. Course Code: 00019303AE03

c. Prerequisite: Knowledge of English Language

d. Rationale: Basic Communication Skills of French Language.

e. Teaching & Examination Scheme:

Teaching Scheme				**Examination Scheme**					**Total**
Lecture Hrs/Week	**Tutorial Hrs/Week**	**Lab Hrs/Week**	**Credit**	**Internal Marks**			**External Marks**		
				Theory	**CE**	**P**	**Theory**	**P**	
2	-	-	2	-	100	-	-	-	100

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

f. Course Content:

Sr. No.	**Topics**	**Weightage**	**Teaching Hours**
1	**Grammar** Alphabets Numbers Telling time Personal Pronouns Nouns (masculine & feminine nouns, singular and plural nouns) Verbs, conjugations (être, avoir, s'appeler and "er ending") Adjective possessive (mon, ma, ton, ta, etc.)	**33%**	**10**
2	**Listening Skills** Sounds: French Songs Basic Vocabulary (months of the year, days of the week, family members' names, Countries and nationalities, colors, Professions).	**17%**	**5**
3	**Speaking Skills** How to Introduce self? Greetings How to ask and tell time? How to talk about Family?	**17%**	**5**
4	**Reading Skills** Samples of: Self-Introduction My family	**33%**	**10**
	Total	**100%**	**30**

g. Text Book and Reference Book:

1. Saison 1 Didier By Marie-Noelle Cocton| Didier
2. Enchanté By Ms. Archana Khurana | Rachna Sagar
3. Larrouse Dictionnaire de Poche
4. Larousse French Grammar (Mini) by Paperback
5. Plaisir D'ecrire By Viral Thakkar | Saraswati House Pvt. Ltd

(29)

a. Course Name: IPDC including History and Culture of India and IKS-II

b. Course Code: 00019303VA01

c. Prerequisite: - IPDC Including History and Culture of India and IKS-I

d. 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.

e. Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Credit	Internal Marks			External Marks		
				Theory	CE	P	Theory	P	
2	-	-	2	-	100	-	-	-	100

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

f. Course Content:

Sr.	Topics	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	6%	2

	greater India relies on the vision and efforts of themselves as a youth.		
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 create a positive environment around them. This concluding lecture encourages students to keep practicing these priceless lessons and prepares them for the next steps in their lives.	**7%**	**2**
	Total	**100%**	**30**

(30)

a. Course Name: - Artificial Intelligence

b. Course Code: 03010503SE01

c. Prerequisite: - Data structure, Probability and Statistics, Linear Algebra, Mathematics

d. 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.

e. Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					Total
Lecture Hrs/Week	T Hrs/ Week	Lab Hrs/Week	Credit	Internal Marks			External Marks		
				Theory	CE	P	Theory	P	
2	-	-	2	-	40	-	60	-	100

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

f. Course Content:

Sr.	Topics	Weightage	Teaching Hours
1	**UNIT-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 Neighbors (k-NN) **Unsupervised** K-Means Clustering, Hierarchical Clustering, Density Based Clustering, Anomaly Detection Techniques, Reinforcement Learning	**20%**	**7**
2	**UNIT-2** Programming fundamentals in Python- Syntax, Variables and Data Types, Operators, Control Structures, Functions, Data Structures, Input and Output, Modules and Packages	**20%**	**6**

3	**UNIT-3** Data preprocessing and Data analysis Using Python Library (Pandas, Numpy). Data exploration and Visualization Using Python Library (Matplotlib, Seaborn)	**20%**	**7**
4	**UNIT-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%**	**5**
5	**UNIT-5** Training and evaluating models on real-world datasets (e.g., image classification, text analysis)	**20%**	**5**
	Total	**100%**	**30**

g. Text Book and Reference Book:

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'ReillyMedia
5. "Machine Learning: A Probabilistic Perspective" Author: Kevin P. Murphy | Publisher: The MIT Press.

(31)

a. Course Name: Molecular Biology

b. Course Code: 11010203DS01

c. Prerequisite: - Basic knowledge of nucleic acid, DNA replication, translation and transcription

d. Rationale: Students will be familiar general concept of molecular biology such as molecular nature of the gene and its mechanisms of gene replication, mutation, transcription and expression.

e. Course Learning Objective:

CLOBJ 1	After completion of this course, the students shall be able to analyze structural levels of nucleic acids- DNA and RNA and genome organization in prokaryotes and eukaryotes.
CLOBJ 2	Understanding the concept of Gene and the gene architecture.
CLOBJ 3	Remembering of the central dogma of life and various molecular events.
CLOBJ 4	Learn molecular events in the DNA replication and role of different enzymes.
CLOBJ 5	Understand the concept of gene in prokaryotes and Eukaryotes.
CLOBJ 6	Learn the concept of reverse transcription.

f. Course Learning Outcomes:

CLO 1	Learn the different types of nucleic acids and their significance.
CLO 2	Learn about structural and functional aspects of gene.
CLO 3	Learn about the gene regulation.
CLO 4	Analyse the significant roles of different enzymes in DNA replication.
CLO 5	Understand the relationship between the diverse groups of prokaryotes and eukaryotes.
CLO 6	Identify the overall process of transcription and translation.

g. Teaching & Examination Scheme:

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

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

h. Course Content:

Sr.	**Topics**	**Weightage**	**Teaching**

			Hours
1	**UNIT I: DNA structure and replication** **DNA structure and replication:** Nucleosides structure, Structure of DNA, Types of DNA: A, B and Z forms of DNA, Chargaff's rule, DNA as genetic material **Replication of DNA in prokaryotes and eukaryotes:** Semiconservative nature of DNA replication, Bidirectional replication, DNA polymerases, the replication complex: prepriming proteins, primosome, replisome, Rolling circle replication, Unique aspects of eukaryotic chromosome replication, Fidelity of replication	**25%**	**15**
2	**UNIT II: DNA damage and repairing mechanism DNA damage and repair:** causes and types of DNA damage, mechanism of DNA repair: Photoreactivation, base excision repair, nucleotide excision repair, mismatch repair, translesion synthesis, recombinational repair, non homologous end joining, Homologous recombination: models and mechanism	**20%**	**12**
3	**UNIT III: Transcription and RNA processing-Transcription in prokaryotes:** Prokaryotic RNA polymerase, role of sigma factor, promoter, Initiation, elongation and termination of RNA chains **Structure of RNA:** mRNA, tRNA **Transcription in eukaryotes:** Eukaryotic RNA polymerases, transcription factors, promoters, enhancers, mechanism of transcription initiation, elongation and termination.	**30%**	**18**
4	**UNIT IV: Genetic code and translation Genetic Code:** Deciphering genetic code, properties of genetic code, wobble hypothesis, codon degeneracy **Prokaryotic and eukaryotic translation:** Charging of tRNA, aminoacyl tRNA synthetases, Mechanism of initiation, elongation and termination of polypeptides	**25%**	**15**
	Total	**100%**	**60**

i. Text Book and Reference Book:

1. Cell and Molecular Biology by Gerald Karp
2. Molecular Biology of the Cell by Bruce Alberts
3. Molecular Cell Biology (2012) by H. Lodish, et al, pub. W.H. Freeman
4. The Cell: A Molecular Approach by Cooper GM
5. Genes VIII By Lewin

(31)

a. Course Name: Intellectual Property

b. Course Code: 17010103UE01

c. 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.

d. 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.

e. Teaching & Examination Scheme:

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

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

f. Course Content:

Sr.	Topics	Weightage	Teaching Hours
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 copyrightRights of copyright owner. Infringement and remedies of copyright.	**25%**	**15**
3	**TRADEMARK** Introduction and meaning of trademarkTypes of trademarks Procedure for registering trademark Infringement and remedies of trademark	**25%**	**15**

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**

g. Text Book and Reference Book:

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
4. University Press, Pub. Year 2017 The Global Regime for the Enforcement of Intellectual Property Rights by X. Seuba | Cambridge University Press, Pub. Year 2017.

(32)

a. Course Name: Lab-I Molecular Biology

b. Course Code: 11010203DS03

c. Prerequisite: Basic knowledge of nucleic acid, spectrophotometer and agarose gel electrophoresis

d. Rationale: Students will be familiar basic techniques used in molecular biology such as isolation of nucleic acid and its concentration estimation, agarose gel electrophoresis and PCR techniques.

e. Course Learning Objective:

CLOBJ 1	After completion of this lab, the students shall be able to experimentally learn structural levels of nucleic acids- DNA and RNA and genome organization in prokaryotes and eukaryotes.
CLOBJ 2	Analyse the structure of DNA and the gene architecture.
CLOBJ 3	Identify the chemical and molecular processes that occur between the cells.
CLOBJ 4	Learn molecular techniques for isolation and quantification of DNA.
CLOBJ 5	Identify the restriction sites and mutagenesis.
CLOBJ 6	Learn the concept of gene cloning through PCR.

f. Course Learning Outcomes:

CLO 1	Learn the different types of nucleic acids and their significance.
CLO 2	Learn about structural and functional aspects of gene.
CLO 3	Analyse about the gene regulation and its functions.
CLO 4	Analyse the techniques in DNA and RNA isolation.
CLO 5	Understand the relationship between the mutation and mutagenic agents.
CLO 6	Identify the overall process of Gene Cloning.

g. Teaching & Examination Scheme:

Teaching Scheme				**Examination Scheme**					**Total**
Lecture Hrs/Week	**T Hrs/Week**	**Lab Hrs/Week**	**Credit**	**Internal Marks**			**External Marks**		
				Theory	**CE**	**P**	**Theory**	**P**	
-	-	4	2	-	-	40	-	60	100

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

h. Course Content:

Sr. No.	List of Practicals
1.	Isolation of genomic DNA from Bacterial
2.	Isolation of genomic DNA from Plant
3.	Estimation of DNA by Diphenylamine and spectrophotometric method
4.	Isolation of RNA from yeast cells
5.	Estimation of RNA by orcinol and spectrophotometric method.
6.	Estimation of DNA and purity determination by UV absorption method
7.	Agarose gel electrophoresis

i. Text Book and Reference Book:

1. Current Protocols in Molecular Biology by Ausbel S.M. and Brent R.
2. Molecular Biology, By Robert Weaver | MCGraw-Hill, 5th Edition, 2012.
3. Molecular Biology of the Cell Author: Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter.
4. Molecular Biology of the Gene by J.D. Watson and H.H. Nancy.
5. Principles and Techniques of Biochemistry and Molecular Biology by Keith Wilson and John Walker | 6th, Pub. Year 2015.

(33)

a. Course Name: Lab II – Immunology

b. Course Code: 11010203DS04

c. Prerequisite: Basic knowledge of buffers, solutions, biomolecules, antigen, antibody etc.

c. Rationale: Student would be able to conduct basic Immunology practical

e. Course Learning Objective:

CLOBJ 1	After completion of this course, the students shall be able to understand the different types of immune cells.
CLOBJ 2	Identify the function of Immune system in body/s defense.
CLOBJ 3	Understand the mechanism of allergic reactions and hypersensitivity.
CLOBJ 4	Identify the structure of Antibody and their types.
CLOBJ 5	Understand the different types of immunologic techniques.
CLOBJ 6	Learn about auto-immune disorders.

f. Course Learning Outcomes:

CLO 1	Learn to distinguish between the different types of immune cells.
CLO 2	Understand the role of Immune system in body's defense.
CLO 3	Remember the underlying mechanism of allergic reactions and hypersensitivity.
CLO 4	Identify the types and functions of different Antibodies.
CLO 5	Learn the reactions involved in immunologic techniques.
CLO 6	Identify the different auto-immune disorders and their treatment.

g. Teaching & Examination Scheme:

Teaching Scheme				**Examination Scheme**					**Total**
Lecture Hrs/Week	**T Hrs/Week**	**Lab Hrs/Week**	**Credit**	**Internal Marks**			**External Marks**		
				Theory	**CE**	**P**	**Theory**	**P**	
-	-	4	2	-	-	40	-	60	100

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

h. Course Content:

Sr. No.	List of Practical's
1.	To perform whole Count of WBC using Hemocytometer
2.	To perform whole Count of RBC using Hemocytometer
3.	To estimate the concentration of Haemoglobin (Hb) from given blood sample
4.	To conduct Haeme-agglutination tests for identification of human blood groups
5.	To perform differential count of Leucocytes from given blood sample
6.	To Detect of HCG by latex agglutination inhibition test.
7.	To Detect Enteric fever by slide agglutination tests.
8.	To Detect Enteric fever by tube test.
9.	To perform Erythrocyte Sedimentation Rate (ESR).
10.	To prepare serum from freshly withdrawn blood

i. Text Book and Reference Book:

1. Practical Immunology by Frank C. Hay and Olwyn M.R. Westwood | Blackwell Science Ltd. 4th
2. Immunology by Roitt I.M., Brostoff. J, Male. D.K. | B. K. & Cdreds, Garland Pub Ltd. | 7th, Pub. Year 2014.
3. Immunology by Goldsby. R.A, Kindt. T. J, Kuby J and Osborne BA | W.H. Freeman Pubn. New York | 7th, Pub. Year 2014.
4. Fundamental Immunology by R.M. Coleman, M.F. Lombard, R. E. Sichard. | Bookbarn International | 5th, Pub. Year 2014.
5. Cellular and Molecular Immunology by Abbas K A, Litchman A. H. | W. B. Saunders Co. | 8th, Pub. Year 2015.

(33)

a. Course Name: Immunology

b. Course Code: 11010203DS02

c. Prerequisite: Basic knowledge of cellular molecules

d. Rationale: The subjects offer all basic concepts of molecular biology, which will form a base for understanding advanced subjects of applied life sciences further.

e. Course Learning Objective:

CLOBJ 1	Learn the fundamentals of immune system.
CLOBJ 2	Study the various cellular and molecular aspects of immune system.
CLOBJ 3	Understand the regulation of immune response.
CLOBJ 4	learn various immunological diagnostic techniques.

f. Course Learning Outcomes:

CLO 1	Explain the basic principles of immunology, including the structure and function of the immune system.
CLO 2	Identify Components and Functions of the Immune System.
CLO 3	Explain the molecular and cellular mechanisms underlying the immune response.
CLO 4	Understand the mechanisms of immune tolerance and regulation to prevent autoimmunity.

g. Teaching & Examination Scheme:

Teaching Scheme				**Examination Scheme**					**Total**
Lecture Hrs/Week	**T Hrs/ Week**	**Lab Hrs/Week**	**Credit**	**Internal Marks**			**External Marks**		
				Theory	**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

f. Course Content:

Sr.	**Topics**	**Weightage**	**Teaching Hours**

1	**Unit-1 Introduction to Immunology**Historical background, biological aspects of Immunology and Scope of Immunology. Antigens: Antigenicity, Immunogenicity, Essential features of Ag, haptens-carrier complex, Antigenic determinants, Adjuvants. Antibodies: Nature, Primary structure of immunoglobulins, light chain, heavy chain, variable region, constant region, Hinge region; Enzymatic fragmentation of Ig. Domain structure of Ig. Classificationand Functions of Immunoglobulins: Types –IgG (G1, G2, G3 & G4), IgM, IgA, IgD and IgE	**25%**	**15**
2	**Unit-2: Components of Immune System**Types of Immunity: Active and passive immunity. Cell mediated immunity,humoral immunity, and immune response; primary and secondary response. Phagocytosis, mechanism of phagocytosis. Cells and Organs of Immune system: Nk cells, B cells, T cells, Phagocytic cells, Macrophages, Neutrophils, Basophils, Eosinophils and Dendritic cells, Primary lymphoid organs- Bone marrow and Thymus and secondary lymphoid organs-Lymphatic system, Spleen, Lymph node, CALT and MALT.	**25%**	**15**
3	**Unit-3: Complement System and Transplantation** Complement system: Nature, components and functions of compliment, Pathways: Classical, alternative and Lectin pathways. Compliment fixation tests. Major Histocompatibility Complex: MHC in mice and HLA in man-fine structure of different types of MHC and functions of each. Transplantation: Terminology, Auto graft, Isograft, Allograft, Xenograft, Immunological basis of transplantation reactions and Allograft rejection.	**25%**	**15**
4	**Unit-4 Antigen-Antibody Interaction and Immunological Techniques** Strength of Antigen- antibody interaction: Antigen antibody interaction, Precipitation curve in liquid, Precipitation reaction in gel- single radial immunodiffusion, Ouchterlony immunodiffusion, Immuno-electrophoresis, Rocket immuno-electrophoresis, 2 D immunoelectrophoresis. Agglutination: Direct and Indirect, Widal test, VDRL test. ABO blood grouping and Rh facto, Types of agglutination- Bacterial, hemagglutination, passive and agglutination inhibition. Immunological techniques: Radioimmunoassay- Principle, method and Application. ELISA – Principle, Methodology and applications. Immunoprecipitation, Immuno-fluorescence: Direct, indirect and Sandwich, in situ localization by techniques such as FISH and GISH.	**25%**	**15**
	Total	**100%**	**60**

g. Text Book and Reference Book

1. Immunology by Judy Owen, Jenni Punt, Sharon Stranford, Patricia Jones Kuby | W.H. Freeman Pubn| 8th, Pub. Year 2018
2. Immunology by Goldsby. R.A, Kindt. T. J, Kuby J and Osborne BA | W.H. Freeman Pubn. New York | 7th, Pub. Year 2014
3. Fundamental Immunology by R.M. Coleman, M.F. Lombard, R. E. Sichard. | Bookbarn International | 5th, Pub. Year 2014
4. Cellular and Molecular Immunology by Abbas K A, Litchman A. H. | W. B. Saunders Co. | 8th, Pub. Year 2015

SEMESTER 4

(36)

a. Course Name: Enzymology

b. Course Code: 11010304DS01

c. Prerequisite: Students should have basic knowledge of Enzymes, Structure of enzymes, nomenclature, classification etc.

d. Rationale: Understand individual reactions are controlled and integrated into the metabolic pathways of the cell.

e. Course Learning Objective:

CLOBJ 1	Knowledge of enzymes for living systems.
CLOBJ 2	Provide basic concepts of structural organization and characterization of proteins.
CLOBJ 3	Learn about role of inhibitors in the living system.
CLOBJ 4	Understand the clinical applications for diagnosis and treatment.
CLOBJ 5	Understand the different types cofactors and coenzymes associated with enzymes.
CLOBJ 6	Knowledge for mechanisms of enzyme catalysis.

f. Course Learning Outcome:

CLO 1	Create interest in Biochemistry and appreciation for chemical basis of biological processes.
CLO 2	Provide an in-depth understanding of chemical reaction mechanisms in biological processes.
CLO 3	Develop problem solving and analytical skills through case studies, research papers and hands on- experience.
CLO 4	Bridge the knowledge and skill gap between academic out and industry requirements.
CLO 5	Learn the reactions involved by enzymes

CLO 6	Identify the different mechanisms in action of enzymes.

g. Teaching & Examination Scheme:

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

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

h. **Course Content:**

Sr. No.	Topics	Weightage	Teaching Hours
1	**Unit I- Introduction to Enzymes** General introduction and historic background- General Terminology, Nomenclature and Classification of Enzymes. Criteria of purity of enzymes- Specific activity. Enzyme units- Katal and IU, Allosteric enzymes, Enzyme activity- chemical nature of enzymes. Protein nature of enzymes and Non protein enzymes-Ribozymes, Abzymes, Synzyme.	**15%**	**10**
2	**Unit II- Enzyme Catalysis** Lock and key, Induced fit and Transition state Hypotheses. Mechanism of enzyme catalysis- Acid-base catalysis, covalent catalysis, Metal ion catalysis, enzyme catalysis and Proximity and orientation effects etc. Mechanism of Serine proteases-Chymotryspin, Lysozyme, Carboxypeptidase A and Ribonuclease., Proenzymes (Zymogens)	**25%**	**14**
3	**Unit III- Enzyme Kinetics and Inhibition** Factors affecting the enzyme activity- Concentration, pH and temperature. Kinetics of a single-substrate enzyme catalysed reaction, Michealis-Menten Equation, Km, Vmax, L.B Plot, Turnover number, Kcat. Kinetics of Enzyme Inhibition. Kinetics Allosteric enzymes. Reversible Inhibition- Competitive, Non Competitive, Uncompetitive, Mixed, Substrate, Allosteric and Product Inhibition.	**30%**	**18**

	Irreversible Inhibition- Suicide inhibition. Examples and Mechanism of various Inhibitions like Penicillin, Iodoacetamide and DIPF.		
4	**Unit IV- Applied Enzymology** Industrial Enzymes- Thermophilic enzymes, amylases, lipases, proteolytic enzymes in meat and leather industry, enzymes used in various fermentation processes, cellulose degrading enzymes, Metal degrading enzymes. Clinical enzymes- Enzymes as thrombolytic agents, Anti-inflamatory agents, Isoenzymes like CPK, ALP and LDH, Transaminases (AST, ALT), Amylases, Cholinesterases, Phosphatases. Immobilization of enzymes, ELISA.	**30%**	**18**
	Total	**100%**	**60**

i. Text Book and Reference Book

1. Lehninger's Principles of Biochemistry Nelson, David and Cox., Macmillan NY by A.L. Lehninger, Nelson and Cox
2. Fundamentals of Biochemistry by Donald Voet, Judith Voet and Charlotte Pratt
3. Harper's illustrated Biochemistry (Text Book) by Robert K. Murray Enzymes (Text Book) by
4. Trevor palmer | East west Press. Enzymes Biotechnology (Text Book) by N Gray, M Calvin, SC Bhatia | CBS Publishers and Distributors Pvt Limited, Pub. Year 2010.

(37)

a. Course Name: Principles of Genetics

b. Course Code: 11011604DS02

c. Prerequisite: Basic Knowledge of Biology

d. Rationale: Understand historical overview and laws of Inheritance, Gene interactions and basic principles of Genetics.

e. Course Learning Objective:

CLOBJ 1	Knowledge of phenotype and genotype.
CLOBJ 2	Provide basic concepts of Mendelian theory.
CLOBJ 3	Insight about extensions to Mendelism.
CLOBJ 4	Understand the linkages and recombination in different models
CLOBJ 5	Understand the extrachromosomal and sex-linked Inheritance
CLOBJ 6	Learn different sex-linked inheritance disorders in humans.

f. Course Learning Outcome:

CLO 1	Create concept for phenotype and genotype
CLO 2	Provide an in-depth understanding of different theory of Mendelian.
CLO 3	Develop knowledge about epistasis and polygenic inheritance.
CLO 4	Bridge the knowledge of crossing over and its role.
CLO 5	Learn about extrachromosomal inheritance and its classification.
CLO 6	Identify the different genes relating different disorders in humans.

g. Teaching & Examination Scheme

Teaching Scheme (Hrs./Week)			**Credit**	**Examination Scheme**					**Total**
Lec	**T**	**Lab**		**Internal**			**External**		
4	**-**	**-**	**4**	**Theory**	**CE**	**P**	**Theory**	**P**	**100**
				20	**20**	**-**	**60**	**-**	

Lect- Lecture, **T** - Tutorial, **Lab** - Lab, **P** - Practical, **CE** - CE

h. Course Content:

Sr. No.	Topic	Weightage	Teaching Hrs.
1.	**UNIT I - History of Genetics**: Pre- Mendelian genetic concepts: Preformation, Epigenesis, Inheritance of acquired characters and Mutation theory. Heredity and Environment: Concepts of Phenotype, Genotype, Heredity, variation, Pure lines and Inbred lines. Biography of Mendel and his experiments on pea plants. Law of Segregation: Monohybrid cross, Back cross and Test cross, Law of Independent Assortment: Dihybrid cross in pea plant, Back cross and Test cross.	25 %	15
2	**UNIT II - Extensions to Mendelism**: Variations of Dominance: Incomplete dominance and Co dominance. Multiple Alleles. Lethal Alleles. Epistasis: Recessive Epistasis, Dominant Epistasis and Duplicate recessive epistasis (Complementary gene action). Variations in expression: Penetrance and Expressivity. Phenocopy. Polygenic Inheritance: Skin colour in Humans and Kernel colour in Wheat.	25%	15
3	**UNIT III -Linkage and Recombination:** Linkage - Definition, Linkage group- Drosophila and man; Types of linkage-complete linkage and incomplete linkage, Significance of linkage. Linkage maps: Crossing over - definition; recombination and recombination frequency, Mechanism of crossing over: Chiasma Interference and coincidence; Coupling and Repulsion hypothesis. Cytological evidence on crossing over.	25%	15
4	**UNIT IV - Extrachromosomal and sex-linked Inheritance**: Introduction to extrachromosomal inheritance, classification: plastid inheritance, shell coiling in snails, inheritance of kappa particles in paramecium, maternal effect in drosophila, mt-DNA inheritance, Sigma Particle in Drosophila. Concept of sex linkage, inheritance of sex-linked traits in Drosophila (red/ white eye colour). Sex linked inheritance in Humans: inheritance of X linked and Y linked traits. sex linked inheritance disorders in humans.	25%	15
	Total	**100%**	**60**

i. Text Book and Reference Book

1. Genetics: Analysis and Principles (6 Ed) (by Robert J. Brooker. T)

2. Gupta, P.K. 1985. Cytology, Genetics and Cytogenetics. Rastogi Publications, Meerut.
3. Gupta, P.K. 2007. Genetics. Rastogi Publications, Meerut.
4. Pundhan Singh, 2000. Elements of Genetics. Kalyani Publishers, Ludhiana.
5. Singh, B.D. 2007. Fundamentals of Genetics. Kalyani Publishers, Ludhiana.
6. Strickberger, M.W. 2004. Genetics. Prentice – Hall of India Pvt. Ltd., New Delhi.
7. Verma, P.S. and Agarwal, V.K. 2005. Cell Biology, Genetics, Molecular Biology, Genetics From Genes to Genomes. Hartwell. L., Michael. L Gold berg., Anne E. Reynolds and Lee. M. Silver. 2009. 4th Edition. Mc Graw Hill Publication.
8. Principles of Genetics. Snustad Simmons. 2008. 6th Edition. John Wiley Publication.

(38)

a. Course Name: Biochemical Pathways

b. Course Code: 11010304DS03

c. Prerequisite: Students should have basic knowledge of different biomolecules and their structures.

d. Rationale: Learning biochemical pathways helps to understand metabolism, energy production and nutrition. Dysregulation of biochemical pathways give rise to metabolic disorders. To diagnosis of those diseases and develop therapeutic target, knowledge of these pathways is crucial.

e. **Course Learning Objective:**

CLOBJ 1	Understand the different types of biochemical pathways in our system.
CLOBJ 2	Knowledge about the regulation of biochemical pathway.
CLOBJ 3	Learn about the biomolecules involved in different biochemical pathways.
CLOBJ 4	Understand the metabolism and energy production by utilizing nutrients
CLOBJ 5	Understand the pathways to degrade different substrate
CLOBJ 6	Utilization of different enzymes in biochemical pathways

f. Course Learning Outcome:

CLO 1	Analyze different pathways for production and degradation.
CLO 2	Acquire depth fundamentals about regulation of each pathway.
CLO 3	Develop knowledge for biomolecules.
CLO 4	Understand about anabolism and catabolism of our system.
CLO 5	Learn about precursors and its application for biochemical pathways.
CLO 6	Identify the role of enzymes to accelerate or inhibit the activity on different substrate.

g. Teaching & Examination Scheme:

Teaching Scheme				**Examination Scheme**					**Total**
Lecture Hrs/Week	**T Hrs/Week**	**Lab Hrs/Week**	**Credit**	**Internal Marks**			**External Marks**		
				Theory	**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

h. Course Content:

Sr. No.	Topics	Weightage	Teaching Hrs.
1	**Unit I- Biochemical Pathways of Carbohydrates** Introduction to metabolism and Its types, Overview of cellular respiration. High energy compounds and ATP as energy currency. Glycolysis: Overview, Reactions, Regulations and Energetics. Fates of Pyruvate. TCA cycle: Overview, Reaction, Regulation and Energetics. Components of ETC and oxidative phosphorylation. PPP pathway and Its importance. ED pathway, Glyoxylate cycle, Anaerobic respiration (lactate and ethanol fermentation)	**30%**	**18**
2	**Unit II- Biochemical Pathways of Protein** Transamination, Deamination, Decarboxylation of amino acids. Glucose- Alanine Cycle, Urea Cycle: Overview, Reactions, Regulations. Connection of urea cycle with TCA cycle. Glucogenic and Ketogenic Amino Acids. Overview of Creatine metabolism.	**30%**	**18**
3	**Unit III- Biochemical Pathways of Lipid** Transport of Lipids: VLDL, LDL, HDL and chylomicrons. β-oxidation: Overview, Reaction, Regulation and Energetics. Ketone bodies formation, Utilization and excretion. Metabolism of Cholesterol: Synthesis, transport, degradation and excretion.	**25%**	**14**
4	**Unit IV- Biochemical Pathways of Nucleic Acid** Biosynthesis of Purine and Pyrimidine nucleotides: *De Novo* and Salvage Pathways, Significance and Regulation. Degradation of Purines and Pyrimidines, RNR, Conversion of ribonucleotides to deoxyribonucleotides,	**15%**	**10**
	Total	**100%**	**60**

i. Text Book and Reference Book:

1. Campbell Biology. 9th edition By Campbell
2. Biochemistry (2011) By D. Voet and J.G. Voet, pub. Wiley
3. Lehninger Principles of Biochemistry, By David L. Nelson, Michael M. Cox, | Publisher: W. H. Freeman Fourth Edition
4. Harper's illustrated Biochemistry (TextBook) By Robert K. Murray.

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a. Course Name: LAB 1 Enzymology

b. Course Code: 11010304DS04

c. Prerequisite: Basic Knowledge of Biology. |

d. Rationale: Understand historical overview and kinetics of enzymes.

e. Course Learning Objective:

CLOBJ 1	Knowledge of Vmax and Km in vitro systems.
CLOBJ 2	Provide basic concepts of effect of metal ions on enzyme activity.
CLOBJ 3	Learn about assay of activity of beta galactosidase.
CLOBJ 4	Understand effect of pH, temperature, time and substrate on enzyme activity.
CLOBJ 5	Understand about immobilization of enzyme.
CLOBJ 6	Awareness for production of microbial enzyme.

f. Course Learning Outcome:

CLO 1	Create interest about enzyme efficiency in vitro system.
CLO 2	Provide an in-depth understanding of enzymatic reaction mechanisms in presence of metal ions.
CLO 3	Develop techniques to assay activity of enzyme.
CLO 4	Learn about enzyme activity at different parameters.
CLO 5	Learn the procedure to immobilize an enzyme.
CLO 6	Identify the different methods for production of enzyme by medium optimization.

g. Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					Total
				Internal Marks			External Marks		
L Hrs/Week	T Hrs/Week	Lab Hrs/Week	Credit	Theory	CE	P	Theory	P	
-	-	4	2	-	20	20	-	60	100

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

h. Course Content:

Sr. No.	List of Practicals
1.	Determination of Vmax and Km for α-amylase.
2.	Effect of different concentration of metal ions on activity of α-amylase enzyme.
3.	Effect of pH, temperature and time on enzyme activity.
4.	Assay of activity of β-galactosidase.
5.	Demonstration of SDS – PAGE
6.	Estimation of free fatty acids by titration method.
7.	Effect of substrate concentration on enzyme activity.
8.	Immobilization of enzyme in alginate gel.
9.	Production microbial enzyme (amylase) and conversion of starch to glucose and detection of formed glucose by anthrone method.

i. Text Book and Reference Book:

1. Modern Topics in Biochemistry (TextBook) by Bennett, T. P., and Frieden | Macmillan, London (1969)
2. Elements of General and Biological Chemistry by Holum, J | Wiley, NY (1968).
3. Practical Clinical Enzymology (TextBook) by Martinek, R | J. Am. Med. Tech., 31
4. Textbook of Biochemistry (TextBook) by Harrow, B., and Mazur, A
5. Enzymes, the Physics and Chemistry of Life by Pfeiffer, J | Simon and Schuster, NY (1954).

(40)

a. Course Name: LAB II Genetics

b. Course Code: 11011604DS05

c. Prerequisite: Basic Knowledge of Biology

d. Rationale: Understand historical overview and laws of Inheritance, Gene interactions and basic principles of Genetics.

e. Course Learning Objective:

CLOBJ 1	Understand the different stages of Mitosis and Meosis.
CLOBJ 2	Provide basic concepts of allele frequency.
CLOBJ 3	Insight about different crosses in different plant species
CLOBJ 4	Identify different Biometrical Computation methods
CLOBJ 5	Observe different plant species in different fields.
CLOBJ 6	Determination of linkage and cross-over analysis.

f. Course Learning Outcome:

CLO 1	Learn the significance of different stages to observe cells.
CLO 2	Provide an in-depth understanding of different theory of Mendelian.
CLO 3	Develop importance of different crosses in identification of traits.
CLO 4	Learn about Biometrical Computation methods to make reports.
CLO 5	Analysis different morphological characteristics of plants in the field.
CLO 6	Bridge the knowledge of crossing over and its role

g. Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					Total
L Hrs/Week	T Hrs/Week	Lab Hrs/Week Hrs/	Credit	Internal Marks			ESE		
				Theory	CE	P	Theory	P	
-	-	4	2	-	20	20	-	60	100

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

h. Course Content

Sr. No.	**Experiments**
1	Preparation of temporary squash Mitosis of onion root tip.
2	Preparation of temporary squash (Meiosis) of: a). Onion Flower buds b). Grasshopper testes lobes
3.	ABO and Rh Blood Typing: Detect the blood group of the class. Report allele frequencies and comment on the results.
4	To perform PTC tasting of the class. Report the frequency of tasters vs non tasters.
5	To study colour blindness trait using Ishihara plates.
6	Practice exercise on monohybrid, dihybrid and trihybrid cross.
7	Practice exercise on epistatic interactions including test cross and back cross.
8	Practice exercise on determination of linkage and cross-over analysis
9	Biometrical Computation of: a. Mean, Median and Mode b. Variance, Standard Deviation of height, Body weight and BMI of the class. Report and comment on the data
10	Field study to collect data on morphological traits such as - eye colour, hair colour, handedness, hand clasping, arm and leg folding, tongue rolling and folding and presence of cleft chin.
11	Field study to observe plant species and record data on common and scientific name, application of plant species (if any) and on traits like - plant height, flower colour, leaf shape, fruit, etc.

i. Text Book and Reference Book:

1. Harper, P. (2010). Practical genetic counselling. CRC Press.

2. Kessler, S. (Ed.). (2013). Genetic counselling: psychological dimensions. Academic Press.

3. Stevenson, A. C., & Davison, B. C. (2016). Genetic counselling. Elsevier.

4. Evans, C. (2006). Genetic counselling: a psychological approach. Cambridge University Press.

5. Atlas of Inherited Metabolic Diseases

6. Mendelian Inheritance in Man: A Catalog of Human Genes and Genetic Disorders, Victor A. McKusick, Vol I & II

7. Stacy L Blachford (Editor) 2001. The Gale Encyclopedia of Genetic Disorders. Gale Group Publishers, Vol.1 (A-L), Vol.II(M-Z).

8. Limoine, W.R. and Cooper, D.NB. 1996: Gene Trophy, Bios Scientific Pub.Oxford.

9. Genetics by Gardener

10. Theory and problems in Genetics by Stansfield

11. Introduction to Genetic Analysis by Suzuki, Griffith, Richard and Lewontin

12. Principles of Genetics by Tamarin

41)

a. **Course Name:** National Cadet Corps (NCC)

b. **Course Code:** 00019404VA03

c. **Prerequisite:** Student who opt for this course should be physically fit and free from any major ailment

d. **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.

e. **Course Learning Outcomes:**

CLO 1	Demonstrate the ability to work effectively in teams with mutual respect, fostering camaraderie and teamwork.
CLO 2	Exhibit self-discipline and adhere to established rules and regulations in various activities, promoting an organized and disciplined approach.
CLO 3	Develop leadership qualities, including decision-making, problem-solving, and the ability to inspire and motivate others.
CLO 4	Understand and respect diverse cultures and religions, promoting unity, harmony, and a secular outlook in all interactions.
CLO5	Engage in activities that enhance physical fitness, environmental awareness, and resilience, fostering a spirit of adventure and sustainable living.
CLO6	Actively participate in community service initiatives, demonstrating social responsibility, empathy, and a commitment to societal well-being.

f. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
1	**-**	**2**	**2**	**20**	**20**	**-**	**60**	**-**	**100**

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

g. **Course Content**

Sr. No.	**Content**	**Weightage%**	**Teaching Hours**

1	**Introduction to NCC:** History and significance of NCC, Organizational structure and functioning.	**14%**	**2**
2	**Leadership and Personality Development:** Leadership qualities and styles, Communication skills, Team building and management.	**16%**	**3**
3	**National Integration and Awareness:** Importance of national integration**,** Cultural diversity and unity.	**14%**	**2**
4	**Health and Hygiene:** Basic health and hygiene practices**,** First aid and emergency response.	**14%**	**2**
5	**Environmental Awareness:** Conservation and sustainable practices**,** Role of NCC in environmental protection.	**14%**	**2**
6	**Disaster Management:** Types of disasters and their impact**,** Preparedness and response strategies.	**14%**	**2**
7	**Social Service and Community Development:** Role of NCC in community service**,** Planning and executing social service activities.	**14%**	**2**
	Total	**100%**	**15**

List of Practical's:

Sr. No.	Content
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.

h. Text Book and Reference Book:

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

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a. **Course Name:** Foundations of Yoga

b. **Course Code:** 00019404VA01

c. **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.

d. **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.

e. **Course Learning Outcomes:**

CLO 1	To introduce students to the basic principles and philosophy of yoga.
CLO 2	To provide an understanding of the physical and mental benefits of yoga.
CLO 3	To teach foundational yoga postures, breathing techniques, and meditation practices.
CLO 4	To cultivate a personal yoga practice that promotes well-being and stress management.

f. **Teaching & Examination Scheme:**

Teaching Scheme				**Examination Scheme**					**Total**
				Internal Marks			**External Marks**		
Lecture Hrs/Week	**Tutorial Hrs/Week**	**Lab Hrs/Week**	**Credit**	**Theory**	**CE**	**P**	**Theory**	**P**	
1	-	2	2	-	20	20	20	40	100

g. **Course Content**

Sr. No.	**Content**	**Weightage%**	**Teaching Hours**
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%**	**3**
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%**	**2**

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%**	**3**
4	**Introduction to Pranayama and Meditation:** Basics of Pranayama (Breathing Techniques) Introduction to Meditation: Importance and Benefits Techniques for Developing Concentration and Mindfulness	**20%**	**3**
5	**Shat chakras:**	**5%**	**1**
6	**Yoga and Health:** Physical and Mental Health Benefits of Yoga Yoga for Stress Management Yoga and Lifestyle Diseases (e.g., Hypertension, Diabetes)	**20%**	**3**
	Total	**100%**	**15**

List of Practical's:

Sr. No.	Content
1	**Warm-up and Preparation:** • Basic Warm-up Exercises • Joint Mobilization and Stretching
2	**Foundational Yoga Postures:** • Standing Postures: Tadasana, Ardhakatichakrasana, Ardhachakrasana,Padahastasana, Trikonasana and Vrikshasana step by step with Sthiti, main procedure, and vishrama. • Sitting Postures: Vajrasana, Suptavajrasana, Shashankasana, Ushtrasana,Marjarasana,Pashchimottanasana, Bhadrasana, Swasthikasana, Siddhasana,Padmasana, Gomukhasana and Ardhamatsyendrasana step by step with Sthiti, main procedure, and vishrama. • Supine Postures: Shavasana, Pavanamuktasana, Sarvangasana, Matsyasana, Halasana, Chakrasana and Setubandhasana step by step with Sthiti, main procedure and visrama • Prone Postures: Bhujangasana, Shalabhasana, Dhanurasana, and Makarasana step by step with Sthiti, main procedure and vishrama. • Introduction to Sun Salutations (Surya Namaskar)

3	**Pranayama Techniques:** • Perform Kumbhakabhedas namely-Suryabhedana, Ujjayi, Sitkari, Sheetali, Bhastrika and Bhramari. • Perform Nadishuddhi Pranayama with inhalation-retention-exhalation in the ratio of 1:4:2 in a comfortable sitting posture
4	**Shuddhikriya Techniques:** Perform Jalaneti, Kapalabhati and Trataka.
5	**Meditation and Relaxation Techniques:** • Guided Meditation for Beginners • Techniques for Relaxation: Yoga Nidra • Mindfulness Meditation Practice • Breath Awareness Meditation
6	**Mudras and Bandhas:**

h. Text Book and Reference Book:

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

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a. Course Name: Physical Education and Sports

b. Course Code: 00019404VA02

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

d. 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.

e. Course Learning Outcomes:

CLO 1	Learning of New Skills in Games and Sports.
CLO 2	Develop healthy life style practices.
CLO 3	Acquire Knowledge of well- being and physical fitness.
CLO 4	Maintain physical fitness through sports.
CLO5	Improve skills of critical thinking, creative-thinking, problem-solving, team-work leadership, cooperative
CLO6	Behavior and technical competencies.
CLO7	Acquire information of sports initiatives of the Government.

f. Teaching & Examination Scheme:

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				Theory	**CE**	**P**	**Theory**	**P**	
1	**-**	**2**	**2**	**20**	**20**	**-**	**60**	**-**	**100**

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

g. Course Content

Sr. No.	**Content**	**Weightage %**	**Teaching Hours**
1	**History and Basic Concept of Sports and Fitness:**	**33**	**5**

	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		
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 **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	**34**	**5**
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**	**5**
	Total	**100%**	**15**

List of Practical's:

Sr. No.	Content
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.

h. Text Book and Reference Book:

1. 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

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a. **Course Name:** Basic French-II

b. **Course Code:** 00019304AE03 -

c. **Prerequisite:** 00019303AE03 - Basic French-I

d. **Rationale:** Basic Communication Skills of French Language.

e. **Course Learning Outcomes:**

CLO 1	Recognize and use essential vocabulary and basic grammatical structures in French.
CLO 2	Talk about future activities and plans.
CLO 3	Ask and respond to questions in French.
CLO 4	Describe feelings in French.
CLO 5	Talk about likes and dislikes.
CLO 6	Engage in simple conversations in French on familiar topics.

f. **Teaching & Examination Scheme:**

Teaching Scheme				**Examination Scheme**					**Total**
Lecture Hrs/W	**Tutorial Hrs/W**	**Lab Hrs/Week**	**Credit**	**Internal Marks**			**External Marks**		
				Theory	**CE**	**P**	**Theory**	**P**	

eek	eek								
2	-	-	2	100	100	-	-	-	100

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

g. Course Content

Sr. No.	Content	Weightage %	Teaching Hours
1	Grammar Articles (definite, indefinite and partitive)\ repositions (à, en, au, aux, à la, à l', chez, du, de la, des, d') Les verbs (Present Tense) : ir, re, irregular verbs Le futur Proche Poser et Répondez aux questions (Asking Questions) – Qui, Quand, Où, Pourquoi, Quel, Quelle, Quels, Quelles	**33**	**10**
	Listening Skills Class room objects Study Subjects Common nouns of places Seasons	**17**	**5**
	Speaking Skills Talking to a French Speaking Stranger Talking about hobbies Talking and writing about hobbies		**5**
4	**Reading Skills and Writing Skills** My family (Ma famille) Les dialogues (Talking to a classmate on the 1st day of school/college. / Talking to a friend about your family or vice versa. / Talking and writing about hobbies. / Talking to a French Speaking Stranger.) My hobbies (Mes loisirs) My Best friend (Mon meilleure ami)	**33**	**10**
	Total	**100%**	**30**

h. Text Book and Reference Book:

1. Saison 1 Didier

By Marie-Noelle Cocton | Didier

2. **Enchanté 0**

By Ms. Archana Khurana | Rachna Sagar

3. **Larrouse Dictionnaire de Poche**
4. **Larousse French Grammar (Mini) by Paperback**
5. **Larousse French Grammar (Mini)**

Paperback

6. **Plaisir D'ecrire by**

By Viral Thakkar | Saraswati House Pvt. Ltd.

(45)

a. **Course Name:** Basic German-II

b. **Course Code:** 00019304AE02

c. **Prerequisite:** 00019303AE03 - Basic German-I

d. **Rationale:** German is the second most commonly used scientific language. Germany is the third largest contributor to research anddevelopment and offers research fellowships to scientists from abroad. Germany awards a generous number of scholarships and other support to study in Germany. Working holiday visas are available for young people from a range country, and special visas are offered to skilled workers and professionals. There are agreements for student exchange between Germany and many countries of the world. Knowing the language of your German business partners improves your relations and therefore your chances for effective communication and success.

e. **Course Learning Outcomes:**

CLO 1	Communicate, understand various City Places, Body Parts, Professions. Can also able to frame the Sentences with the help of Modal Verbs.
CLO 2	Can communicate in German with Friends and in shopping mall and also able ask and guide Directions in German Language.
CLO 3	Can read basic Passages in German.
CLO 4	Write basic topics in German.

f. Teaching & Examination Scheme:

Teaching Scheme				Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Credit	Internal Marks			External Marks		
				T	CE	P	T	P	
2	-	-	2	100	100	-	-	-	100

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

g. Course Content

Sr. No.	Content	Weightage %	Teaching Hours
1	Grammar and Vocabulary Körperteile (Body Parts) Beruf (Professions) Konjunktion (Conjunctions) Modal Verb Zeitformen (Tenses) Briefeschreiben (Letter writing)	**33**	10
2	Speaking skills Dialogue Sprechen (Suggested Situation) Richtungen (Asking Directions) Conversation between two People Conversation in shopping mall/Shop	**20**	6
3	Reading Skills Lebenslauf (Daily activities) Kurzgeschichten (Short stories)	**20**	6
4	Listening Skills Objekt (Objects) Audio Übung (audio exercises) Conversation identification	**27**	8
	Total	**100%**	**30**

h. Text Book and Reference Book:

1. **Netzwerk A1 Deutsch als Fremdsprache Kursbuch**

   By Stefanie Dengler, Paul Rusch | Klett- Langenscheidt

2. **Studio D**

   By Hermann Funk| Cornelsen

3. **The Everything Essential German Book**

   By Edward Swick | Adams Media

(46)

a. Course Name: Advanced English-II

b. **Course Code:** 00019304AE01

c. **Prerequisite:** 00019303AE03 - Basic English-I

d. Rationale: Advanced communication skills of English language.

e. Course Learning Outcomes:

CLO 1	Develop advanced communication skills.
CLO 2	Become more proficient in formal writing.
CLO 3	Apply interpersonal communication skills to be more productive at the workplace.
CLO 4	Identify, set and achieve the goals with the help of public speaking.
CLO 5	Use wide range of vocabulary to communicate effectively.

f. Teaching & Examination Scheme:

Teaching Scheme				**Examination Scheme**					**Total**
Lecture Hrs/Week	**Tutorial Hrs/Week**	**Lab Hrs/Week**	**Credit**	**Internal Marks**			**External Marks**		
				T	**CE**	**P**	**T**	**P**	
2	-	-	2	100	100	-	-	-	100

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

g. Course Content

Sr. No.	**Content**	**Weightage %**	**Teaching Hours**
1	Corporate Etiquettes 1. Tips and guide to develop personality and	3	1

	gain various etiquettes manners, case studies and activities. 2. Telephone etiquettes		
2	Etiquette for foreign business trips	3	1
3	Etiquette for small talks	3	1
4	Respecting privacy Learning to say 'No'	3	1
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
6	Email etiquettes & Writing	7	2
7	Article writing	7	2
8	Poster making	7	2
9	Advertisement designing	7	2
10	Convincing skills	7	2
11	Insane inventor	7	2
12	Picture perception	4	1
13	Book review	3	1
14	Movie review	3	1
15	Critical thinking	3	1
	Total	**100%**	**30**

h. Text Book and Reference Book:

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