



Four-Year Undergraduate Programme

Bachelor of Science

Physics Honors with minor in Data analytics

Faculty of Applied Sciences

Parul University

Vadodara, Gujarat, India

Faculty of Applied Sciences
Bachelor of Science in Physics

1. Vision of the Department

To be a premier department of physics providing competent and ethical strong foundation in the discipline while exposing them to cutting-edge developments in the field, make them capable of finding solutions to problems related to fundamental concept of technology and scientific advancement.

2. Mission of the Department

M1	To create graduates possessing sound fundamental knowledge with practical skills.
M2	To organize and sustain efficient operating systems in the Department for realization of our objectives as Institution of eminence and international standards.
M3	To create manpower for contributing effectively towards societal development with basic aspects.
M4	To motivate faculty and students to do impactful research on industrial needs with ethics to society

3. Program Educational Objectives

The statements below indicate the career and professional achievements that the B.Sc. Physics curriculum enables graduates to attain.

PEO 1	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	Program's structure is multidisciplinary, allowing students to explore the intersections between physics and other fields of study and helps them understand the interconnectedness of various areas of knowledge.
PEO 3	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:	Apply the knowledge of mathematics, science, engineering fundamentals, and physics specialization to the solution of complex problems.
PLO 2	Problem analysis:	Identify, formulate, review research literature, and analyze complex recent problems reaching substantiated conclusions using basic software tools for natural sciences, and engineering sciences.

PLO 3	Design/development of solutions:	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
PLO 4	Conduct investigations of complex problems:	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PLO 5	Modern tool usage:	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PLO 6	The engineer and society:	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PLO 7	Environment and sustainability:	Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PLO 8	Ethics:	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PLO 9	Individual and team work:	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PLO 10	Communication:	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PLO 11	Project management and finance:	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PLO 12	Life-long learning:	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

5. Program Specific Learning Outcomes

PSO 1	Demand as per recent development	Design the solutions as per the recent research demand objective.
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PSO 2	Research skill	Fundamental concepts to design the system with appropriate usage of software tools, and gather data for modelling system.
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6. Credit Framework

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

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

7. Program Curriculum

Semester 1							
Sr. No.	Subject Code	Subject Name	Category	Credit	Lect	Lab	Tut
1	00019301AE01	MIL-1 (AEC-1) (Refer table 1)	AEC	2	2	0	0
Table 1: Semester 1 (MIL - 1)							
	00019301AE01	Basic English - I	AEC	2	2	0	0
	00019301AE02	Basic Hindi - I	AEC	2	2	0	0
	00019301AE03	Basic Gujarati - I	AEC	2	2	0	0
2	11011401VA01	VAC-1 (Climate change & sustainable environment)	VAC	2	0	0	2

3	11010401SE01	SEC- 1 (Non-destructive Testing / Everyday Physics)	SEC	2	1	2	0
4	11010601MA01	Minor Sub- 1	Minor	4	3	0	1
5	11010401DS01	Core-1- Mechanics	DSC	4	4	0	0
6	11010401DS02	Core-2 Waves & Oscillations	DSC	3	3	0	0
7	11010401DS03	Lab 1- (Waves & Oscillations)	DSC	1	0	2	0
8	03010901UE01	University Elective – 1 (refer table 2)	Multidisciplinary	4	4	0	0

Table 2: Elective subjects

	03010901UE01	Introduction to MATLAB Programming	Multidisciplinary	4	3	2	0
	05010101UE01	Office Automation	Multidisciplinary	4	3	2	0
	09010101UE01	First Aid and Life Support	Multidisciplinary	4	4	0	0
	18010201UE01	Basic Photography	Multidisciplinary	4	2	4	0
Total				22	17	4	3

Semester 2

Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
9	00019302AE04	MIL-2 (AEC-2) (refer table 3)	AEC	2	2	0	0

Table 3: Semester 2 (MIL – 2)

	00019302AE04	Basic English-II	AEC	2	2	0	0
	00019302AE05	Basic Hindi-II	AEC	2	2	0	0
	00019302AE06	Basic Gujarati-II	AEC	2	2	0	0
10	00019101SE01	SEC-2 (Mathematical Aptitude/Statistical Software Package)	SEC	2	2	0	0
11	00019302VA01	VAC-2 (IPDC including history and culture of India and IKS-I)	VAC	2	2	0	0
12	11010602MA01	Minor Sub-2	Minor	4	3	0	1
13	15010402UE01	University Elective – 2 (refer table 4)	Multidisciplinary	4	4	0	0

Table 4: Elective – 2

	03010602UE01	Maintenance of Household Apparatus	Multidisciplinary	4	3	2	0
	15010402UE01	Human Psychology	Multidisciplinary	4	4	0	0
	19010002UE01	Digital Health	Multidisciplinary	4	4	0	0
	19010202UE01	Public Health Nutrition	Multidisciplinary	4	3	2	0

14	11010402DS03	Core-3 Electronics- I	DSC	4	4	0	0
15	11010402DS04	Core-4 Optics	DSC	3	3	0	0
16	11010402DS05	Lab-(Optics)	DSC	1	0	2	0
Total				22	20	2	1
Semester 3							
Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
17	00019303AE01	MEL-1 (AEC-3) (refer table 5)	AEC	2	2	0	0
Table 5: AEC - 3							
	00019303AE01	Advanced English - I	AEC	2	2	0	0
	00019303AE02	Basic German	AEC	2	2	0	0
	00019303AE03	Basic French	AEC	2	2	0	0
18	00019303VA01	VAC-3 (IPDC including history and culture of India and IKS - 2)	VAC	2	0	0	2
19	03010503SE01	SEC-3 AI/ Web Development and Designing	SEC	2	2	0	0
20	11010403DS01	Core-5 Electronics II	DSC	3	3	0	0
21	11010403DS02	Lab (Electronics)	DSC	1	0	2	0
22	17010103UE01	University Elective 3 (refer table 6)	Multidisciplinary	4	4	0	0
Table 6: University elective 3							
	17010103UE01	Intellectual Property	Multidisciplinary	4	4	0	0
	06010103UE02	Cyber Security, Tools, Techniques and Counter Measures	Multidisciplinary	4	4	0	0
	05010103UE01	Artificial Intelligence Application in People Management	Multidisciplinary	4	4	0	0
	21010101UE02	Basics of Event Management	Multidisciplinary	4	4	0	0
23	11010403DS03	Core-6 Properties of Matter	DSC	4	4	0	0
24	11010403DS04	Core-7 Electrodynamics I	DSC	4	4	0	0
Total				22	19	2	2
Semester 4							
Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
25	00019304AE01	MEL-2 (AEC-4) (refer table 7)	AEC	2	2	0	0

Table 7: AEC - 4							
	00019304AE01	Advanced English - II	AEC	2	2	0	0
	00019304AE02	Advanced German	AEC	2	2	0	0
	00019304AE03	Advanced French	AEC	2	2	0	0
26	11010401SE01	[SEC-4 (Electronics & Electrical Instruments/ Renewable Energy)]	SEC	2	2	0	0
27	11010404DS01	Core-8 Electrodynamics II	DSC	4	4	0	0
28	19010204VA01	VAC: -4 Positive mental health/ Physical Education: Yoga/NCC	VAC	2	2	0	0
29	11010604MA01	Minor Sub-3	Minor	4	3	0	1
30	11010404DS02	Core-9 Nuclear Physics	DSC	4	4	0	0
31	11010404DS03	Core-10 Modern Physics	DSC	3	3	0	0
32	11010404DS04	Lab (Modern Physics)	DSC	1	0	2	0
Total				22	20	2	1
Semester 5							
Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
33	11010405DS01	Core-11 Mathematical Physics	DSC	4	3	0	1
34	11010405DS02	Core-12 Classical Mechanics	DSC	4	4	0	0
35	11010405DS03	Core 13 Laser & Optoelectronics	DSC	3	3	0	0
36	11010405DS04	Lab (Laser & Optoelectronics)	DSC	1	0	2	0
37	06010105SE01/ 06010105SE02	SEC 5- Digital Literacy/Finance for everyone	SEC	2	2	0	0
38	11010605MA01	Minor Sub-4	Minor	4	3	0	1
39	11010605MA02	Minor Sub 5	Minor	4	3	0	1
Total				22	18	2	3
Semester 6							
Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
40	11010406DS01	Core-14 Quantum Mechanics	DSC	4	4	0	0
41	11010406DS02	Core-15 Solid State Physics	DSC	3	3	0	0

42	11010406DS03	Core-16 Thermodynamics & Statistical Physics	DSC	4	4	0	0
43	11010406DS04	Lab (Solid State Physics)	DSC	1	0	2	0
44	00019306AE01	AEC-5 Professional ethics and communication	AEC	2	2	0	0
45	11010606MA01	Minor Sub-6	Minor	4	3	2	0
46	11010406IN01	Internship/Mini Project	Internship/Project	4	0	0	0
Total				22	16	4	0

Semester 7 (HONS)

Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
47	11010407DS01	Core-17 Material Science	DSC	4	4	0	0
48	11010407DS02	Core-18 Computational Physics	DSC	4	3	0	1
49	11010407DS03	Core-19 Nanoscience & Nanotechnology	DSC	4	4	0	0
50	11010607MA01	Minor Sub-7	Minor	4	4	0	0
51	11010407IN01	On Job Training	Research Project/OJT	6	0	12	0
Total				22	15	12	1

Semester 7 (RESEARCH)

Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
52	11010407DS01	Core-17 Material Science	DSC	4	4	0	0
53	11010407DS02	Core-18 Computational Physics	DSC	4	3	0	1
54	11010407DS03	Core-19 Nanoscience & Nanotechnology	DSC	4	4	0	0
55	11010607MA01	Minor Sub-7	Minor	4	4	0	0
56	11010407IN01	Research Project (Physics)	Research Project	6	0	12	0
		Total		22	15	12	1

Semester 8 (HONS)

Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
57	11010508CH01	Minor sub-8	Minor	4	4	0	0

58	11010408DS01	Core-20 Materials Characterization Techniques	DSC	4	4	0	0
59	11010408DS02	Core-21 Spectroscopy Techniques	DSC	4	4	0	0
60	11010408DS03	Core-22 Physical Instrumentation Techniques & Methods	DSC	4	4	0	0
61	11010408IN01	On Job Training	Research Project/OJT	6	0	0	0
		Total		22	16	0	0

Semester 8 (RESEARCH)

Sr. No.	Subject Code	Subject Name		Credit	Lect	Lab	Tut
62	11010508CH01	Minor sub-8	Minor	4	4	0	0
63	11010408DS01	Core-20 Materials Characterization Techniques	DSC	4	4	0	0
64	11010408DS02	Core-21 Spectroscopy Techniques	DSC	4	4	0	0
65	11010408DS03	Core-22 Physical Instrumentation Techniques & Methods	DSC	4	4	0	0
66	11010408RP01	Research Project (Physics)	Research Project	6	0	0	0
		Total		22	16	0	0
		Total		176			

ANNEXURE-III
Semester – 1

Course Name: Mechanics

Course Code: 11010401DS01

Prerequisite: foundational understanding of classical mechanics and basic principles of physics is required.

Rationale: This course is designed to provide students with a deep understanding of wave phenomena and oscillatory motion, exploring fundamental concepts and their practical applications. Through a structured approach, students will delve into topics such as wave equations, vibrations, sound waves, simple harmonic motion, superposition, and damped/forced oscillations. The course aims to equip students with a solid foundation in wave physics, fostering critical thinking and problem-solving skills applicable in various scientific and engineering domains.

Course Learning Objective:

CLOBJ 1	Understand fundamental concepts in classical mechanics, including Newton's laws of motion, kinematics, and dynamics.
CLOBJ 2	Apply problem-solving skills using theoretical principles to solve a variety of mechanics problems, ranging from simple one-dimensional motion to complex systems.
CLOBJ 3	Analyze and evaluate physical phenomena, and to make connections between theoretical concepts and real-world applications.
CLOBJ 4	Learn interconnectedness of mechanics with other branches of physics, such as electromagnetism and thermodynamics, and understand how principles from different areas can be integrated.

Course Learning Outcomes:

CLO 1	Gain an understanding of wave properties, including longitudinal and transverse waves, wave equations, and the behavior of standing waves.
CLO 2	Learn about sound wave characteristics, including intensity, and gain an understanding of ultrasonic waves, including the methods used to produce them.
CLO 3	Acquire proficiency in the principles of simple harmonic oscillation, including the behavior of spring-mass systems and pendulum motion.
CLO 4	Gain an understanding of the principles of superposition and damped oscillation, including the concept of resonance and power dissipation.

CLO 5	Apply their knowledge of wave and oscillation concepts to solve real-world problems and understand how these principles relate to various phenomena.
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Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Unit 1 Fundamentals of Dynamics: Inertial and Non-inertial frames, Newton's Laws of Motion and their invariance under Galilean transformations. Motion of rocket. Principle of conservation of momentum. Impulse. Centre of Mass of discrete and continuous objects. Work and Energy: Work and Kinetic Energy Theorem. Conservative forces and examples (Gravitational and electrostatic), non-conservative forces and examples (velocity dependent forces e.g. frictional force, magnetic force), Potential Energy. Energy diagram. Stable, unstable and neutral equilibrium. Force as gradient of the potential energy. Work done by non-conservative forces. Collisions: Elastic and inelastic collisions between two spherical bodies. Kinematics of 2 & 2 scattering in Centre of mass and laboratory frames	25%	15

2	Unit 2 Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Determination of moment of inertia of symmetric rigid bodies (rectangular, cylindrical and spherical) using parallel and perpendicular axes theorems. Kinetic energy of rotation. Motion involving both translation and rotation. Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Centrifugal force. Coriolis force and its applications	25%	15
3	Unit 3 Central Force Motion: Central forces, Law of conservation of angular momentum for central forces, Two-body problem and its reduction to equivalent one-body problem and its solution. Concept of effective potential energy and stability of orbits for central potentials of the form k/r^n for $n = 2$ and -1 using energy diagram, Kepler Law, Solution of the Kepler Problem, Kepler's Laws for planetary motion, orbit for artificial satellites. Motion of satellite, Velocity and time period of satellite (moon) around the planet.	25%	15
4	Unit 4 Relativity: Postulates of Special Theory of Relativity, Lorentz Transformations, simultaneity, length contraction, time dilation, proper length and proper time, life time of a Relativistic particle (for example muon decay time and decay length). Space-like, time-like and light-like separated events, relativistic transformation of velocity and acceleration, variation of mass with velocity, mass-energy equivalence, transformation of energy and momentum.	25%	15
	Total	100%	60

Text Book and Reference Book:

1. An Introduction to Mechanics (2/e),
By Daniel Kleppner and Robert Kolenkow, | Cambridge University Press. | 2014
2. Mechanics Berkeley Physics Course, Vol. 1, 2/e:
By Charles Kittel, et. al. | McGraw Hill Education | 2017,
3. Classical Mechanics
By Peter Dourmashkin, | John Wiley and Sons | 2013,
4. Theory and Problems of Theoretical Mechanics,
By Murray R. Spiegel, Shaum's outline Series | McGraw Hill Education. | 1977,
5. Introduction to Classical Mechanics With Problems and

Solutions, By David Morin, | Cambridge University Press. | 2008,

6. Fundamental of Physics

By Halliday, Resnick and Walker | , John Wiley & Sons, 2013.

7. Introduction to Special

Relativity, By Robert Resnick |

Wile | 2017

8. Classical Mechanics (TextBook)

By Herbert Goldstein | Addison-Wesley Publishing Co, 1980

Course Name: Waves and Oscillations

Course Code: 11010401DS02

Prerequisite: A fundamental understanding of wave mechanics and basic principles of physics is required.

Rationale: to provide a comprehensive understanding of the principles governing waves and oscillations, with a focus on both theoretical concepts and practical applications. Through a structured exploration of fundamental wave phenomena, the course will equip students with the knowledge to analyze and describe various types of waves, their properties, and the dynamics of oscillatory systems. The course will also delve into related topics such as sound waves, simple harmonic motion, superposition, and damped/forced oscillations, providing a well-rounded foundation in wave physics.

Course Learning Objective:

CLOBJ 1	Develop a comprehensive understanding of wave phenomena, encompassing longitudinal and transverse waves. Explore the wave equation and classical wave equation for one-dimensional plane waves. Analyze standing waves on a stretched string with both ends fixed, focusing on normal modes.
CLOBJ 2	Investigate the velocity of waves, emphasizing transverse waves in stretched strings and stationary waves with fixed and free ends. Explore Melde's experiment. Examine the velocity of longitudinal waves in fluids and pipes, including Newton's formula for the velocity of sound.
CLOBJ 3	Understand simple harmonic motion (SHO), covering the restoring force and basic characteristics. Analyze oscillations of a spring-mass system, solve the differential equation of SHM, and study simple and compound pendulum motion. Explore velocity, acceleration, and energy of SHO.
CLOBJ 4	Explore the superposition principle, applying it to N collinear harmonic oscillations with equal phase differences and equal frequency differences. Investigate beats and superposition of two perpendicular harmonic oscillations.
CLOBJ 5	Investigate the equation of a damped oscillator and its solutions, covering heavy damping, critical damping, deadbeat motion, critically damped systems, and lightly damped systems.

CLOBJ 6	Examine the equation of a weakly damped forced harmonic oscillator and its solutions, including steady-state solutions and resonance. Explore examples of forced vibrations and resonance, understanding the sharpness of resonance, power dissipation, and the quality factor.
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Course Learning Outcomes:

CLO 1	Develop understanding of wave phenomena, differentiate between longitudinal and transverse waves. Apply the wave equation to analyze one-dimensional plane waves, standing waves on stretched strings, and normal modes.
CLO 2	Attain a solid grasp of wave velocity, interpret and apply Newton's formula for sound velocity. Understand characteristic intensity, intensity level, and factors influencing loudness and pitch.
CLO 3	Exhibit competence in simple harmonic motion (SHO) principles, including restoring forces. Analyze oscillations in spring-mass systems, solve the differential equation of SHM, and comprehend motion characteristics of simple and compound pendulums.
CLO 4	Demonstrate proficiency in the superposition principle, applying it to N collinear harmonic oscillations with equal phase and frequency differences. Analyze beats and understand superposition of two perpendicular harmonic oscillations.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	0	3	20	20	-	60	-	100

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1	WAVE AND MOTION Fundamental of Wave, Longitudinal and Transverse Waves- Wave Equation, One dimensional plane wave, classical wave equation, standing wave on a stretched string (both ends fixed), normal modes. Travelling wave solution, Particle and Wave Velocities Differential Equation, Pressure of a Longitudinal Wave, Energy Transport, Intensity of Wave, Water Waves - Ripple and Gravity Waves	25%	12
2	VELOCITY OF WAVE AND INTRODUCTION OF SOUND WAVE Velocity of Transverse wave-, Vibrations of	25%	10

	Stretched Strings, Stationary Waves in a String: Fixed and Free Ends, Melde's experiment. Velocity of Longitudinal Waves- in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Sound waves - Introduction, Characteristic Intensity & intensity level, Loudness & pitch Ultrasonic wave - Introduction, Characteristic, Magnetostriction and Piezo electric method of production of ultrasonic wave		
3	SIMPLE HARMONIC OSCILLATION AND SUPERPOSITION SHO-Restoring force, Basic Characteristics of Simple Harmonic Motion, Oscillations of a Spring-Mass System; Differential Equation of SHM and its Solution, Simple Pendulum, Compound pendulum, Velocity and Acceleration and energy of SHO Superposition- Superposition Principle, Superposition of N collinear harmonic oscillations with (1) equal phase differences and (2) equal frequency differences, Beats, Superposition of two perpendicular harmonic oscillation.	25%	12
4	DAMPED AND FORCED OSCILLATION Equation of a damped oscillator and its solutions, heavy damping, critical damping, dead beat motion, critically damped system, lightly damping; characterizing lightly damped system Equation of a weakly damped forced harmonic oscillator and its solutions, steady state solution, resonance. Examples of forced vibrations and resonance, sharpness of resonance, power dissipation, quality factor	25%	11
	Total	100%	45

Text Book and Reference Book:

TEXT BOOKS:

- 1 Vibrations, waves and acoustics by D. Chattopadhyay and P.C. Rakshit (New Central book agency Pvt. India)
- 2 The Physics of Waves and Oscillations, N.K. Bajaj, 1998, Tata McGraw Hill.
- 3 A text book on oscillations, waves & Acoustics by M. Ghosh, D. Bhattacharya (S. Chand)
- 4 Text book of Vibrations and waves (Revised edition) by S.P. Puri (Macmilan India Ltd. 2004)
- 5 Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
- 6 Vibrations and Waves by A. P. French. (CBS Pub. and Dist., 1987)

REFERENCE BOOKS

- 1 Mechanics by D.S.Mathur,S.Chand
- 2 The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons
- 3 An Introduction to Mechanics by Daniel Kleppner, Robert J. Kolenkow (McGraw-Hill, 1973)
- 4 Mechanics, Wave motion & Heat by Francis Weston Sears (Addison Wesley Publication)

Course Name: Basic English-I

Course Code: 00019301AE01

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

Rationale: Knowledge of LSRW is essential for students.

Course Learning Objective:

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

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Listening Skills and Hearing: Listening Vs Hearing Types of listening, Traits of good listener, Barriers of listening	7%	2
2	Listening Practice: Listening Practice(Audio & Video)	10%	3

3	Presentation Skills: Defining the purpose of presentation Presentation strategies, How to make an effective presentation? Knowing /Analysing audience, Organizing content and preparing an outline Traits of a good speaker	3%	1
4	Activity: Crazy Scientist.	7%	2
5	Speaking Practice: Speaking practice (Elocution)	24%	7
6	Reading Skills: Define reading, Reading Strategies, Techniques of reading, Techniques to read faster	3%	1
7	Reading Practice: Reading Practice (Reading Comprehension)	13%	4
8	Writing Skills: Develop Writing Skills, 7cs of communication, Techniques of writing better, Identifying common errors in writing	10%	3
9	Paragraph Writing : Introduction of Paragraph Writing, Central components of paragraph development, Techniques for paragraph development	3%	1
10	Writing Practice: Note making, Picture Description, Dialogue Writing, Paragraph Writing Completion of story from given points	20%	6
	Total	100%	30

Text Book and Reference Book:

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

Course Name: Basic Hindi-I

Course Code: 00019301AE02

Prerequisite: Basic communication skills in Hindi

Rationale: Basic comprehensive skills Hindi.

Course Learning Objective:

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

Course Learning Outcomes:

CLO 1	Identify the sounds and symbols of the Hindi alphabet.
CLO 2	Understand simple spoken and written Hindi passages on familiar topics.
CLO 3	Apply their knowledge of Hindi in everyday situations, such as greetings, introductions, and basic conversations.

CLO 4	Analyse the structure and content of simple Hindi texts, such as stories, poems, or dialogues.
CLO 5	Create original content in Hindi, such as short stories, poems, or dialogues.
CLO 6	Evaluate the effectiveness of different language learning strategies for acquiring Hindi proficiency.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	हिंदी वर्णमाला (Hindi Alphabets) हिंदी वर्णमाला (Hindi Alphabets) Relate with English Alphabets स्वर (vowel) व्यंजन (consonant)	13%	4
2	हिंदी बारखंडी (Hindi Phonetics) हिंदी बारखंडी (Hindi Phonetics) संयुक्त शब्दी (Joint words) kha, sva etc.	13%	4
3	शब्द निर्माण (Word Formation) दो/तीन अक्षर का शब्द निर्माण (two/three letter word formation)	13%	4
4	हिंदी व्याकरण (Hindi Grammar) हिंदी व्याकरण (Hindi Grammar) संज्ञा (Noun) सर्वनाम (Pronoun) क्रिया (Verb) क्रिया विशेषण (Adverb) विशेषण (Adjective)	34%	10
5	हिंदी शब्दावली (Hindi Vocabulary) हिंदी शब्दावली (Hindi Vocabulary) संख्या (Numbers) (1 to 50) सप्ताह के दिन (Days of the week) रंग (Colors)	27%	8
	Total	100%	30

Text Book and Reference Book:

1. Text book of Hindi standard 1-5

Course Name: Basic Gujarati-I

Course Code: 00019301AE03

Prerequisite: Basic communication skills in Gujarati

Rationale: Basic comprehensive skills in Gujarati

Course Learning Objective:

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

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

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	ગુજરાતી મૂળાક્ષર (Gujarati Alphabets) ગુજરાતી મૂળાક્ષર (Gujarati Alphabets) Relate with English Alphabets સ્વર (vowel) વ્યંજન (consonant)	13%	4
2	બારાક્ષરી (Gujarati Phonetics) બારાક્ષરી (Gujarati Phonetics) સંયુક્ત શબ્દો (Joint words) kha, sva etc.	13%	4
3	શબ્દ રચના (Word Formation) બે/ત્રણ અક્ષરની શબ્દ રચના (two/three letter word formation)	13%	4
4	ગુજરાતી વ્યાકરણ (Gujarati Grammar) ગુજરાતી વ્યાકરણ (Gujarati Grammar) સંજ્ઞા (Noun) સર્વનામ (Pronoun) ક્રિયાપદ (Verb) ક્રિયાવિશેષણ (adverb) વિશેષણ (adjective)	34%	10
5	ગુજરાતી શબ્દભંડોળ (Gujarati Vocabulary) ગુજરાતી શબ્દભંડોળ (Gujarati Vocabulary) સંખ્યાઓ (Numbers) (1 to 50) અઠવાડિયાના દિવસો (Days of the week) રંગો (Colors)	27%	8
	Total	100%	30

Text Book and Reference Book:

1. Text book of Gujarati standard 1-5

Course Name: Introduction to MATLAB Programming

Course Code: 03010901UE01

Prerequisite: Fundamental Knowledge of Mathematics.

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

Course Learning Objective:

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

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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1	Getting Started with MATLAB: Introduction to MATLAB, history, features, and uses, MATLAB desktop, basic commands, variables, and data types, performing arithmetic operations and using functions.	13%	6
2	Working with Matrices and Arrays: Creating Matrices and Arrays, Array Operations and Indexing, Logical Operations and Relational Operators	18%	8
3	Data Visualization in MATLAB: Visualizing data using 2D plots and 3D Plot, Customizing Plots, Enhancing plots with titles, labels, and formatting.	18%	8
4	Programming with MATLAB: Conditional Statements (if-else), loops (for and while), Vectorization and Logical operation	18%	8
5	Working with Files and Symbolic Math: Reading from and writing to files, data import/export, performing symbolic computations using Symbolic Math Toolbox	18%	8
6	Reading Skills: Define reading, Reading Strategies, Techniques of reading, Techniques to read faster	3%	2
	Total	100%	40

Text Book and Reference Book:

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

Course Name: Office Automation

Course Code: 0501001UE01

Prerequisite: Basic computer literacy.

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

Course Learning Objective:

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

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to Office Automation: Overview of Office Automation, Importance and Benefits of Office Automation, Role in Modern Work Environments, Integration with Business Processes, Challenges and Considerations.	8%	4
2	Introduction of Computer: Overview of Computer, Computer Input and Output devices, Operating System, hardware and Software Introduction to Ram ,Rom ,CPU and more devices.	8%	4
3	Microsoft Word: Introduction to MS Word, Getting Familiar with the Interface, Creating a New Document, Basic Text Formatting, Bold, Italic, Underline), Aligning Text (Left, Centre, Right), Saving and Opening Documents, Navigate Through a Document, Insert hyperlinks, Search for text, Replace, Create bookmarks, Move to a specific location or object in a document, Apply document themes, Apply document style sets, Insert headers and footers, Insert page numbers, Format page background elements, Create a numbered or bulleted list, Change bullet characters or number formats for a list level, Define a custom bullet character or number format.	25%	11
4	Microsoft Excel: Introduction to MS Excel Create a workbook, Search for data within a workbook, Change worksheet tab color, Rename a worksheet, Insert and delete columns or rows, Change workbook themes, Adjust row	25%	10

	height and column width, Insert headers and footers, Hide or unhide worksheets, data validation, Duplicate Values, Apply styles to tables, Filter records, Sort data by multiple columns, Change sort order, Remove duplicate records, Perform calculations by using the SUM function, MIN and MAX functions, COUNT function, AVERAGE function, Create a new chart, Resize charts, Save a workbook as a template, Manage workbook versions, Protect a worksheet		
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

List of Practicals

1	Case study on salary calculation Calculate Allowance based on given Condition. 1. HRA is 10% on Basic Salary if Salary more than 20000. 2. DA is on 25% on Basic Salary. 3. Medical Allowance (MA) = Executives get MA Rs 1000, Officers get MA Rs 700 & Assistants get MA Rs 500 4. Calculate Gross Salary. Gross Salary = Total of Basic + HRA + DA + MA 5. Calculate Professional Tax Upto 5000 = 0, upto 1000 = 60, upto 15000 = 100 & over 15000 = 150 6. Calculate Annual Salary 7. Calculate Income Tax Upto 100000 = 0, then 50000 = 10%, then 100000 = 20%, over 250000 = 30% Hint:Formula =IF(K2<=100000,0,IF(K2<=150000,(J2-100000)*10%,IF(K2<=250000,(K2-150000)*20%+5000,(K2-250000)*30%+25000))) 8. Calculate Net Salary Payable Annual salary - income tax
2	Formatting alignment and creating table 1. Type in the Title Microsoft Word ComputerTrainingManual 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. e) Insert a new row between the rows holding the London and Sheffield rainfall statistics. Enter the following details: Newcastle 65 63 57 50 39 21 f) Copy the appropriate formula to obtain the total rainfall for Newcastle during the period.
8	Table column exercises. Change the column width of column B to 15. 2. Change column width of column D to G to 20. 3. Change column width of column A and B to 14 4. Calculate Total Sales for each item and store result in column D. Hint: Total sales=Quantity * Unit Price. 5. Calculate Total Sales for all the items and store result in cell B6. 6. Copy Unit Price for PC in cell D7. Move Total sales from cell B6 to D8.
9	Insert remove columns of table Complete the following tasks: a) Add a Units Used column to show the number of units of electricity used by each customer (Hint: Subtract the Previous Reading from the Present Reading). b) The cost of one unit of electricity is Rs.0.08. Add a Unit Cost column to show the cost of one unit. (This column will contain 0.08 in all of the relevant cells). c) Add a Units Charge column to show the total cost of the units used by each customer. (Hint: Unit Cost * Units Used) d) There is a standing charge of Rs.13.60 on each customer's account. Add a column to display this Standing Charge. (This column will contain Rs.13.60 in all of the relevant cells).
10	Math functions The functions and commands required to solve the following assignment are as follows: Enter data - labels and values 1. Editing cell contents 2. Saving a spreadsheet 3. Altering column widths 4. Using the SUM function 5. Adding a new row after the last row of data 6. Adding a new column after the last column of

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

Text Book and Reference Book:

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

Course Name: First Aid & Life Support

Course Code: 09010101UE01

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

Rationale: Gain basic knowledge about first aid & life sciences.

Course Learning Objective:

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

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to first aid: Aims of first aid The first aider First aid and the law Indian good Samaritan protection guidelines Duty of giving care Consent of the person in need Privacy Negligence	7%	4

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

	childbirth: Review of anatomy and physiology of Urinary & Reproductive system, Male reproductive system, Female reproductive system, Pregnancy, Stages of labour and giving birth, Aftercare of the mother, Medical conditions and pregnancy, Diabetes, High blood pressure, Infections, Prevention of sexually transmitted diseases (STD), Sexually transmitted infections, Reducing the risk of STDS/STIS, Emergency childbirth		
10	Psychological first aid: Definition of psychological first aid, Traumatic crisis, (psychological) shock phase, Reaction phase, Processing phase, Reorientation phase, Behave calmly, Listening to the affected person, Physical contact, Providing psychological first aid to all	7%	4
11	Specific emergency situations and disaster management: Emergencies at school, Emergencies at work, Road and traffic accidents, Emergencies in rural area, Disasters and multiple casualty accidents Emergency triage	10%	6
	Total	100%	60

Text Book and Reference Book:

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

Course Name: Basic Photography

Course Code: 18010201UE01

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

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

Course Learning Objective:

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

	effectively.
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Course Learning Outcomes:

CLO 1	Identify some component of photography and Improved technical skills: Basic photography classes will teach you the fundamentals of camera operation, exposure, and lighting.
CLO 2	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 the composition, colour, and perspective, and create images that are not only technically proficient but also visually compelling.
CLO 5	Assess proficiency in operating and adjusting camera settings to achieve proper exposure.
CLO 6	Create vision and explore different styles of photography.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Digital Camera Mechanism : A basic photography course will help you understand the features of a Digital camera Mechanism, such as aperture, shutter speed, ISO, and how to use them effectively to create the kind of photos you want. Characteristic of Lens: Different focal lengths has different aesthetical use. According to need we'll choose our Lens. Aesthetic of Composition: In terms of Visual Experience composition is a very important element. It Is the arrangement of visual elements within the frame of the photograph.	33%	30
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%	30
3	Documentary Photography: Apart from fiction, there is the parallel world of documentary Photography. Great photographers like Kevin Carter, Danish Siddiqui has devoted there life in Documentary Photography and Photo Journalism. Students need to go out and Practically grab some images	33%	30

	from daily livelihood of the society. Photographers Study : Students need to study great photographers and their work both from fiction and non- fiction genre		
	Total	100%	90

Text Book and Reference Book:

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

Course Name: Climate change & Sustainable Environment

Course Code: 11011401VA01

Prerequisite: Shall have the basic knowledge about environmental studies.

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

Course Learning Objective:

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

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

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

Text Book and Reference Book:

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

Course Name: Everyday Physics

Course Code: 1101104SE01

Prerequisite: A basic understanding of high school physics concepts is assumed. This includes topics such as Newton's laws of motion, kinematics, basic thermodynamics, optics, and simple harmonic motion.

Rationale: Physics is about understanding the natural world and explaining how things work, so being willing to question and explore the underlying principles of the universe is essential.

Course Learning Objective:

CLOBJ 1	Understanding of the fundamental physical principles underlying everyday phenomena, such as motion, sound, light, electricity, and magnetism.
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CLOBJ 2	Cultivate problem-solving skills by applying basic physics principles to everyday situations, enabling them to analyze and solve problems encountered in their daily lives.
CLOBJ 3	Learn to critically evaluate claims and explanations related to physical phenomena encountered in the media and everyday discourse, distinguishing between scientific concepts and misconceptions
CLOBJ 4	Develop proficiency in using quantitative reasoning to describe, analyze, and predict the behavior of physical systems, including the interpretation of measurements and data.
CLOBJ 5	Explore practical applications of physics in various fields, such as engineering, medicine, technology, and environmental science, recognizing the relevance of physics to everyday life and societal challenges.

Course Learning Outcomes:

CLO 1	Demonstrate a deep understanding of fundamental physics concepts and principles, including motion, forces, energy, waves, electricity, and magnetism, and their relevance to everyday phenomena.
CLO 2	Apply physics principles to solve a variety of real-world problems encountered in everyday life, including situations involving motion, sound, light, electricity, and magnetism
CLO 3	Evaluate and analyze scientific claims and explanations related to everyday physics phenomena, distinguishing between evidence-based reasoning and common misconceptions.
CLO 4	Demonstrate proficiency in using quantitative reasoning skills to describe, analyze, and predict the behavior of physical systems, including the interpretation of measurements and data.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	Basic Electricity Principles: Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC and DC Electricity. Familiarization with multimeter, voltmeter and ammeter. Electrical Circuits: Basic electric circuit elements and their combination. Rules to analyze DC sourced electrical circuits. Current and voltage drop across the DC circuit elements. Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Real, imaginary and complex power components of AC source. Power factor. Saving energy and money.	35	10
2.	Generators and Transformers: AC/DC generators. Inductance, capacitance, and impedance. Operation of transformers. Solid-State Devices: Resistors, inductors and capacitors. Diode and rectifiers. Components in Series or in shunt. Response of inductors and capacitors with DC or AC sources. Electrical Protection: Relays. Fuses and disconnect switches. Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection. Relay protection device.	30	10
3.	Electrical Wiring: Different types of conductors and cables. Basics of wiring-Star and delta connection. Voltage drop and losses across cables and conductors. Instruments to measure current, voltage, power in DC and AC circuits. Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wirenuts, crimps, terminal blocks, and solder. Preparation of extension board. Network Theorems: (1) Thevenin theorem (2) Norton theorem (3) Superposition theorem (4) Maximum Power Transfer theorem.	35	10
	Total	100%	30

Text Book and Reference Book:

1. University physics" by Francis W. Sears and Mark W. Zemansky
2. "A guide to physics problems, part 1: Mechanics, Relativity and Electrodynamics" by Sidney B. Cahn & Boris E. Nadgorny
3. "The feynman lectures on physics" by Richard P. Feynman, Robert B. Leighton & Matthew Sands
4. "Concept of modern physics" by Arthur Beiser
5. "Thermal Physics" by Charles Kittel and Herbert Kroemer.
6. Concepts of physics" by H.C. Verma Verma: Volume 1&2, BHARATHI BHAVAN, 2008 "A textbook of engineering physics" by M.N. Avadhanulu & P.G. Kshirsagar, S. Chand Publishing,

2008.

7. "Physics for scientists and engineers" by Serway and Jewett, Cengage learning, 2018.
8. "University Physics" by Young and Freedman, MA: Addison-Wesley, 1996.
9. "Fundamental of Physics" by Halliday, Resnick and Walker, John Wiley & Sons, 2013.
10. "Introduction to electrodynamics" by David J. Griffiths, Cambridge University Press, 2017
11. "Classical Mechanics" : Vol. 1 by John R. Taylor, Sausalito: University science books, 2005.

Course Name: Basics of Chemistry

Course Code: 11010501CH01

Prerequisite: Basic math skills & foundational science knowledge.

Rationale: Chemistry is about understanding the natural world and explaining how things work, so being willing to question and explore the underlying principles of the universe is essential.

Course Learning Objective:

CLOBJ 1	Describe the structure of an atom, including protons, neutrons, and electrons.
CLOBJ 2	Differentiate between ionic, covalent, and metallic bonds.
CLOBJ 3	Write and balance chemical equations for various types of reactions.
CLOBJ 4	Describe the properties of solids, liquids, and gases, and explain phase changes.
CLOBJ 5	Utilize mathematical and conceptual approaches to solve chemistry problems.

Course Learning Outcomes:

CLO 1	Understanding Fundamental Concepts
CLO 2	Laboratory Skills
CLO 3	Apply critical thinking and problem-solving skills to chemical problems and scenarios
CLO 4	Describe the structure of atoms and molecules, including the arrangement of electrons, molecular geometry, and the periodic table

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	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	33.33	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, aldehydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones.	33.33	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, sp ² , sp ³ hybridization	33.33	10
	Total	100%	30

Text Book and Reference Book:

“Essential of Physical Chemistry”; B.S. Bhal, G.D. Tuli and Arun Bhal, S. Chand and Company Ltd.
Organic chemistry by I.L. Finar, Volume-I & II. Longmans

Course Name: Basics of Chemistry (Lab)

Course Code: 11010501CH02

Course Learning Objective:

CLOBJ 1	Describe the structure of an atom, including protons, neutrons, and electrons.
CLOBJ 2	Differentiate between ionic, covalent, and metallic bonds.
CLOBJ 3	Write and balance chemical equations for various types of reactions.
CLOBJ 4	Describe the properties of solids, liquids, and gases, and explain phase changes.
CLOBJ 5	Utilize mathematical and conceptual approaches to solve chemistry problems.

Course Learning Outcomes:

CLO 1	Understanding Fundamental Concepts
CLO 2	Laboratory Skills
CLO 3	Apply critical thinking and problem-solving skills to chemical problems and scenarios
CLO 4	Describe the structure of atoms and molecules, including the arrangement of electrons, molecular geometry, and the periodic table

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
-	-	3	1	-	-	20	-	30	50

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

Text Book and Reference Book:

“Essential of Physical Chemistry”; B.S. Bhal, G.D. Tuli and Arun Bhal, S. Chand and Company Ltd.

Organic chemistry by I.L. Finar, Volume-I & II. Longmans

Course Name: Programming in Python

Course Code: 03010501DA01

Prerequisite: Basic Programming.

Rationale: Learning of programming language.

Course Learning Objective:

CLOBJ 1	Explain the basic syntax and structure of Python programming language.
CLOBJ 2	Implement control flow structures such as conditionals (if, elif, else) and loops (for, while) to manage program logic.
CLOBJ 3	Define and call functions to create reusable code blocks and modular programs.
CLOBJ 4	Read from and write to files using Python's file handling capabilities.
CLOBJ 5	Design and implement classes and methods to model real-world entities and relationships.

Course Learning Outcomes:

CLO 1	Write and execute python code in command line.
CLO 2	Debug errors in Python Programming.
CLO 3	Apply concept of object oriented programming to the real life applications.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	Introduction to Python: Overview of Python and its applications, Setting up the Python environment, Variables, data types, and basic operations, Control structures: if-else statements and loops	25	11
2.	Functions and Modules and Data Structures in Python: Writing and using functions in Python, Introduction to modules and packages, Creating and importing custom modules, Lists, tuples, sets, and dictionaries, List comprehensions and other data manipulation techniques, Working with strings	30	13
3.	File Handling: Reading and writing files in Python, Working with CSV and JSON data formats	15	9
4.	NumPy for Numerical Computing and Data Manipulation with Pandas: Introduction to NumPy arrays and operations, Array slicing and reshaping, NumPy for mathematical computations, Introduction to Pandas DataFrames and Series, Data cleaning, filtering, and aggregation, Merging and joining datasets	30	12
	Total	100%	45

Text Book and Reference Book:

Fluent Python, 2nd Edition by Luciano Ramalho (TextBook)

Introducing Python by Lubanovic Bill, O' Reilly

Course Name: Programming in Python (lab)

Course Code: 03010501DA02

Prerequisite: Basic Programming.

Rationale: Learning of programming language.

Course Learning Objective:

CLOBJ 1	Explain the basic syntax and structure of Python programming language.
CLOBJ 2	Implement control flow structures such as conditionals (if, elif, else) and loops (for, while) to manage program logic.
CLOBJ 3	Define and call functions to create reusable code blocks and modular programs.
CLOBJ 4	Read from and write to files using Python's file handling capabilities.
CLOBJ 5	Design and implement classes and methods to model real-world entities and relationships.

Course Learning Outcomes:

CLO 1	Write and execute python code in command line.
CLO 2	Debug errors in Python Programming.
CLO 3	Apply concept of object oriented programming to the real life applications.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
-	-	3	1	-	-	20	-	30	50

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

Text Book and Reference Book:

Fluent Python, 2nd Edition by Luciano Ramalho (TextBook)

Introducing Python by Lubanovic Bill, O' Reilly

Course Name: Calculus
Course Code: 11010601MA01

Course Learning Objective:

CLOBJ 1	Define and compute limits of functions as they approach a specific point or infinity.
CLOBJ 2	Compute derivatives of functions using the definition of the derivative as a limit.
CLOBJ 3	Solve problems involving optimization to find maximum and minimum values of functions in real-world contexts.
CLOBJ 4	Define and compute definite and indefinite integrals using various techniques, including substitution and integration by parts.
CLOBJ 5	Understand the basics of functions of multiple variables, including partial derivatives and gradients.

Course Learning Outcomes:

CLO 1	Accurately calculate limits of functions as they approach specific points and infinity, using algebraic manipulation and limit laws.
CLO 2	Solve real-world problems involving optimization to find maximum and minimum values of functions in practical contexts.
CLO 3	Accurately compute both definite and indefinite integrals using various techniques, including substitution, integration by parts, and partial fractions.

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	-	60	-	100

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Unit 1 Functions of one Variable Function of one variable, limit, continuity, and Differentiability, Physical interpretation of derivative, Derivative of some elementary functions, Composite Function, Chain Rule, Implicit functions and its derivative, Logarithmic function and its derivatives, Definition, L'Hôpital Rule	40	18
2.	Unit 2 Mean Value Theorem and its Applications Rolle's theorem, Lagrange's Mean value theorems, and Cauchy Mean Value Theorem, Linearization, Error approximation, Tangent to the curve, Taylor's theorem	18	10
3.	Unit 3 Indefinite Integration Indefinite integration as anti-derivative, integration of some elementary functions, substitution method, integration by parts, integration using partial fractions	30	14
4.	Unit 4 Definite Integration and its Applications Definite Integration, Fundamental Theorem Calculus, Application to length, area, volume by revolution.	12	6
	Total	100%	48

Semester 2

Course Name: Electronics - 1

Course Code: 11010402DS03

Prerequisite: Basic knowledge of electronics

Rationale: Understand working of electronic devices

Course Learning Objective:

CLOBJ 1	Define and explain basic electrical concepts, including voltage, current, resistance, and power.
CLOBJ 2	Identify and describe the function of basic electronic components such as resistors, capacitors, inductors, diodes, transistors, and integrated circuits.
CLOBJ 3	Design and analyze basic analog circuits, such as amplifiers (e.g., operational amplifiers) and filters (e.g., low-pass, high-pass, band-pass).

Course Learning Outcomes:

CLO 1	Explain the working of these devices based on respective working principles
CLO 2	Apply fundamentals of electronic devices and laws/principles in real life problems.
CLO 3	Understand the scientific method and its application in the research in the field of electronics

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Unit 1 SEMICONDUCTOR DEVICES AND ITS APPLICATIONS: Semiconductor Devices: Introduction to Semiconductor Materials, Energy Band in Solids, Donors, Acceptors, Intrinsic and Extrinsic Semiconductors, P-Type and N-type Semiconductor Applications: Semiconductor Diode, P-N Junction Diode and Barrier Formation, Forward Biased Diode, Reverse Biased Diode, Zener Diode, Varactor Diode, Tunnel Diode, Light Emitting Diode (LED), Liquid Crystal Display (LCD), Semiconductor Laser Diode, Photo Diode, LDR, Solar Cell, Schockley Diode, Voltage Doubler, Half-Wave Rectifier, Full-Wave Rectifier and its Types (Centre-Tapped, Bridge), Metal Semiconductor Junctions: Ohmic and Rectifying Contacts.	25	14
2.	Unit 2 TRANSISTORS: Definition and Introduction, Naming Transistor Terminals, Transistor Symbols, Transistor as a amplifier, CB, CE and CC Configurations, Faithful Amplification, Transistor Biasing and its Need, Methods of Transistor Biasing (Base Resistor, Emitter Bias, Collector Feedback Resistor, Voltage Divider Bias with emitter bias, Mid Point Biasing, Fixed bias circuit, Collector-to-base bias), PNP Transistor, NPN Transistor, Input and Output characteristics, Current Gains α and β ; and Relations between α and β , Current, Voltage and Power gains.	20	13
3.	Unit 3 SINGLE STAGE TRANSISTOR AMPLIFIERS: Single Stage Amplification and Phase Reversal, Practical Circuit of Transistor Amplifier, Input/Output Phase Relationships, AC-DC Equivalent Circuits, Load Line Analysis, Voltage Gain and Voltage Gain Stability, Swamped Amplifier, Classification of Amplifiers (Mode of Operation and Gain), RC coupled Single stage amplifier.	18	10
4.	Unit 4 MULTI STAGE TRANSISTOR AMPLIFIERS: Multi Stage Amplification, Role of Capacitors in Transistor Amplifiers, Types of Transistor Amplifiers (RC Coupled, Transformer Coupled, Direct Coupled), Difference between Transistor and Tube Amplifiers.	12	9
5.	Unit 5 OPERATIONAL AMPLIFIERS: Characteristics and Working of Operational Amplifiers, Differential Amplifiers, Bandwidth, Frequency Response, Common Mode Voltage Gain, Common Mode Rejection Ratio (CMRR) and Slew Rate. Types of Operational Amplifiers: Inverting, Non-Inverting, Adder, Subtractor, Multiplier, Divider, Integrator, Differentiator, Logarithmic, Antilog, Comparator, Phase Shifting, Voltage Follower, Voltage to Current Converter, Current to Voltage Converter, Analog voltage multiplier, Analog voltage divider, Temperature to Voltage converter, Schmitt Trigger.	25	14

	Total	100%	60
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References

Solid State Electronic Devices (TextBook)

By G. Streetman, and S. K. Banerjee | Pearson

Course: optics

Course code: 11010402DS04

Rationale: the course work in “optics” provides learner a strong foundation in understanding the propagation of light as electromagnetic radiation. By understanding interaction of light with different media concept of refraction and reflection can be understood. The introduction to refractive index and introducing different optical systems such as glass, lens, and prism with different refractive index learner will enable learner to gain detailed understanding of propagation of light, and superposition of two different waves. This course will introduce learner to concept of interference and diffraction of light which is important to understand complete picture of description of light as electromagnetic radiation. Application of theories learnt in this course work can be found in quantum mechanics as well.

Course learning objective

CLOBJ1	Understand detailed description of light as electromagnetic radiation and laws governing propagation of light between two points in space.
CLOBJ2	Understand different optical systems such as lens, prism, mirrors and Propagation of light through various optical systems of various geometries.
CLOBJ3	Understand different imperfections arising in optical systems such as Aberrations and methodology of removal of aberrations.
CLOBJ4	Understand interaction of different waves resulting in diffraction and interference patterns as a stepping stone to understand effect of double slit in path of propagation of light
CLOBJ5	Understand concept of hologram and resolving power of optical system.

Course Learning Outcomes

CLO1	Understand Concepts of reflection and refraction which finds its application in wide fields of physics such as quantum mechanics.
CLO2	Understand passage of light beam through various lens and image formation
CLO3	Calculate focal points of lens and numerical aperture for given system of lens. By knowing different types of aberrations learner will be able to identify causes of distortion in image and how to correct such errors.

CLO4	Calculate magnification power of microscope and limiting factors affecting the magnification achieved by optical systems,
CLO5	Calculate minimum separation of two objects which can be resolved by a telescope and factors affecting such resolution power. The basic and strong understanding of such a theory will be useful for astronomical observations

Teaching & Examination Scheme:

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

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

Course content

	CONTENT	Weightage	Teaching hours
Unit 1	Nature of Light: - Theories of Light. Electromagnetic Nature of Light-Definition of a Wave Front-Propagation of a Wave Front-Huygens Principle of Secondary Wavelets-Fermat's Principle of Least Time or Extremum Path-Examples of Fermat's Principle: - (1) Reflection and (2) Refraction. Geometrical optics: Introduction to lenses and sign conventions- Thin lenses: Lens equation for single convex lens-Lens maker equation- Equivalent focal length of two thin lens system- Concept of cardinal points -Problems Lens Aberrations: Introduction to Aberration-Types of aberration: Spherical aberration-methods of minimizing spherical aberration - condition for minimum spherical aberration in case of two lenses separated by a distance -chromatic aberration in lenses condition for achromatism of two thin lenses (in and out of contact) – dispersion produced by a thin prism	29	16

Unit 2	Interference: Concept of Interference-Division of Amplitude and Division of Wave front-Techniques of obtaining interference-Condition of obtaining interference--Young's Double Slit Experiment. Lloyd's Mirror and Fresnel's Biprism-Non-localized fringes-Phase Change on Reflection: Stoke's treatment. Interference in Thin Films: Interference due to transmitted light-Parallel and Wedge-shaped Films. Newton's Rings: Measurement of Wavelength and Refractive Index. Michelson's Interferometer: Principle-Construction, Working, Circular fringes-Localized fringes-White light fringes-Visibility of fringes, Applications of Michelson's Interferometer Coherence: - Temporal and Spatial Coherence. Theory of Partial Coherence. Coherence Time and Coherence Length. Purity of a Spectrum Line.	29	16
Unit 3	Diffraction: Concept of diffraction, Fresnel-Fresnel's assumptions, Difference between interference and diffraction-Fresnel and Fraunhofer types of diffraction-Fresnel Diffraction pattern of a straight edge-Fraunhofer diffraction at double slit Polarization: Introduction to polarization-Unpolarised and Polarized light- Production of plane polarized light-Polarizer and analyser-Anisotropic crystal-Nichol prism-Double refraction in calcite crystal-Quarter wave plate-Babinet compensator-Application of polarized light-Brewster's law-Malus's Law-Problems	25	16
Unit 4	Resolving Power-Rayleigh's Criterion-Limit resolution of eye, Limit resolution of a convex lens-Resolving power of optical instrument-Criterion for resolution according to Lord Rayleigh-Resolving-power of telescope-Resolving power of microscope-Resolving power of grating-Resolving power of a prism-Magnification versus resolving power Holography : Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves.	17	12
	Total	100%	60

TEXT BOOKS:

Brij Lal, M N Avadhanulu & N Subrahmanyam 'A TEXT BOOK OF OPTICS'. S.Chand & Co., New Delhi (2012)

Textbook Optics, Dr. N. Subrahmanyam, Brijlal, Dr. M. N. Avadhanulu, 2015, S. Chand & Comp. Pvt. Ltd.

Ghatak Ajoy, Optics 3rd Edition, The McGraw Hill companies.

Practical Optics, Naftaly Menn, Academic press (2004)

E.A. Saleh and M.C. Teich, 'FUNDAMENTALS OF PHOTONICS', John Wiley & Sons, Inc. (1991)

Fundamentals of Optics, F.A Jenkins and H.E White, 1976, McGraw-Hill

Principles of Optics, B.K. Mathur, 1995, Gopal Printing

Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publications

University Physics. F.W. Sears, M.W. Zemansky and H.D. Young. 13/e, 1986. Addison-Wesley

Course Name: Optics (lab)

Course Code: 11010402DS05

Course Learning Objective:

CLOBJ 1	Understand detailed description of light as electromagnetic radiation and laws governing propagation of light between two points in space.
CLOBJ 2	Understand different optical systems such as lens, prism, mirrors and Propagation of light through various optical systems of various geometries.
CLOBJ 3	Understand different imperfections arising in optical systems such as Aberrations and methodology of removal of aberrations.

Course Learning Outcomes:

CLO 1	Explain the working of these devices based on respective working principles
CLO 2	Apply fundamentals of electronic devices and laws/principles in real life problems.
CLO 3	Understand the scientific method and its application in the research in the field of electronics

Teaching & Examination Scheme:

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

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

References

Solid State Electronic Devices (TextBook)

By G. Streetman, and S. K. Banerjee | Pearson

Course Name: Basic English-II

Course Code: 00019302AE04

Prerequisite: Basic Knowledge of Communication

Rationale: Knowledge of Communication is essential for students

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.

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.
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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

Course Content:

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

Text Book and Reference Book:

Business Correspondence and Report Writing SHARMA, R. AND MOHAN, K.

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

Course Name: Basic Hindi-II

Course Code: 00019301AE05

Prerequisite: Knowledge of Basic Hindi-I

Rationale: Basic comprehensive skills Hindi.

Course Learning Objective:

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

Course Learning Outcomes:

CLO 1	Identify the sounds and symbols of the Hindi alphabet.
CLO 2	Understand simple spoken and written Hindi passages on familiar topics.
CLO 3	Apply their knowledge of Hindi in everyday situations, such as greetings, introductions, and basic conversations.
CLO 4	Analyse the structure and content of simple Hindi texts, such as stories, poems, or dialogues.
CLO 5	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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	उन्नत शब्दावली (Advanced vocabulary) उन्नत शब्दावली (Advanced vocabulary) संख्या (Numbers) (51 onwards) समय (Telling Time) अभिवादन (Greetings)	13%	4
2	श्रवण कौशल (Listening skills) श्रवण कौशल (Listening skills) लघु कथा ((Short Story) छोटी बातचीत ((Short Conversation)	20%	6
3	बोलने की कुशलताएं (Speaking Skills) बोलने की कुशलताएं (Speaking Skills) आत्म परिचय (Self Introduction) दिन पर दिन बातचीत (Day to day conversation) वाग्मिता (Elocution)	27%	8
4	पढ़ने के कौशल (Reading Skills) पढ़ने के कौशल (Reading Skills) समझवृद्ध कर पढ़ना (Reading Comprehension) लघु कथा (Short Story) अखबार का लेख (Newspaper article)	20%	6
5	लेखन कौशल (Writing skills) लेखन कौशल (Writing skills) आत्म परिचय (Self Introduction) लघु सन्देश (Short message)	20%	6
	Total	100%	30

Text Book and Reference Book:

1. Hindi for Beginners published By Up To School Worksheets
2. Hindi Abhyaas Pustika Published By Seema Verma | Trishala Learning System pvt.
3. NCERT Workbook of Hindi for Grade-2
4. Rachnatmak Vyakaran by Suresh Pant and Himani Joshi | Pearson.
5. Matra Gyan Wonder House Books
6. Amoli Hindi Vyakaran by Dr. Nirmal Dalal

Course Name: Basic Gujarati-II**Course Code:** 00019301AE06**Prerequisite:** Basic communication skills in Gujarati-I**Rationale:** Basic comprehensive skills in Gujarati-I**Course Learning Objective:**

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

Course Learning Outcomes:

CLO 1	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.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	અધરા શબ્દો (Advanced vocabulary)અધરા શબ્દો (Advanced vocabulary) સંખ્યાઓ (Numbers) (51 onwards) સમય (Telling time) શુભેચ્છાઓ (Greetings)	13%	4
2	શ્રવણ કૌશલ્ય (Listening Skills)શ્રવણ કૌશલ્ય (Listening Skills) ટૂંકી વાર્તા (Short Story) ટૂંકી વાતચીત (Short Conversation)	20%	6
3	બોલવાની કુશળતા (Speaking Skills)બોલવાની કુશળતા (Speaking Skills) પોતાનો પરિચય (Self Introduction) રોજિંદી વાતચીત (Day to day conversation) વક્તવ્ય (Elocution)	27%	8
4	વાંચન કુશળતા (Reading Skills)વાંચન કુશળતા (Reading Skills) વાંચન સમજ (reading comprehension) ટૂંકી વાર્તા (Short Story) અખબાર નો લેખ (Newspaper article)	20%	6
5	લેખન કૌશલ્ય (Writing skills)લેખન કૌશલ્ય (Writing skills) પોતાનો પરિચય (Self Introduction) ટૂંકો સંદેશ (Short message)	20%	6
	Total	100%	30

Text Book and Reference Book:

1. Text Technical Communication : Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford University Press
2. All in One (English-Gujarati) Manoj Publications
3. Gujarati Barakhadi by Sonika Agrawal Published by Notion Press
4. Varna Lekhan By Gujarati Books
5. My first Gujarati alphabets By Priyal J. | My first Picture Book Inc

Course Name: Mathematical Aptitude

Course Code: 00019101SE01

Prerequisite: F Basic numeracy skill

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

Course Learning Objective:

CLOBJ 1	Understand and apply fundamental concepts of arithmetic, including numbers, highest common factor (HCF), lowest common multiple (LCM), square roots, and cube roots, to solve numerical problems efficiently and accurately.
CLOBJ 2	Develop proficiency in solving problems involving ratio and proportion, including applications in comparison, scaling, mixing, and distribution scenarios, to analyze and solve real-world quantitative problems effectively.
CLOBJ 3	Practise solving problems related to permutations and combinations, including applications in counting arrangements, selections, and probability calculations, to analyze and solve combinatorial problems across various domains.
CLOBJ 4	analyse concepts of percentage, average, and partnership, including shortcut techniques for calculating averages and distributing profits or expenses among partners, to analyse financial data and make informed decisions.
CLOBJ 5	Evaluate proficiency in solving problems related to time, work, distance, boats, streams, mixtures, logarithms, progressions (arithmetic mean, geometric mean, harmonic mean), and series, to solve practical problems involving time management, resource allocation, and sequence analysis.
CLOBJ 6	Develop the ability to solve problems related to interest (simple interest and compound interest), depreciation rates, profit-loss calculations, discounts, equations (linear and quadratic), and probability, to analyze financial transactions, investment decisions, and risk assessment scenarios effectively

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	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

Course Name: Digital Health

Course Code: 19010002UE01

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

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

Course Learning Objective:

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.

Course Learning Outcomes:

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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	25%	15

	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		
	Total	100%	60

Text Book and Reference Book:

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

Course Name: Human Psychology

Course Code: 15010402UE01

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

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

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 influence human behaviour 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.

Course Learning Outcomes:

CLO 1	Remember concepts, perform calculations, and identify practical applications and assess electrical loads and power ratings of household appliances.
CLO 2	Understanding of electrical circuits including the ability to apply concepts, perform calculations, and identify practical applications and assess electrical loads and power ratings of household appliances.
CLO 3	Apply multi-meter to measure various electrical quantities accurately, and apply measurement techniques to assess power consumption and energy efficiency of electrical appliances.
CLO 4	Analyse a comprehensive understanding of earthing and grounding systems in

	residential buildings, recognizing the significance of grounding for electrical safety, and showcasing practical skills.
CLO 5	Interpret various electrical wiring systems employed in households, encompassing staircase and Godown wiring, and competence in hands-on wiring connections while prioritizing safety measures.
CLO 6	Create thorough knowledge and design for using household appliances

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Unit I Human Development Meaning, Difference between Growth, Development, Maturation and Evolution Factors Influencing Development Overview of Developmental stages Prenatal stage Infancy Childhood Challenges of Adolescence Adulthood Old Age	17%	10
2	Unit II Sensation, Attention & Perception Sensation: Definition, types Attention: Definition, Types Perception: Figure-Ground perception, perceptual constancies: shape, size, brightness; Depth perception: monocular and binocular cues; illusions	17%	10
3	Unit III Thinking Nature and Processes Problem Solving Reasoning Decision Making Developing Creative Thinking Barriers to Creative Thinking Strategies for Creative Thinking	17%	10
4	Unit IV Intelligence Theories of Intelligence Multiple Intelligence theory	17%	10

	Triarchic Theory of Intelligence PASS Model of Intelligence Individual Differences in Intelligence Emotional Intelligence		
5	Unit V Personality Concept of Self and Personality Major Approaches of Personality Trait & Type Approaches Five-Factor Model Psychodynamic Approach Behavioural Approach Humanistic Approach Assessment of Personality Self-report Measures Projective Techniques	16%	10
6	Unit VI Sexuality and Gender Physical and psychological side of psychology Gender theories Human sexual behavior Sexual dysfunction and problems	16%	10
	Total	100%	60

Text Book and Reference Book:

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

Course Name: Maintenance of Household Apparatus

Course Code: 03010602UE01

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

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

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.

Course Learning Outcomes:

CLO 1	Remember concepts, perform calculations, and identify practical applications and assess electrical loads and power ratings of household appliances.
CLO 2	Understanding of electrical circuits including the ability to apply concepts, perform calculations, and identify practical applications and assess electrical loads and power ratings of household appliances.
CLO 3	Apply multi-meter to measure various electrical quantities accurately, and apply measurement techniques to assess power consumption and energy efficiency of electrical appliances.
CLO 4	Analyse a comprehensive understanding of earthing and grounding systems in residential buildings, recognizing the significance of grounding for electrical safety, and showcasing practical skills.
CLO 5	Interpret various electrical wiring systems employed in households, encompassing staircase and Godown wiring, and competence in hands-on wiring connections while prioritizing safety measures.
CLO 6	Create thorough knowledge and design for using household appliances

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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	13%	6

	households. Staircase wiring, Godown wiring. Wiring for lighting circuits, power outlets, and specialized appliances. Hands-on practice on wiring connections and safety measures.		
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

Text Book and Reference Book:

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

Course Name: Public Health Nutrition

Course Code: 19010202UE01

Prerequisite: Basic knowledge of Nutrition and Public Health.

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

Course Learning Objective:

CLOBJ 1	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 on nutrition for diverse populations.

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 economic 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.

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	-	60	-	100

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Introduction to 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 2.1 Undernutrition: global and Indian prevalence of undernutrition, risk factors consequences 2.2. Major nutritional Problems – etiology, prevalence, clinical	30%	12

	manifestations, preventive and therapeutic measures for: Macro and micro nutrient deficiencies. 2.3. Other nutritional problems- etiology, prevalence, clinical manifestations, preventive and therapeutic measures for: lathyrism, dropsy, aflatoxicosis, alcoholism and fluorosis. 2.4. Nutrition and Non-communicable diseases – Overweight, obesity and chronic degenerative diseases		
3	National nutrition programmes and policies 3.1. Programmes and policies on nutrition and health (National and Global) 3.2. United Nations (UN) Decade of Action on Nutrition (2016 - 2025) 3.3. Overview of Sustainable Development Goals (SDGs) - keeping Nutrition at centre stage	10%	5
4	Food and nutrition security 4.1. Factors affecting food security, indicators and systems (Global & national) 4.2. Identification and measurement of food insecurity (FIA, ISMAP) 4.3. Food production, access, distribution, availability, losses and consumption 4.4. Socio-cultural aspects of dietary patterns and their implications for nutrition and health	10%	5
5	Approaches and Strategies for improving nutritional status and health 5.1. Programmatic approaches, their advantages and demerits, feasibility, and available resources 5.2. Health-based interventions, foodbased interventions including: Fortification and genetic improvement of foods, supplementary feeding, nutrition education for behaviour change 5.3. Case studies: Community-based preventive and management programmes; screening approaches, etc.	30%	11
	Total	100%	45

Text Book and Reference Book:

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

Course Name: IPDC including History and culture of India and IKS-1

Course Code: 00019302VA01

Course Learning Objective:

CLOBJ 1	Define IPDC
CLOBJ 2	Understand History and past

CLOBJ 3	Understand Culture of India
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Course Learning Outcomes:

CLO 1	Define IPDC
CLO 2	Understand History and past
CLO 3	Understand Culture of India

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Introduction 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 positive perspective	7	2
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

Course Name: Business analytics with MS-Excel

Course Code: 03010502DA01

Prerequisite: Basic knowledge of MS-Excel

Rationale: Facilitate learner with business analysis using Excel software

Course Learning Objective:

CLOBJ 1	Define and explain key concepts in business analytics, including data analysis, data visualization, and predictive modeling.
CLOBJ 2	Utilize essential Excel functions and formulas to perform data calculations, including statistical, financial, and logical functions.
CLOBJ 3	Import, clean, and organize data from various sources into Excel for analysis.
CLOBJ 4	Apply descriptive statistics to summarize and interpret data, including measures of central tendency and variability.

Course Learning Outcomes:

CLO 1	Do data analysis with Excel
CLO 2	Perform power query and power pivot with excel

CLO 3	Compute and interpret basic descriptive statistics such as mean, median, mode, standard deviation
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Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	Overview of Business Analytics and its applications: Introduction to MS Excel: Interface, navigation, and essential functions, Data types, data entry, and data formatting in Excel	10	4
2.	Working with Data in Excel: Sorting and filtering data using formulas and functions for basic calculations, Introduction to data visualization in Excel (charts and graphs)	15	4
3.	Data Analysis Techniques with Excel: PivotTables: Creating, customizing, and analyzing data, Pivot Charts: Visualizing data from PivotTables, Data cleaning and data validation techniques, Descriptive statistics: Measures of central tendency and dispersion, Histograms and frequency distributions, Scatter plots and trendlines for data exploration	15	8

4.	Advanced Data Analysis with Excel: Advanced Excel functions (e.g., VLOOKUP, IF, SUMIF, AVERAGEIF, etc.), Using Solver for optimization problems, Goal Seek and Scenario Manager for sensitivity analysis.	10	4
5.	Introduction to Business Forecasting: Time series data analysis with Excel, Moving averages and exponential smoothing techniques, Forecasting using Excel's Forecast Sheet feature	5	3
6.	Regression Analysis with Excel: Understanding regression analysis and its applications, Performing linear regression in Excel, Interpreting regression results and assessing model accuracy	10	5
7.	Data Visualization and Dashboard Creation: Advanced charting techniques in Excel, Creating interactive dashboards using Excel features (e.g., slicers, pivot charts), Visual storytelling and effective data presentation	10	5
8.	Introduction to Power Query and Power Pivot and Advanced Topics in Business Analytics with Excel: Importing and transforming data with Power Query, Creating data models and relationships using Power Pivot, Combining data from multiple sources Business Intelligence with Power BI (integration with Excel), Data analysis using Excel's add-ins (e.g., Analysis ToolPak), Introduction to macros and automation in Excel	20	9
9.	Real-world Case Studies and Applications: Analyzing business datasets to derive insights, Applying various Excel techniques to solve real-world business problems	5	3
	Total	100%	45

Course Name: Business analytics with MS-Excel (Lab)

Course Code: 03010502DA02

Prerequisite: Basic knowledge of MS-Excel

Rationale: Facilitate learner with business analysis using Excel software

Course Learning Objective:

CLOBJ 1	Define and explain key concepts in business analytics, including data analysis, data visualization, and predictive modeling.
CLOBJ 2	Utilize essential Excel functions and formulas to perform data calculations, including statistical, financial, and logical functions.

CLOBJ 3	Import, clean, and organize data from various sources into Excel for analysis.
CLOBJ 4	Apply descriptive statistics to summarize and interpret data, including measures of central tendency and variability.

Course Learning Outcomes:

CLO 1	Do data analysis with Excel
CLO 2	Perform power query and power pivot with excel
CLO 3	Compute and interpret basic descriptive statistics such as mean, median, mode, standard deviation

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Data Entry and Formatting: Students practice entering data into Excel spreadsheets and apply formatting techniques such as cell formatting, conditional formatting, and data validation. Sorting and Filtering Data: Students sort and filter datasets to organize and analyze information effectively. Basic Formulas and Functions: Exercises involving basic Excel functions like SUM, AVERAGE, COUNT, MIN, and MAX to perform calculations on datasets. Creating Charts and Graphs: Students generate various types of charts and graphs to visualize data, such as bar charts, line charts, and pie charts. PivotTables: Practical exercises on creating PivotTables to		

summarize and analyze large datasets. PivotCharts: Students create PivotCharts based on PivotTable data to visualize trends and patterns. Data Cleaning and Validation: Exercises to clean and validate datasets, including removing duplicates, handling missing values, and correcting errors. Descriptive Statistics: Practical exercises on calculating descriptive statistics like mean, median, mode, standard deviation, and variance. Exploratory Data Analysis (EDA): Students perform EDA techniques like creating histograms, scatter plots, and box plots to explore data distributions and relationships. Forecasting Time Series Data: Exercises on using Excel's time series forecasting tools to predict future values based on historical data. Regression Analysis: Students apply regression analysis to identify relationships between variables and make predictions. Goal Seek and Scenario Manager: Practical exercises using Goal Seek and Scenario Manager for sensitivity analysis and what-if scenarios. Data Visualization and Dashboard Creation: Students design interactive dashboards using Excel features like slicers and pivot charts to present data insights. Power Query: Exercises on using Power Query to import, transform, and clean data from external sources. Power Pivot: Practical exercises using Power Pivot to create data models and relationships for more advanced data analysis. Business Intelligence with Power BI: An introduction to Power BI and its integration with Excel for advanced data visualization and analysis. Advanced Excel Functions: Exercises involving advanced functions like VLOOKUP, IF, SUMIF, AVERAGEIF, and INDEXMATCH. Macros and Automation: Students learn to create and use Excel macros to automate repetitive tasks. Real-World Case Studies: Students work on real-world business analytics projects, applying Excel techniques to solve		
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	specific business problems. Final Project: A comprehensive project that allows students to integrate the concepts and skills learned throughout the course to analyze and present data-driven insights. By incorporating these practical exercises into the course, students can gain practical experience in using MS Excel for Business Analytics, which will help solidify their understanding and make them proficient in applying analytics techniques in real-world scenarios.		
	Total	100%	

Course Name: Basics of organic chemistry

Course Code: 11010502CH01

Prerequisite: Knowledge of basic organic chemistry concepts

Rationale: Understanding of chemical reaction

Course Learning Objective:

CLOBJ 1	Identify and draw the structures of organic molecules, including alkanes, alkenes, alkynes, and aromatic compounds.
CLOBJ 2	Apply IUPAC rules to name organic compounds and interpret the nomenclature of complex molecules.
CLOBJ 3	Understand and describe the mechanisms of common organic reactions, including nucleophilic substitution, elimination, addition, and rearrangement reactions
CLOBJ 4	Utilize spectroscopic methods, such as NMR (Nuclear Magnetic Resonance), IR (Infrared Spectroscopy), and MS (Mass Spectrometry), to determine the structure and composition of organic compounds.

Course Learning Outcomes:

CLO 1	Recognize the relevance of organic chemistry in everyday life, industry, and other scientific disciplines.
CLO 2	Apply organic chemistry concepts to solve real-world problems.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	Free Radical and Intermediates Introduction of reactive intermediate Types of reagents: Nucleophiles and electrophiles, reaction intermediates, carbocations, carbanions, free radicals, carbenes, nitrenes and benzyne	34	10
2.	Mechanism of reaction Types of organic reaction: addition, elimination, substitution and rearrangement reaction, polymerization, aldol condensation, rosenmund Reaction, wolff reduction	33	10
3.	Functional Groups Introduction, Synthesis and chemical reaction of carboxylic acid, aldehydes, amines, ketones, Nitrile, halo alkane, Esters, Ether. Alcohol	33	10
	Total	100%	30

Course Name: Basics of organic chemistry (lab)

Course Code: 110110502CH02

Prerequisite: Knowledge of basic organic chemistry concepts

Rationale: Understanding of chemical reaction

Course Learning Objective:

CLOBJ 1	Identify and draw the structures of organic molecules, including alkanes, alkenes, alkynes, and aromatic compounds.
CLOBJ 2	Apply IUPAC rules to name organic compounds and interpret the nomenclature of complex molecules.
CLOBJ 3	Understand and describe the mechanisms of common organic reactions, including nucleophilic substitution, elimination, addition, and rearrangement reactions
CLOBJ 4	Utilize spectroscopic methods, such as NMR (Nuclear Magnetic Resonance), IR (Infrared Spectroscopy), and MS (Mass Spectrometry), to determine the structure and composition of organic compounds.

Course Learning Outcomes:

CLO 1	Recognize the relevance of organic chemistry in everyday life, industry, and other scientific disciplines.
CLO 2	Apply organic chemistry concepts to solve real-world problems.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	Determination of elements, functional group analysis and identification of given organic compound: Benzoic acid Determination of elements, functional group analysis and identification of given organic compound: Benzoic acid Determination of elements, functional group analysis and identification of given organic compound: betanaphthol Determination of elements, functional group analysis and identification of given organic compound: beta-naphthol Determination of elements, functional group analysis and identification of given organic compound: oxalic acid Determination of elements, functional group analysis and identification of given organic compound: oxalic acid Determination of elements, functional group analysis and identification of given organic compound: Urea Determination of elements, functional group analysis and identification of given organic compound: Urea Determination of elements, functional group analysis and identification of given organic compound: Glucose Determination of elements, functional group analysis and identification of given organic compound: Glucose Determination of elements, functional group analysis and identification of given organic compound: Thiourea Determination of elements, functional group analysis and identification of given organic compound: Thiourea Determination of elements, functional group analysis and identification of given organic compound: chlorobenzene Determination of elements, functional group analysis and identification of given organic compound: chlorobenzene Determination of elements, functional group analysis and identification of given organic compound: naphthalene Determination of elements, functional group analysis and		

	identification of given organic compound: naphthalene Determination of elements, functional group analysis and identification of given organic compound: Acetone Determination of elements, functional group analysis and identification of given organic compound: Acetone Determination of elements, functional group analysis and identification of given organic compound: Ethyl Acetate Determination of elements, functional group analysis and identification of given organic compound: Acetone Determination of elements, functional group analysis and identification of given organic compound: Aniline Determination of elements, functional group analysis and identification of given organic compound: Aniline Determination of elements, functional group analysis and identification of given organic compound: Dinitrobenzene Determination of elements, functional group analysis and identification of given organic compound: Dinitrobenzene Determination of elements, functional group analysis and identification of given organic compound: benzaldehyde Determination of elements, functional group analysis and identification of given organic compound: benzaldehyde Determination of elements, functional group analysis and identification of given organic compound: Acetophenone		
	Total	100%	

Course Name: Vector Calculus

Course Code: 11010602MA01

Prerequisite: Calculus

Rationale: understanding of calculus

Course Learning Objective:

CLOBJ 1	Define and interpret vector functions and vector fields.
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CLOBJ 2	Calculate partial derivatives and gradients of scalar and vector functions.
CLOBJ 3	Use Stokes' Theorem to relate surface integrals over a surface to line integrals around the boundary of the surface.
CLOBJ 4	Clearly articulate vector calculus concepts and solutions in written and oral formats

Course Learning Outcomes:

CLO 1	Identify and analyze vector fields, understanding how they represent the distribution of vector quantities in space.
CLO 2	Apply the concept of maxima and minima for optimization
CLO 3	Develop problem-solving abilities, applying vector calculus concepts to complex real-world situations

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	1	-	4	20	20	-	60	-	100

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	Unit 1 Points and vectors in the plane and in space. Operations in vectors. Parametric representation of lines and planes. Scalar product. Orthogonal vectors. Projections. Unit vectors. Matrices, Vector product. Implicit equations of lines and planes	20	12

2.	Unit 2 Functions of several variables, limit, continuity, partial derivatives, Mixed order partial derivative, Chain Rule, Homogeneous function, Euler's theorem, Jacobian	25	15
3.	Unit 3 Taylor's theorem for 2 variables, Maclaurin's theorem for 2 variables, critical point, linear approximation, Maxima and Minima, Lagrange's method.	25	15
4.	Unit 4 Gradient, Directional derivative, Curl, Divergence, Line integral, Surface integral, Gauss's theorem, Stoke's theorem, Green's theorem.	30	18
	Total	100%	60

Course Name: Advanced English-I

Course Code: 00019303AE01

Prerequisite: Basic knowledge of English

Rationale: Advanced communication skills in English

Course Learning Objective:

CLOBJ 1	Develop Critical Reading Skills: Analyze texts critically, understanding themes, characters, and literary techniques.
CLOBJ 2	Identify Literary Devices: Recognize and interpret the use of literary devices such as metaphor, symbolism, and irony.
CLOBJ 3	Contextual Understanding: Understand texts within their historical, cultural, and social contexts.
CLOBJ 4	Craft Clear and Cohesive Essays: Write structured and coherent essays, including argumentative, analytical, and narrative forms.

Course Learning Outcomes:

CLO 1	Develop advanced communication skills.
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CLO 2	Apply interpersonal communication skills to be more productive at the workplace.
CLO 3	Use wide range of vocabulary to communicate effectively.

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	abcd		
2.	Public Speaking Define Public Speaking Importance of Public speaking Types of Public speaking Techniques to master public speaking	5	2
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 Debate activity	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

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

Course Code: 00019303VA01

Prerequisite:

Rationale: IPDC aims to prepare students for the modern challenges they face in their daily lives.

Course Learning Objective:

CLOBJ 1	Identify Key Historical Periods: Recognize and differentiate between major periods in Indian history, such as Ancient India, Medieval India, and Modern India.
CLOBJ 2	Outline Major Events: Understand and sequence significant historical events and movements, such as the rise and fall of empires, colonialism, and independence.
CLOBJ 3	Investigate Cultural Contributions: Study India's rich cultural heritage, including literature, art, architecture, and religious practices.
CLOBJ 4	Examine Regional Interactions: Study the interactions between various regions and how they influenced national history.

Course Learning Outcomes:

CLO 1	Provide students with a holistic value-based education that will enable them to be successful in their academic, professional, and social lives.
CLO 2	Allow students to establish a stronger connection with their family through critical thinking and development of qualities such as unity, forgiveness, empathy, and effective communication.
CLO 3	Enhance awareness of India's glory and global values, and to create considerate citizens who strive for the betterment of their family, college, workforce, and nation.

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

Course Content:

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

8.	My India My Pride: An Ideal Citizen – 2 Students will learn that by developing the values of loyalty, sincerity, and punctuality; they become indispensable and can leave a strong impression. They will start developing these values by trying to keep perfection in every small task and by looking at the bigger picture.	7	2
9.	Facing Failures: Timeless Wisdom for Daily Life Students will learn the role wisdom plays in finding long-term stability. They will use ancient wisdom to solve their modern-day challenges.	7	2
10.	From House to Home: Forgive & Forget Students will understand the importance and benefits that forgiveness plays in their personal and professional life. They will learn to apply this knowledge in realistic situations.	7	2
11.	Remaking Yourself: Stress Management Students will learn to cope with current and future causes of stress.	7	2
12.	Remaking Yourself: Better Health Better Future A healthy body prevents disease and stress; increases positivity, productivity, and brainpower. Students will learn to maintain good health through regular exercise, healthy eating habits, and regular and sufficient sleep.	7	2
13.	Learning from Legends: Words of Wisdom A panel of learned and experienced mentors will personally answer practical questions that students face in their daily life.	7	2
14.	Soft Skills: Financial Planning Students will develop a variety of practical financial skills that prepare them to become financially stable throughout their future careers	7	2
15.	Remaking Yourself: Impact of Company and Life After IPDC Students will understand that the type of company that we keep, has a crucial role in determining who we are and who we will become. They will develop the ability to create a positive environment around them. This concluding lecture encourages students to keep practising these priceless lessons and prepares them for the next steps in their lives	7	2
	Total	100%	30

Course Name: Artificial Intelligence

Course Code: 03010503SE01

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

Rationale: This course provides a broad introduction to Artificial Intelligence.

Course Learning Objective:

CLOBJ 1	Define AI and Its Scope: Understand the definition of AI and the range of problems it can address, including differences between AI, machine learning (ML), and deep learning (DL).
CLOBJ 2	Explore AI History: Learn about the historical development of AI and its evolution over time.
CLOBJ 3	Understand Machine Learning Algorithms: Gain knowledge of various machine learning algorithms, including supervised, unsupervised, and reinforcement learning.
CLOBJ 4	Study Neural Networks: Understand the architecture and functioning of neural networks, including feedforward, convolutional, and recurrent networks.

Course Learning Outcomes:

CLO 1	Gain foundational knowledge of AI and ML, applicable to various fields.
CLO 2	Develop practical programming and data analysis skills.
CLO 3	Understand the potential and limitations of AI and ML technologies.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	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

Course Name: Intellectual Property

Course Code: 17010103UE01

Prerequisite: Basic understanding of Intellectual properties.

Rationale: Study Intellectual properties.

Course Learning Objective:

CLOBJ 1	Define IP and Its Types: Understand the different types of intellectual property, including patents, copyrights, trademarks, and trade secrets.
CLOBJ 2	Study IP Laws and Regulations: Familiarize yourself with the legal frameworks and international treaties that govern IP rights.
CLOBJ 3	Understand Patent Basics: Learn about the nature of patents, including what can be patented, the process of patent application, and patentable criteria.
CLOBJ 4	Grasp Copyright Principles: Understand the basics of copyright law, including the scope of protection, duration of rights, and exclusive rights of authors.

Course Learning Outcomes:

CLO 1	Identify the different forms of intellectual property and describe the importance of protection of IP.
CLO 2	Demonstrate a solid understanding of the key concepts, principles, and categories of intellectual property rights, as well as the legal frameworks that govern them.
CLO 3	Evaluate as against other the international legal framework related to IP protection and articulate the problem areas for the deficiency.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	PATENT Introduction to Intellectual Property Law (IPR) Meaning of patent Patentable inventions Procedure for obtaining patent Rights of patent holder Infringement and remedies of pate	25	15
2.	COPYRIGHT Introduction, meaning and characteristics of copyright Rights of copyright owner Infringement and remedies of copyright	25	15

3.	TRADEMARK Introduction and meaning of trademark Types of trademark Procedure for registering trademark Infringement and remedies of trademark	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

Course Name: Electronics II

Course Code: 11010403DS01

Prerequisite: Required the basic and fundamental knowledge of Electronics and transistor theory.

Rationale: Electronics powers modern devices like smartphones and computers.

Course Learning Objective:

CLOBJ 1	Learn Basic Concepts: Understand fundamental concepts of electronics, including voltage, current, resistance, and power.
CLOBJ 2	Explore Electronic Components: Identify and understand the function of basic electronic components such as resistors, capacitors, diodes, and transistors.
CLOBJ 3	Apply Ohm's Law and Kirchhoff's Laws: Use Ohm's Law and Kirchhoff's Voltage and Current Laws to analyze and solve electrical circuits.
CLOBJ 4	Understand Circuit Theorems: Apply circuit theorems such as Thevenin's and Norton's theorems to simplify and analyze complex circuits.

Course Learning Outcomes:

CLO 1	Knowledge of some basic electronic components and circuits.
CLO 2	Understand the working of some Amplifier based circuits
CLO 3	Study logic gates and their usage in digital circuits.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	UNIT-1TRANSISTORS AS AUDIO POWER AND TUNED AMPLIFIERS: Audio Power Amplifier: Introduction, Small and Large Signal Amplifier, Difference between Power and Voltage Amplifiers, Class A, Class B, Class C, Class AB Amplifier, Push Pull Operations of different Amplifiers. Tuned Amplifiers: Distinction between Tuned and Other Amplifiers, Need for Tuned amplifier, Fundamentals concept of Tuned Amplifier, Single Tuned Amplifier, Double Tuned Amplifier, Bandwidth of Single Tuned and Double Tuned Amplifiers, Advantages of Tuned Amplifiers, Frequency Response, Relation Between Q and Bandwidth,	25	12
2.	UNIT-2FEEDBACK AMPLIFIERS AND SINUSOIDAL OSCILLATORS: Feedback Amplifiers: Principles of Feedback Amplifiers, Positive Feedback, Negative Feedback, Advantages of Negative Voltage Feedback, Clipping and Clamping Circuits, Application of Clipping and Clamping Circuits, Negative Clamper, Positive Clamper, Emitter Follower Circuit and Applications, Undamped Oscillations from Tank Circuit, Barkhausen Criteria, Colpitts, Hartley, Wein-Bridge, Clapp, Crystal, Voltage Controlled (VCO), Phase Shift	25	12
3.	UNIT-3FILTER CIRCUITS, SCR, SOLID STATE SWITCHING CIRCUITS, FET AND POWER ELECTRONICS: Filter Circuits: Low Pass, High Pass, Band Pass, Band Reject, All Pass, Butterworth, Inductor, Capacitor, L-type, PI type. SCR: Working of SCR, SCR in Normal Operation, SCR as a Switch and Rectifier, SCR Switching Full-Wave and Half-Wave Rectifiers, Bridge Rectifiers. Solid State Switching Circuits: Mechanical Switch, Electromechanical Switch (Relay), Electronic Switches and Advantages, Switching Transistors Multivibrators: Introduction, Types of Multivibrators (Astable, Monostable, Bistable). Introduction to Field Effect Transistor (FET), Junction FET (JFET), Metal Oxide Semiconductor FET (MOSFET), Unijunction Transistor (UJT), DIAC, TRIAC, Advantages and Applications of Various	25	9

	FETs.		
4.	UNIT-4 Digital Electronics:- LOGIC GATES, BOOLEAN ALGEBRA AND BASICS OF FLIP-FLOPS: Circuits and Digital Number System: Introduction to Analog Circuit, Introduction to Digital Circuits, Difference between Analog and Digital Circuits, Basics of Digital Number System. IC circuit Logic Gates: AND, OR and NOT or Inverter Gates, NAND and NOR Gates as Universal Gates, XOR and XNOR Gates, Combinational Logic Gates, Encoders and Decoders. Boolean Algebra: Basics of Boolean Algebra and Boolean Laws, De-Morgan's Theorems, Truth Tables from Logic Circuits, Electronic Adders and Subtrators. Flip Flops: Introduction to Flip-Flops, Advantages and Disadvantages of Digital Electronics.	25	12
	Total	100%	45

Course Name: Lab-Electronics

Course Code: 11010403DS02

Prerequisite: Basic and fundamental knowledge of electronics

Rationale: Enhances analytical and troubleshooting abilities through circuit analysis and design

Course Learning Objective:

CLOBJ 1	Learn Basic Concepts: Understand fundamental concepts of electronics, including voltage, current, resistance, and power.
CLOBJ 2	Explore Electronic Components: Identify and understand the function of basic electronic components such as resistors, capacitors, diodes, and transistors.
CLOBJ 3	Apply Ohm's Law and Kirchhoff's Laws: Use Ohm's Law and Kirchhoff's Voltage and Current Laws to analyze and solve electrical circuits.
CLOBJ 4	Understand Circuit Theorems: Apply circuit theorems such as Thevenin's and Norton's theorems to simplify and analyze complex circuits.

Course Learning Outcomes:

CLO 1	Knowledge of some basic electronic components and circuits.
CLO 2	Understand the working of some Amplifier based circuits
CLO 3	study logic gates and their usage in digital circuit

Teaching & Examination Scheme:

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

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

Course Content:

1. Kirchhoff's Law
2. BH curve tracing
3. To verify the maximum power transfer theorem
4. Wattage of lamp
5. Measurement of band gap of semiconductor material
6. Deflection of Magnetometer
7. Determination of dielectric constant of dielectric material
8. Determination of Hall coefficient R_H and carrier concentration in semiconductor
9. Characteristics of PNP transistor
10. Characteristics of NPN transistor

Course Name: Properties of Matter

Course Code: 11010403DS03

Prerequisite: Basic knowledge of the various properties of matter and their states

Rationale: Matter forms the basis of the universe, making it essential to study its properties for understanding natural phenomena.

Course Learning Objective:

CLOBJ 1	Define Matter: Understand the basic definition of matter and its classification into solid, liquid, and gas phases.
CLOBJ 2	Explore States of Matter: Study the characteristics and transitions between different states of matter, including phase changes such as melting, freezing, and boiling.
CLOBJ 3	Identify Key Properties: Learn to identify and measure physical properties such as density, mass, volume, and viscosity.
CLOBJ 4	Understand Measurement Techniques: Explore various methods and instruments used to measure physical properties accurately.

Course Learning Outcomes:

CLO 1	Able to understand the elastic properties of solid
CLO 2	Study of the structural and physical properties of matter
CLO 3	Understand the thermodynamics laws and their applications

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	UNIT-1 Elasticity: Strain and stress, elastic limit, Hooke's law; Moduli (Young's, Bulk, Rigidity) and Poisson's ratio, Surface tension: Surface tension and surface energy, angle of contact, capillary action, Flow of liquids and gases: Streamline and turbulent flow, Equation of continuity, Bernoulli's theorem and its application to biological system, Torricelli's theorem; Coefficient of viscosity, Stoke's law.	25	15
2.	UNIT-2 Structural and physical properties, Structural properties, crystallographic theory, Physical properties such as Thermal conductivity, Melting point, Temperature and Heat, Specific Heat, Specific Heat, Heat capacity, Thermal insulation, Thermal shock resistance Laws of Thermodynamics, Thermodynamic Description of system: Zeroth Law of thermodynamics and temperature. First law and internal energy, conversion of heat into work, Applications of First Law: General Second law & Entropy, Third law of thermodynamics	25	15

3.	UNIT-3 Magnetic Properties of Matter: Dia-, Para-, Ferri- and Ferromagnetic Materials. Classical Langevin Theory of dia – and Paramagnetic Domains. Curie"s law, Weiss"s Theory of Ferromagnetism and Ferromagnetic Domains. Discussion of B-H Curve. Hysteresis and Energy Loss.	25	15
4.	UNIT-4 Dielectric Properties of Materials: Polarization. Local Electric Field at an Atom. Depolarization Field. Electric Susceptibility. Polarizability. Clausius Mosotti Equation. Classical Theory of Electric Polarizability. Applications: Piezoelectric, Pyroelectric, Ferroelectric, Ferromagnetic materials	25	15
	Total	100%	60

Course Name: Electrodynamics I

Course Code: 11010403DS04

Prerequisite: Fundamental knowledge of properties of matter.

Rationale: Study of electromagnetism.

Course Learning Objective:

CLOBJ 1	Understand Electromagnetic Theory: Grasp the core principles of electromagnetism, including Maxwell's equations, and their implications for electric and magnetic fields.
CLOBJ 2	Apply Vector Calculus: Use vector calculus to describe and analyze electromagnetic fields, including operations such as divergence, curl, and gradient.
CLOBJ 3	Study Electric Fields: Analyze electric fields in various configurations, including point charges, continuous charge distributions, and conductors.
CLOBJ 4	Explore Electric Potential: Understand the concept of electric potential and potential difference, and solve problems involving potential and field relationships.

Course Learning Outcomes:

CLO 1	Understand the concept of vector and scalar potential.
CLO 2	Understand the Electrostatic and electric properties of matter.
CLO 3	Study of theory of magneto-statics and properties of matter based on the magnetic field.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	UNIT-1 VECTOR CALCULUS FOR ELECTRODYNAMICS Vector Algebra, Coordinate Systems and Transformations, Concept of irrotational & rotational vector fields, gradient of scalar field and curl of a vector field, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors	25	15
2.	UNIT-2 ELECTROSTATICS AND PROPERTIES OF MATTER Gauss Law with applications, Poissons equation, Laplaces equation and Uniqueness theorems, Electric dipole, dipole moment, polarization and charge density, polarizability and susceptibility, Electric displacement, Gauss's law in dielectrics, bound charges and their physical interpretation, Static boundary conditions in dielectrics, electric potential, Energy of field in the presence of dielectrics, potential and field due to charged shell, ring, disc, Multipole expansion.	25	15
3.	UNIT-3 MAGNETOSTATICS AND PROPERTIES OF MATTER Magnetic field and units, Lorentz force, Biot-savart's law, The Divergence and Curl of Magnetic Field, Magnetic vector potential, Magnetic flux density, Ampere's law with applications. Types of magnetic materials, Magnetic Susceptibility and permeability, Relation between B, H, M, Ferromagnetism, B-H curve and hysteresis	25	15
4.	UNIT-4 ELECTROMAGNETIC INDUCTION Comparison of magnetostatics and electrostatics, Electromotive Force and motional emf, Lenz's Law, Faraday's law of Electromagnetic Induction, Introduction of Maxwell's equations, Maxwell's equations inside matter, Boundary conditions	25	15
	Total	100%	60

Semester 4

Course Name: Nuclear Physics

Course Code: 11010404DS02

Prerequisite: Basic knowledge of nuclear interactions

Rationale: Knowledge of particle interactions.

Course Learning Objective:

CLOBJ 1	Describe the fundamental components of atomic nuclei, including protons, neutrons, and their interactions.
CLOBJ 2	Describe the processes of alpha, beta, and gamma decay and calculate the decay rates and half-lives.
CLOBJ 3	Analyze the validity and limitations of different nuclear models in explaining nuclear phenomena.
CLOBJ 4	Discuss the principles behind nuclear detectors, such as scintillation counters, Geiger-Müller tubes, and semiconductor detectors.

Course Learning Outcomes:

CLO 1	Explain the structure of atomic nuclei, including the arrangement of protons and neutrons and the forces that bind them.
CLO 2	Analyze and predict the behavior of radioactive isotopes, including calculating decay rates, half-lives, and the resulting energy emissions.
CLO 3	Demonstrate the ability to apply nuclear models, such as the liquid drop model and shell model, to explain the properties and behaviors of nuclei.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1.	INTRODUCTION TO NUCLEAR PHYSICS: General Properties of Atomic Nucleus: Introduction: General properties of the nucleus, Early Atomic Spectra, Thomson Model, Scattering of a Particles by Rutherford Experiment, Nuclear Size and its Determination, Mass Spectroscopy, Theories of Nuclear Composition, Binding Energy, Semi-Empirical Mass Formula. Interactions of Nuclear Reactions with Matter: Interaction of Charged Particles with Matter, Stopping Power of Heavy Charged Particles, Energy Loss of Heavy Ions, Stopping Power and Range for Electrons, Ceronkov Radiation, Synchrotron Radiation, Compton Effect, Pair Production. Nuclear Forces: Neutron-Proton Scattering at Low Energies, Neutron-Neutron (<i>nn</i>) Scattering, Proton-Proton (<i>pp</i>) Scattering at Low Energies, Similarites between <i>nn</i> and <i>pp</i> forces, Non-Central Forces, High Energy <i>np</i> and <i>pp</i> Scattering, Nucleon-Nucleon Scattering Data.	25	12
2.	PARTICLE DECAY THEORIES: Introduction to Alpha (α), Beta (β) and Gamma (γ) Decay. Alpha (α) Decay: Rutherford and Royd's Experiment to Determine q/M for a Particles, Gieger-Nuttal Law, a Particle Spectra, General Theory of a Decay. Beta (β) Decay: β Spectroscopy, The Neutrino and Antineutrino, Fermi Theory of β Decay, Selection Rules for Allowed and Forbidden Transitions of β Decay, General Theory of β Decay, Conservation of β Decay, Double β Decay. Gamma (γ) Radiation: Measurement of γ Ray, Multipole Radiations, Internal Pair Creation, Measurement of Lifetimes of Nuclear States, Fundamentals of Mossbauer Effect. Nuclear Models: Liquid Drop Model, Shell Model, Collective Nuclear Model, Unified Model.	25	12
3.	NUCLEAR REACTIONS: Fundamentals of Reactions: Types of Nuclear Reactions, Nuclear Reaction Kinematics, Nuclear Transmutations, Requirements of Reactions, Reaction Mechanisms, Inverse Reactions, Different Stages of a Nuclear Reaction, Heavy Ion Reactions. Nuclear Fission and Fusion: Introduction, Types of Fission, Distribution of Fission Products, Neutron Emission in Fission, Fissile Materials, Spontaneous Fission, Basics of Radioactivity, Fission Product Radioactivity, Nuclear Fusion and Thermo Nuclear Reactions, Controlled Thermo Nuclear	25	9

	Reactions, Controlled and Uncontrolled Chain Reactions.		
4.	ACCELERATORS AND NUCLEAR DETECTORS: Particle Accelerators: Electrostatic Accelerators (Pelletron), Linear Accelerators, Synchrotrons, Heavy Ion Accelerators, Indian Accelerators. Nuclear Detectors & Counters; Need for an accelerator of charged particles, Ionization Chamber, Semiconductor Detector, Gieger Muller (GM) Counter, Scintillation Counter. Elementary Particles: Introduction to Elementary Particles, Classification of Various Elementary Particles with Definitions, Fundamental Interactions. Effects of Radiations: Chemical Effects of Radiations, Nuclear Agriculture, Biological Effects of Radiations.	25	12
	Total	100%	45

References:

Nuclear Physics by D.C. Tayal, Himalaya Publishing House, Ed. V, 2007.

Atomic and Nuclear Physics by Shatendra K. Sharma, Pearson Education India, 2008.

Course Name: Modern Physics

Course Code: 11010404DS03

Prerequisite: Basic knowledge of relativity and quantum physics.

Rationale: Understand developments of modern physics.

Course Learning Objective:

CLOBJ 1	Explain the principles of special relativity, including time dilation, length contraction, and the equivalence of mass and energy ($E = mc^2$).
CLOBJ 2	Describe the key concepts of quantum mechanics, including wave-particle duality, the uncertainty principle, and quantization of energy.
CLOBJ 3	Analyze thought experiments like the EPR paradox and understand the debates around quantum non-locality and the nature of reality.
CLOBJ 4	Explore the structure of atomic nuclei, nuclear decay, and the types of nuclear reactions (fission and fusion) from a modern physics perspective.

Course Learning Outcomes:

CLO 1	Explain the core principles of special relativity, including time dilation, length contraction, and the mass-energy equivalence ($E = mc^2$), and apply these concepts to solve problems involving objects moving at high velocities.
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CLO 2	Understanding of the fundamental principles of quantum mechanics, including wave-particle duality, the uncertainty principle, and the superposition of quantum states.
CLO 3	Explain the concept of quantum entanglement and its implications for information theory, including quantum computing and quantum cryptography.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Planck's quantum, Planck's constant and light as a collection of photons; Blackbody Radiation: Quantum theory of Light; Photo-electric effect and Compton scattering. De Broglie wavelength and matter waves; Davisson-Germer experiment. Wave description of particles by wave packets. Group and Phase velocities and relation between them. Two-Slit experiment with electrons. Probability. Wave amplitude and wave functions. Two slit interference experiment with photons, atoms and particles; linear superposition principle as a consequence; Matter waves and wave amplitude; Schrodinger equation for non-relativistic particles; Momentum and Energy operators; stationary states; physical interpretation of a wave function, probabilities and normalization; Probability and probability current densities in one dimension.	25	12
2.	Position measurement- gamma ray microscope thought experiment; Wave-particle duality, Heisenberg uncertainty principle (Uncertainty relations involving Canonical pair of variables): Derivation from Wave Packets impossibility of a particle following a trajectory; Estimating minimum energy of a confined particle using uncertainty principle; Energy-time uncertainty principle- application to virtual particles and range of an interaction. One dimensional infinitely rigid box- energy eigenvalues and eigen functions, normalization; Quantum dot as example; Quantum mechanical scattering and tunneling in one dimension-across a step potential & rectangular potential barrier.	25	12

3.	Concepts of X-rays, properties of X-rays, production of X-rays , hard X-rays, soft X-rays, merits and demerits of X-rays, Crystalline and Non-crystalline Solids, Ionic solids, Covalent Solids, Vander walls bond, metallic bonds, molecular solids, band theory of solids, superconductivity, intrinsic and impurity semiconductors	25	9
4.	Radioactivity: stability of the nucleus; Law of radioactive decay; Mean life and half-life; Alpha decay; Beta decay- energy released, spectrum and Pauli's prediction of neutrino; Gamma ray emission, energy-momentum conservation: electron-positron pair creation by gamma photons in the vicinity of a nucleus. Size and structure of atomic nucleus, Nuclear radius, Non-existence of electron in nucleus, NZ graph, Liquid Drop model: binding energy, B/A vs A curve interpretation, semi-empirical mass formula and binding energy, Limitation of liquid drop model and magic numbers, Nature of nuclear force. Fission and fusion reactions, Nuclear reactor, 4 factor formula, Energy production in stars. Illustrative problems	25	15
	Total	100%	45

References:

Modern Physics" by Paul A. Tipler and Ralph Llewellyn

Modern Physics for Scientists and Engineers" by Stephen T. Thornton and Andrew Rex

Course Name: Advanced English - II

Course Code: 00019304AE01

Prerequisite: Knowledge of basic English.

Rationale: Advanced Communication Skills of English Language.

Course Learning Objective:

CLOBJ 1	Expand and refine vocabulary through exposure to a wide range of texts, including literature, academic writing, and professional materials.
CLOBJ 2	Apply advanced grammatical structures with accuracy, including complex sentence constructions, varied tenses, and the correct use of modals, conditionals, and passive voice
CLOBJ 3	Write well-organized, cohesive essays, research papers, and reports that reflect advanced critical thinking and argumentation skills.
CLOBJ 4	Analyze and interpret a variety of literary genres, including fiction, poetry, drama, and non-fiction, recognizing thematic elements, symbolism, and stylistic devices.

Course Learning Outcomes:

CLO 1	Develop advanced communication skills
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CLO 2	Identify, set and achieve the goals with the help of public speaking.
CLO 3	Use wide range of vocabulary to communicate effectively.

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Corporate Etiquettes 1. Tips and guide to develop personality and gain various etiquettes manners, case studies and activities. 2. Telephone etiquettes	3	1
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

References:

Business Correspondence and Report Writing SHARMA, R. AND MOHAN, K.

Oxford Practice Grammar

Course Name: Basic German II

Course Code: 00019304AE02

Prerequisite:

Rationale: German is a widely used language all over the world. Knowledge of it is essential.

Course Learning Objective:

CLOBJ 1	Ability to communicate, understand various City Places, Body Parts, Professions. Can also able to frame the Sentences with the help of Modal Verbs.
CLOBJ 2	Communication skill development in German language helps to communicate with Friends and in shopping mall and also able ask and guide Directions in German Language
CLOBJ 3	Ability to develop reading habits in German
CLOBJ 4	Ability to write in German

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

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	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

References:

Netzwerk A1 Deutsch als Fremdsprache Kursbuch

Studio D

Course Name: Basic French II

Course Code: 00019304AE03

Prerequisite:

Rationale: Basic Communication Skills of French Language.

Course Learning Objective:

CLOBJ 1	Ability to communicate, understand various City Places, Body Parts, Professions. Can also able to frame the Sentences with the help of Modal Verbs.
CLOBJ 2	Communication skill development in French language helps to communicate with Friends and in shopping mall and also able ask and guide Directions in French Language
CLOBJ 3	Ability to develop reading habits in French
CLOBJ 4	Ability to write in French

Course Learning Outcomes:

CLO 1	Recognize and use essential vocabulary and basic grammatical structures in French.
CLO 2	Ask and respond to questions in French.
CLO 3	Engage in simple conversations in French on familiar topics

Teaching & Examination Scheme:

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

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

Course Content:

Sr. No .	Content	Weightage	Teaching Hours
1.	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
2.	Listening Skills Class room objects Study Subjects Common nouns of places Seasons	17	5
3.	Speaking Skills Talking to a French Speaking Stranger Talking about hobbies Talking and writing about hobbies	17	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

References:

Saison 1 Didier

Larousse Dictionnaire de Poche

Course Name: Physical Education and Sports**Course Code:** 00019404VA02**Prerequisite:** Basic understanding of sports technique.**Rationale:** Fostering balance of mind and body.

Course Learning Objective:

CLOBJ 1	Behaviour and technical competencies to be developed.
CLOBJ 2	Acquire information of sports initiatives of the Government.
CLOBJ 3	Improve skills of critical thinking, creative-thinking, problem-solving, team-work leadership, etc.

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.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	-	20	20	20	40	100

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	History and Basic Concept of Sports and Fitness: Concept of Sports and Fitness Aims and Objectives, Importance of Sports and Fitness Difference between Games and Sports History of Sports Ancient and Modern Olympics Asian Games and Common Wealth Games functioning	33	5

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

References:

Text book of Sports and Exercise Physiology

Course Name: Foundations of Yoga

Course Code: 00019404VA01

Prerequisite: An open mind and Yoga equipment

Rationale: Flexibility, calmness and clarity of mind and body.

Course Learning Objective:

CLOBJ 1	Basic principles and philosophy of yoga.
CLOBJ 2	Understanding of the physical and mental benefits of yoga.
CLOBJ 3	Foundational yoga postures, breathing techniques, and meditation practices.

Course Learning Outcomes:

CLO 1	Knowledge of basic principles and philosophy of yoga
CLO 2	cultivate a personal yoga practice that promotes well-being and stress management
CLO 3	understanding of the physical and mental benefits of yoga

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	-	20	20	20	40	100

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Introduction to 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

References:

Swasthya Shiksha

Principles and History of Physical Education

Course Name: National Cadet Corps (NCC)

Course Code: 00019404VA03

Prerequisite: Physical fitness

Rationale: Development of character and discipline.

Course Learning Objective:

CLOBJ 1	Demonstrate the ability to work effectively in teams with mutual respect, fostering camaraderie and teamwork.
CLOBJ 2	Exhibit self-discipline and adhere to established rules and regulations in various activities, promoting an organized and disciplined approach.
CLOBJ 3	Understand and respect diverse cultures and religions, promoting unity, harmony, and a secular outlook in all interactions

Course Learning Outcomes:

CLO 1	Ability to work effectively in teams with mutual respect, fostering camaraderie and teamwork.
CLO 2	Actively participate in community service initiatives, demonstrating social responsibility, empathy, and a commitment to societal well-being.
CLO 3	Develop leadership qualities, including decision-making, problem-solving, and the ability to inspire and motivate others.

Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	-	20	20	20	40	100

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

Course Content:

Sr. No	Content	Weightage	Teaching Hours
1.	Introduction to 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

References:

Cadet's Hand Book Common Subject, All Wings

Cadet's Hand Book Specialized Subject, All Wings