B Sc MATHEMATICS

LOCF SYLLABUS 2025

Department of Mathematics

School of Computing Sciences

St. Joseph's College (Autonomous)

Tiruchirappalli - 620002, Tamil Nadu, India

SCHOOLS OF EXCELLENCE WITH CHOICE BASED CREDIT SYSTEM (CBCS) UNDERGRADUATE COURSES

St. Joseph's College (Autonomous), an esteemed institution in the realm of higher education in India, has embarked on a journey to uphold and perpetuate academic excellence. One of the pivotal initiatives in this pursuit is the establishment of five Schools of Excellence commencing from the academic year 2014-15. These schools are strategically designed to confront and surpass the challenges posed by the 21st century.

Each School amalgamates correlated disciplines under a unified umbrella, fostering synergy and coherence. This integrated approach fosters the optimal utilization of both human expertise and infrastructural assets. Moreover, it facilitates academic fluidity and augments employability by nurturing a dynamic environment conducive to learning and innovation. Importantly, while promoting collaboration and interdisciplinary study, the Schools of Excellence also uphold the individual identity, autonomy, and distinctiveness of every department within.

The overarching objectives of these five schools are as follows:

1. Optimal Resource Utilization: Ensuring the efficient use of both human and material resources to foster academic flexibility and attain excellence across disciplines.

2. Horizontal Mobility for Students: Providing students with the freedom to choose courses aligning with their interests and facilitating credit transfers, thereby enhancing their academic mobility and enriching their learning experience.

3. Credit-Transfer Across Disciplines (CTAD): The existing curricular structure, in accordance with regulations from entities such as TANSCHE and other higher educational institutions, facilitates seamless credit transfers across diverse disciplines. This underscores the adaptability and uniqueness of the choice-based credit system.

4. Promotion of Human Excellence: Nurturing excellence in specialized areas through focused attention and resources, thus empowering individuals to excel in their respective fields.

5. Emphasis on Internships and Projects: Encouraging students to engage in internships and projects, serving as stepping stones toward research endeavors, thereby fostering a culture of inquiry and innovation.

6. Addressing Stakeholder Needs: The multi-disciplinary nature of the School System is tailored to meet the requirements of various stakeholders, particularly employers, by equipping students with versatile skills and competencies essential for success in the contemporary professional landscape.

In essence, the Schools of Excellence at St. Joseph's College (Autonomous) epitomize a holistic approach towards education, aiming not only to impart knowledge but also to cultivate critical thinking, creativity, and adaptability – qualities indispensable for thriving in the dynamic global arena of the 21st century.

Credit system

The credit system at St. Joseph's College (Autonomous) assigns weightage to courses based on the hours allocated to each course. Typically, one credit is equivalent to one hour of instruction per week. However, credits are awarded regardless of actual teaching hours to ensure consistency and adherence to guidelines.

The credits and hours allotted to each course within a programme are detailed in the Programme Pattern table. While the table provides a framework, there may be some flexibility due to practical sessions, field visits, tutorials, and the nature of project work.

For undergraduate (UG) courses, students are required to accumulate a minimum of 137 credits, as stipulated in the programme pattern table. The total number of courses offered by the department is outlined in the Programme Structure.

OUTCOME-BASED EDUCATION (OBE)

OBE is an educational approach that revolves around clearly defined goals or outcomes for every aspect of the educational system. The primary aim is for each student to successfully achieve these predetermined outcomes by the culmination of their educational journey. Unlike traditional methods, OBE does not prescribe a singular teaching style or assessment format. Instead, classes, activities, and evaluations are structured to support students in attaining the specified outcomes effectively.

In OBE, the emphasis lies on measurable outcomes, allowing educational institutions to establish their own set of objectives tailored to their unique context and priorities. The overarching objective of OBE is to establish a direct link between education and employability, ensuring that students acquire the necessary skills and competencies sought after by employers.

OBE fosters a student-centric approach to teaching and learning, where the delivery of courses and assessments are meticulously planned to align with the predetermined objectives and outcomes. It places significant emphasis on evaluating student performance at various levels to gauge their progress and proficiency in meeting the desired outcomes.

Here are some key aspects of Outcome-Based Education:

Course: A course refers to a theory, practical, or a combination of both that is done within a semester.

Course Outcomes (COs): These are statements that delineate the significant and essential learning outcomes that learners should have achieved and can reliably demonstrate by the conclusion of a course. Typically, three or more course outcomes are specified for each course, depending on its importance.

Programme: This term pertains to the specialization or discipline of a degree programme.

Programme Outcomes (POs): POs are statements that articulate what students are expected to be capable of by the time they graduate. These outcomes are closely aligned with Graduate Attributes.

Programme Specific Outcomes (PSOs): PSOs outline the specific skills and abilities that students should possess upon graduation within a particular discipline or specialization.

Programme Educational Objectives (PEOs): PEOs encapsulate the expected accomplishments of graduates in their careers, particularly highlighting what they are expected to achieve and perform during the initial years postgraduation.

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

The Learning Outcomes-Centric Framework (LOCF) places the learning outcomes at the forefront of curriculum design and execution. It underscores the importance of ensuring that these outcomes are clear, measurable, and relevant. LOCF orchestrates teaching methodologies, evaluations, and activities in direct correlation with these outcomes. Furthermore, LOCF adopts a backward design approach, focusing on defining precise and attainable learning objectives. The goal is to create a cohesive framework where every educational element is in harmony with these outcomes.

Assessment practices within LOCF are intricately linked to the established learning objectives. Evaluations are crafted to gauge students' achievement of these outcomes accurately. Emphasis is often placed on employing authentic assessment methods, allowing students to showcase their learning in real-life scenarios. Additionally, LOCF frameworks emphasize flexibility and adaptability, enabling educators to tailor curriculum and instructional approaches to suit the diverse needs of students while ensuring alignment with the defined learning outcomes.

Some Important Terminologies

Core Course (CC): *Core Courses represent obligatory elements within an academic programme, imparting fundamental knowledge within the primary discipline while ensuring consistency and acknowledgment.*

Allied Course (AC): *Allied Courses complement primary disciplines by furnishing supplementary knowledge, enriching students' understanding and skill repertoire within their academic pursuit.*

Skill Enhancement Course (SEC): *Skill Enhancement Courses aim to nurture students' abilities and competencies through practical training, open to students across disciplines but particularly advantageous for those in programme-related fields.*

Value Education (VE): *Value education encompasses the teaching of moral, ethical, and social values to students, aiming to foster their holistic development. It instills virtues such as empathy, integrity, and responsibility, guiding students towards becoming morally upright and socially responsible members of society.*

Ability Enhancement Compulsory Course (AECC): *Ability Enhancement Compulsory Course is designed to enhance students' knowledge and skills; examples include Communicative English and Environmental Science. These courses are obligatory for all disciplines.*

AE-1: Communicative English: This three-credit mandatory course, offered by the Department of English during the first semester of the degree programme, is conducted outside regular class hours.

AE-2: Environmental Science: This one-credit compulsory course, offered during the second semester by the Department of Human Excellence, emphasizes environmental awareness and stewardship.

Allied Optional (AO): *Allied optional course are elective modules that complement the primary disciplines by providing additional knowledge and skills. These courses allow students to explore areas of interest outside their major field of study, broadening their understanding and enhancing their skill set.*

Discipline Specific Elective (DSE): *These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature. Four courses are offered, two courses each in semester V and VI*

Note: To offer one DSE, a minimum of two courses of equal importance/weightage is a must. A department with two sections must offer two courses to the students.

Open Elective (OE): *A course chosen from a different discipline or subject area, typically to gain exposure. Students pursuing specific disciplines must select Open Elective courses from the options available across departments as per the college's course offerings. The breadth of Open Elective (OE) Courses is directly linked to the diversity of disciplines offered by the college. Two OE Courses are available, one in each semester V and VI, and are open to students from other departments.*

Self-Learning (SL): *A two-credit course designed to foster students' ability for independent and self-directed learning. There are* Four Self-Learning Courses:

- *Compulsory MOOC on NPTEL-SWAYAM in Semester I or II*
- 'Artificial Intelligence' *as a Self-Learning Course jointly offered by the Departments of CS, AI, IT and Data Science on JosTEL in Semester III*
- *A Department-Specific Self-Learning Course in Semester IV on JosTEL*
- *A Certificate Course in Semester V: Each department will offer ONE certificate Course (45 – 60 hours) that will be creditised in the curriculum.*

Internship (IS): *Following the fourth semester, students are required to undertake an internship during the summer break. Subsequently, they must submit a comprehensive report detailing their internship experience along with requisite documentation. Additionally, students are expected to participate in a viva-voce examination during the fifth semester. Credits for the internship will be reflected in the mark statement for the fifth semester. One of the Core Courses in Sem IV is offered as internship embedded course which contains content related to industry.*

Experiential Learning (EL): *In the sixth semester, students are required to undertake a one credit Project / Industrial visit / Field visit chosen by the department. This component is intended to foster learning by direct experience and application of acquired knowledge to practical settings.*

Comprehensive Examination (CE): *A detailed syllabus consisting of five units to be chosen from the courses offered over the five semesters which are of immense importance and those portions which could not be accommodated in the regular syllabus.*

Extra Credit Courses: *To support students in acquiring knowledge and skills through online platforms such as Massive Open Online Courses (MOOCs), additional credits are granted upon verification of course completion. These extra credits can be availed across five semesters (2 - 6). In line with UGC guidelines, students are encouraged to enhance their learning by enrolling in MOOCs offered by portals like SWAYAM, NPTEL, and others. Additionally, certificate courses provided by the college also qualify for these extra credits.*

Outreach Programme (OR): *It is a compulsory course to create a sense of social concern among all the students and to inspire them to dedicated service to the needy.*

Course Coding

The following code system (11 alphanumeric characters) is adopted for Under Graduate courses:

25	**UXX**	**0**	**0**	**XX**	**00/X**
Year of Revision	UG Department Code	Semester Number	Part Specification	Course Specific Initials	Running Number/with Choice

Course Specific Initials

GL - Languages (Tamil / Hindi / French / Sanskrit)
GE - General English
CC - Core Theory; CP- Core Practical
AC - Allied Course
AP - Allied Practical
SEC - Skill Enhancement Course
VE - Value Education
WS - Workshop
AE - Ability Enhancement Course
AO - Allied Optional
OP - Allied Optional Practical
ES - Discipline Specific Elective
IS - Internship
SL - Self-Learning
OE - Open Elective
PW - Project and Viva Voce
CE - Comprehensive Examination
EL - Experiential Learning
OR - Outreach Programme

EVALUATION PATTERN (UG)

Continuous Internal Assessment

Sl No	Component	Marks Allotted
1	Mid Semester Test	30
2	End Semester Test	30
3	*Two Components (15 + 20)	35
4	Library Referencing	5
	Total	**100**

Passing minimum: 40 marks

* *The first component is a compulsory online test (JosTEL platform) for 15 marks comprising 7 questions (1 mark) at K1 level and 4 questions (2 marks) at K2 level;* The second component is decided by the course in-charge in accordance with the prescribed K levels.

Question Paper Blueprint for Mid and End Semester Tests

Duration: 2 Hours								**Maximum Marks: 60**
Section		**K levels**						**Marks**
		K1	**K2**	**K3**	**K4**	**K5**	**K6**	
A *(compulsory)*		7						7 × 1 = 7
B *(compulsory)*			5					5 × 3 = 15
C *(either…or type)*				3				3 × 6 = 18
D *(2 out of 3)*	Mid Sem				1(2)	1*		2 × 10 = 20
	End Sem				1*	1(2)		
							Total	**60**

***** *Compulsory*

Question Paper Blueprint for Semester Examination

Duration: 3 Hours						**Maximum Marks: 100**
Section	**K levels**					**Marks**
	K1	**K2**	**K3**	**K4**	**K5**	**K6**	
A *(compulsory)*	10						10 × 1 = 10
B *(compulsory)*		10					10 × 3 = 30
C *(either…or type)*			5				5 × 6 = 30
D *(3 out of 5)*				2(3)	1(2)		3 × 10 = 30
						Total	**100**

***** *Compulsory*

Evaluation Pattern for Part IV and One/Two-credit Courses

Title of the Course	**CIA**	**Semester Examination**	**Final**
• One credit Core Course (Sem 1) • Skill Enhancement Course (NCC and Department Specific)	25 + 25 = 50	50 *(Department)*	100
• Self - Learning Course (Dept Specific) • Comprehensive Examination	25 + 25 = 50	50 *(CoE)*	100
• Value Education • Environmental Studies	50	50 *(CoE)*	100
• Skill Enhancement Course: Soft Skills • Self - Learning Course (Common) • Self - Learning Online Course (NPTEL / SWAYAM) • Certificate Course • Internship	100	-	100
• Project / Industrial Visit / Field Visit	100	-	100

Grading System

The marks obtained in the CIA and semester for each course will be graded as per the scheme provided in Table - 1.

From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$$SGPA\ and\ CGPA = \frac{\sum_{i=1}^{n} C_i Gp_i}{\sum_{i=1}^{n} C_i}$$

$$WAM = \frac{\sum_{i=1}^{n} C_i M_i}{\sum_{i=1}^{n} C_i}$$

Where,

Ci - credit earned for the Course i

Gpi - Grade Point obtained for the Course i

Mi - Marks obtained for the Course i

*n - Number of Courses **passed** in that semester*

WAM - Weighted Average Marks

Classification of Final Results

- For each of the first three parts in the UG Programme, there shall be separate classification on the basis of CGPA, as indicated in Table - 2.
- For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts / Science / Commerce / Management as Outstanding / Excellent / Very Good / Good / Above Average / Average, the marks and the corresponding CGPA earned by the candidate in Part III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in all the five Parts of the programme.
- Grade in Part IV and Part V shall be shown separately and it shall not be taken into account for classification.
- A pass in SHEPHERD will continue to be mandatory although the marks will not be counted for the calculation of the CGPA.
- Absence from an examination shall not be considered as an attempt.

Table - 1: Grading of the Courses

Mark Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	0	RA

Table - 2: Grading of the Final Performance

CGPA	Grade	Performance
9.00 and above	O	Outstanding*
8.00 to 8.99	A+	Excellent*
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appear

**The Candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the Candidates Grade is O/A+ with more than one attempt, the performance is considered "Very Good".*

Vision

Forming globally competent, committed, compassionate and holistic persons, to be men and women for others, promoting a just society.

Mission

- Fostering learning environment to students of diverse background, developing their inherent skills and competencies through reflection, creation of knowledge and service.
- Nurturing comprehensive learning and best practices through innovative and value- driven pedagogy.
- Contributing significantly to Higher Education through Teaching, Learning, Research and Extension.

Programme Educational Objectives (PEOs)

- Graduates will be able to accomplish professional standards in the global environment.
- Graduates will be able to uphold integrity and human values.
- Graduates will be able to appreciate and promote pluralism and multiculturalism in working environment.

Programme Outcomes (POs)

1. Graduates will be able to comprehend the concepts learnt and apply in real life situations with analytical skills.
2. Graduates with acquired skills and enhanced knowledge will be employable/ become entrepreneurs or will pursue higher Education.
3. Graduates with acquired knowledge of modern tools communicative skills and will be able to contribute effectively as team members.
4. Graduates are able to read the signs of the time analyze and provide practical solutions.
5. Graduates imbibed with ethical values and social concern will be able to understand and appreciate social harmony, cultural diversity ensure sustainable environment.

Programme Specific Objectives (PSOs)

Graduates will be able to

1. acquire a systematic understanding of the fundamental concepts and theories of mathematics.
2. adopt changing scientific environment in the process of sustainable development by using mathematical tools.
3. hone problem solving skills to succeed in various competitive examinations including JAM, NBHM, CAT, UPSC.
4. understand and appreciate integrated learning to create mathematical models, practice ethical values and realize societal responsibilities.
5. strengthen the mathematical ability, abstract intelligence and orient themselves towards higher mathematics and research.

B. Sc. Mathematics					
Programme Structure					
Part	**Semester**	**Specification**	**No. of Courses**	**Hours**	**Credits**
1	1- 4	Languages (Tamil / Hindi / French / Sanskrit)	4	16	12
2	1 - 4	General English	4	20	12
3	1 - 6	Core Course	15	80	54
	1 - 6	Core Practical	1	2	1
	1 & 2	Allied Course	2	12	8
	1 & 2	Allied Practical	-	-	-
	3 & 4	Allied Optional	2	10	6
	3 & 4	Allied Optional Practical	1	2	2
	5 & 6	Discipline Specific Elective	4	16	12
	5	Internship	1	-	1
	6	Project / Industrial Visit / Field Visit	1	-	1
	6	Comprehensive Examination	1	-	2
4	1 - 4	Value Education	4	8	4
	1 & 2	Ability Enhancement Compulsory Course	2	2	3
	2 - 5	Self - Learning	4	-	8
	3 & 4	Skill Enhancement Course	2	4	2
	5 & 6	Open Elective	2	8	4
5	2 - 6	Outreach Programme (SHEPHERD)	-	-	4
	2 - 6	Co-curricular and Extracurricular Activities	-	-	1
	2 - 6	Extra Credit Courses (MOOC) / Certificate Courses	5	-	(15)
		Total	**55**	**180**	**137 (15)**

B Sc MATHEMATICS PROGRAMME PATTERN									
Course Details							Scheme of Exams		
Sem.	Part	Course Code	Course Type	Title of the Course	Hours	Credits	CIA	SE	Final
1	I	25UTA11GL01	GL	General Tamil - 1	4	3	100	100	100
		25UFR11GL01		Language French - 1					
		25UHI11GL01		Language Hindi - 1					
		25USA11GL01		Language Sanskrit - 1					
	II	25UEN12GE01A	GE	**General English – 1:** Pre-Intermediate Stream	5	3	100	100	100
		25UEN12GE01B		**General English – 1:** Intermediate Stream					
	III	25UMA13CC01	CC Major	**Core Course - 1:** Algebra and Trigonometry	5	4	100	100	100
		25UMA13CC02		**Core Course - 2:** Differential Calculus	6	4	100	100	100
		25UMA13CC03		**Core Course - 3:** A Foundation Course in Mathematics	2	1	100	-	100
		25UMA13AC01	AC Minor	**Allied Course - 1:** Statistics - 1	6	4	100	100	100
	IV	25UHE14VE01	VE	**Value Education – 1:** Essentials of Humanity*	2	1	50	50	50
		25UEN14AE01	AECC	Communicative English	-	2	100	-	100
				Total	**30**	**22**			
2	I	25UTA21GL02	GL	General Tamil - 2	4	3	100	100	100
		25UFR21GL02		Language French – 2					
		25UHI21GL02		Language Hindi – 2					
		25USA21GL02		Language Sanskrit - 2					
	II	25UEN22GE02A	GE	**General English – 2:** Pre-Intermediate Stream	5	3	100	100	100
		25UEN22GE02B		**General English – 2:** Intermediate Stream					
	III	25UMA23CC04	CC Major	**Core Course - 4:** Analytical Geometry	5	4	100	100	100
		25UMA23CC05		**Core Course - 5:** Integral Calculus	6	4	100	100	100
		25UMA23AC02	AC Minor	**Allied Course - 2:** Statistics - 2	6	4	100	100	100
	IV	25UHE24AE02	AECC	Environmental Studies*	2	1	50	50	50
		25UHE24VE02	VE	**Value Education - 2:** Fundamentals of Human Rights*	2	1	50	50	50
		25UMA24SL01	SL	Online Courses: (NPTEL / SWAYAM)	0	2	-	100	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
3	I	25UTA31GL03	GL	General Tamil - 3	4	3	100	100	100
		25UFR31GL03		Language French – 3					
		25UHI31GL03		Language Hindi – 3					
		25USA31GL03		Language Sanskrit - 3					
	II	25UEN32GE03B	GE	General English – 3: English for Science - 1	5	3	100	100	100
	III	25UMA33CC06	CC Major	**Core Course -6:** Sequences and Series	5	4	100	100	100
		25UMA33CC07		**Core Course -7:** Differential Equations	6	4	100	100	100
		25UMA33AO01A	AO Minor	**Allied Optional – 1:** Physics - 1	4	3	100	100	100
		@		**Allied Optional Practical:** Physics	2	-	-	-	-
		25UMA33AO01B		**Allied Optional – 1:** Accounts - 1	(6)	(4)	100	100	100
	IV	25UHE34VE03A	VE	**Value Education -3:** Social Ethics – 1*	2	1	50	50	50
		25UHE34VE03B		**Value Education -3:** Religious Doctrine – 1*					
		25UNC34SE01 / 25USS34SE01	SEC	**Skill Enhancement Course – 1:** Introduction to NCC / **Skill Enhancement Course – 1:** Soft Skills	2	1	100	-	100
		25UAI34SL02	SL	Artificial Intelligence (Online)	0	2	100	-	100
				Extra Credit Course	0	(3)			
				Total	**30**	**21/22 (3)**			
4	I	25UTA41GL04B	GL	General Tamil – 4 - Scientific Tamil (அறிவியல் தமிழ்)	4	3	100	100	100
		25UFR41GL04		Language French – 4					
		25UHI41GL04		Language Hindi – 4					
		25USA41GL04		Language Sanskrit - 4					
	II	25UEN42GE04B	GE	General English – 4: English for Science - 2	5	3	100	100	100
	III	25UMA43CC08	CC Major	**Core Course - 8:** Operations Research (Internship-embedded Course)	5	4	100	100	100
		25UMA43CC09		**Core Course - 9:** Modern Algebra	6	4	100	100	100

		25UMA43AO02A	**AO Minor**	**Allied Optional - 2:** Physics - 2	4	3	100	100	100
		25UMA43OP01A		**Allied Optional Practical:** Physics	2	2	100	100	100
		25UMA43AO02B		**Allied Optional – 2:** Accounts - 2	(6)	(4)	100	100	100
	IV	25UHE44VE04A	**VE**	**Value Education -3:** Social Ethics – 2*	2	1	50	50	50
		25UHE44VE04B		**Value Education -3:** Religious Doctrine – 2*					
		25UNC44SE02 / 25UMA44SE02	**SEC**	**Skill Enhancement Course – 2:** NCC (Special Subject) / **Skill Enhancement Course – 2:** MATLAB	2	1	100	-	100
		25UMA44SL03	**SL**	**Self-Learning:** History of Mathematics*	0	2	50	50	50
				Extra Credit Course	0	(3)			
				Total	**30**	**23/22 (3)**			
5	III	25UMA53CC10	**CC Major**	**Core Course -10:** Real Analysis	6	4	100	100	100
		25UMA53CC11		**Core Course -11:** Linear Algebra	6	4	100	100	100
		25UMA53CC12		**Core Course -12:** Mechanics	6	3	100	100	100
		25UMA53ES01A	**DSE**	**Discipline Specific Elective - 1:** Combinatorics	4	3	100	100	100
		25UMA53ES01B		**Discipline Specific Elective - 1:** Number Theory					
		25UMA53ES02A	**DSE**	**Discipline Specific Elective - 2:** Graph Theory	4	3	100	100	100
		25UMA53ES02B		**Discipline Specific Elective - 2:** Mathematical Modelling					
		25UMA53IS01	**IS**	Internship	0	1	100	-	100
	IV	25UMA54OE01	**OE**	**Open Elective - 1 (WS):** Quantitative Aptitude	4	2	100	100	100
		25UMA54SL04	**SL**	**Certificate Course:** Latex for Technical Writing	0	2	100	-	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
6	III	25UMA63CC13	**CC Major**	**Core Course - 13:** Complex Analysis	6	4	100	100	100
		25UMA63CC14		**Core Course - 14:** Computer Oriented Numerical Methods with 'C'	5	3	100	100	100
		25UMA63CP01		**Core Practical - 1:** C Programming	2	1	100	100	100
		25UMA63CC15		**Core Course - 15:** Discrete Mathematics	5	3	100	100	100
		25UMA63ES03A	**DSE**	**Discipline Specific Elective - 3:** Astronomy	4	3	100	100	100
		25UMA63ES03B		**Discipline Specific Elective - 3:** Optimization Techniques					
		25UMA63ES04A	**DSE**	**Discipline Specific Elective - 4:** Automata Theory	4	3	100	100	100
		25UMA63ES04B		**Discipline Specific Elective - 4:** Fuzzy Theory					
		25UMA63EL01A	**EL**	Project / **Industrial Visit** / Field Visit	0	1	100	-	100
		25UMA63EL01B							
		25UMA63EL01C							
		25UMA63CE01	**CE**	Comprehensive Examination*	0	2	50	50	50
	IV	25UMA64OE02	**OE**	**Open Elective - 2:** Mathematics for Competitive Examinations	4	2	100	100	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
	V	25UCW65OR01	**OR**	Outreach Programme	-	4			
		25UCW65EC01	**EC**	Co - Curricular& Extra Curricular Activities	-	1			
1-6				**TOTAL**	**180**	**137 (15)**			

***For Grade Calculation:** Marks obtained out of 50 will be converted into 100 in the mark statements.

Open Elective - 1 (WS): 5th Semester

School	Course Code	Title of the Course
SCS		
Artificial Intelligence and Machine Learning	25UAI54OE01	Cyber Security
BCA	25UBC54OE01	Digital Marketing
Computer Science	25UCS54OE01	Web User Interface Design
Mathematics	25UMA54OE01	Quantitative Aptitude
Statistics	25UST54OE01	Quality Management and Official Statistics

Open Elective - 2: 6th Semester
Offered to students from other Departments

Department	Course Code	Title of the Course
Artificial Intelligence and Machine Learning	25UAI64OE02	Gen AI tools
Botany	25UBO64OE02	Landscape Designing and Waste Management
Biotechnology	25UBT64OE02	Food Science and Technology
BBA	25UBU64OE02A	Practical Stock trading
	25UBU64OE02B	Export Management
B Com Business Analytics	25UCB64OE02	Personal Investment Planning
B Com Computer Application	25UCC64OE02A	Social Media Marketing
	25UCC64OE02B	Basics of Banking
B Com Strategic Finance	25UCF64OE02	Personal Financial Management
Chemistry	25UCH64OE02	Food & Nutrition
B Com	25UCO64OE02A	Digital Marketing
	25UCO64OE02B	Digital Banking
	25UCO64OE02C	Stock Trading
Computer Science	25UCS64OE02	Design Thinking
BCA	25UBC64OE02	Web Design
Economics	25UEC64OE02	Economics for Competitive Exams
Electronics	25UEL64OE02A	CCTV and Smart Security Systems
	25UEL64OE02B	Entrepreneurial Electronics
English	25UEN64OE02	English for Employability
History	25UHS64OE02	Intellectual Revivalism in Tamil Nadu
Mathematics	25UMA64OE02	Mathematics for Competitive Examinations
Physics	25UPH64OE02A	Laser Technology and its Application
	25UPH64OE02B	Physics of Earth
Statistics	25UST64OE02	Applied Statistics
Tamil	25UTA64OE02	படைப்பிலக்கியம் (Creative writing)
Visual Communication	25UVC64OE02	Digital Media and Production

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UTA11GL01	பொதுத்தமிழ் – 1: General Tamil - 1	4	3

கற்றலின் நோக்கங்கள் (Course Objectives)
புதிய இலக்கிய வடிவங்களை அறியும் திறனைப் பெறுதல்
எழுத்து சொல் இலக்கணத்தில் இன்றியமையாமையை உணர்தல்
புதுக்கவிதைகளின் கூறுகளை வாழ்வியலோடு பொருத்திப்பார்த்தல்
தமிழ்க்கவிதைகளைப் பிறமொழிக் கவிதைகளோடு ஒப்பிட்டுப் பார்த்தல்
புதுக்கவிதைகளைப் படைக்கும் திறன் பெறுதல்

அலகு-1 **(12 மணி நேரம்)**

பாரதியார் கவிதைகள் - பாஞ்சாலிசபதம்: சபதச் சருக்கம்
பாரதிதாசன் கவிதைகள் - புரட்சிக்கவி : மன்னனின் சர்வாதிகாரம், கவிஞனின் எழுச்சியுரை, கவிஞனின் மொழிப்பற்று, மக்களாட்சி மலரும் விதம்
இலக்கிய வரலாறு - இருபதாம் நூற்றாண்டுத் தமிழ்க்கவிஞர்கள்
உரைநடை - முதல் மூன்று கட்டுரைகள்

அலகு-2 **(12 மணி நேரம்)**

வெ.இராமலிங்கனார் - தமிழ், அரசியல்
முடியரசனார் - தொழிலாளி, துறைதோறும் தமிழே காண்பீர், மொழியுணர்ச்சி
பெருஞ்சித்திரனார் - என்னென்று சொல்வோம், இனியேனும் ஒன்றிணைவீர்
பட்டுக்கோட்டையார் - என் விருப்பம், ஏட்டில் படித்ததோடு இருந்து விடாதே, அன்னசத்திரம் இருப்பதெதனாலே?
இலக்கிய வரலாறு - புதுக்கவிதை வடிவங்கள்
இலக்கணம் - எழுத்து

அலகு-3 : சமூகக் கவிதைகள் **(12 மணி நேரம்)**

சுரதா - நெஞ்சில் நிறுத்துங்கள், பூம்புகார்
மு. மேத்தா - உன்னுடைய கொடியை
கண்ணதாசன் - ஆணவம் அழியும்
அப்துல் ரகுமான் - பசி
தங்கம் மூர்த்தி - கூடு திரும்புதல் எளிதன்று
ஜெயபாஸ்கரன் - ஒற்றைக் கேள்வியுடன் ஒருவர்
இலக்கிய வரலாறு - சிறுகதை- உரைநடை
சிறுகதை - முதல் மூன்று கதைகள்

அலகு-4 : அரசியல் கவிதைகள் **(12 மணி நேரம்)**

ஈரோடு தமிழன்பன் - எட்டாவது சீர்
யுகபாரதி - பழைய புத்தக வியாபாரி
கனிமொழி - கருவறை வாசனை
அ.வெண்ணிலா - நீரில் அலையும் முகம்
பெருமாள் முருகன் - குழந்தைகளைத் தண்டித்தல்
சீனு ராமசாமி - அகதி
கல்கி சுப்பிரமணியம் - விதியை எழுதினேன்
இலக்கணம் - சொல்

அலகு-5 : அயலகக் கவிதைகள் **(12 மணி நேரம்)**

தஸ்லீமா நஸ்ரின் - கல் உடைக்கும் பெண்
மாயா ஏஞ்சலு - கைத்தட்டுங்கள் கொண்டாடுங்கள்
நானிலு கவிதைகள் - 10 கவிதைகள்
உரைநடை - நான்கு முதல் ஆறு வரை உள்ள கட்டுரைகள்
சிறுகதை - நான்கு முதல் ஆறு வரை உள்ள கதைகள்

கற்பித்தல் அணுகுமுறை Teaching Methodology	விரிவுரை **(Lecture),** காணொளிக் காட்சி **(Videos),** விளக்கக் காட்சி **(PPT presentation)**
மதிப்பீட்டு முறைகள் Assessment methods	நூல் நோக்குத் தேர்வு **(Open Book Test),** இயங்கலைத்தேர்வு **(**Online Test**),** ஒப்படைவு **(Assignment),** வினாடி வினா **(Quiz),** கருத்துரை **(Seminar)**

பாடநூல்:

பொதுத்தமிழ்-1(2025), தமிழாய்வுத்துறை, தூய வளனார் கல்லூரி

Websites and eLearning Sources:

- *https://www.tamilvu.org/library/nationalized/pdf/35-subbureddiyar/452-panjalisabatham.pdf*
- *https://www.annacentenarylibrary.org - https://shorturl.at/KWZx5*
- *https://eluthu.com/kavithai*
- *https://www.tamilvu.org/courses/degree/p103/p1032/html/p1032614.htm*
- *https://kavithaivaasal.blogspot.com/2017/11/blog-post.html*

Course Outcomes

CO No.	***CO-Statements*** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	***Cognitive Levels (K –Levels)***
CO–1	இக்கால இலக்கிய வகைகளைக் கண்டறிவர்	***K1***
CO–2	எழுத்து, சொல்லிலக்கணங்களின் அடிப்படைகளை வகைப்படுத்தி அறிவர்.	***K2***
CO–3	அயலகக் கவிதை வடிவங்கள் குறித்த தெளிவான விளக்கங்களைப் பெறுவர்.	***K3***
CO–4	மொழிபெயர்ப்புக் கவிதைகளைக் கற்பதன் வாயிலாகத் திறனாய்வு செய்யும் திறனை வளர்த்தெடுப்பர்.	***K4***
CO–5	புதுக்கவிதை வாயிலாக வெளிப்படும் சமூக, அரசியல் விழுமியங்களை மதிப்பிடுவர்	***K5***

Relationship Matrix											
Semester	***Course Code***			***Title of the Course***						***Hours***	***Credits***
1	***25UTA11GL01***			பொதுத்தமிழ் – *1: General Tamil - 1*						***4***	***3***
Course Outcomes↓	***Programme Outcomes (PO)***					***Programme Specific Outcomes (PSO)***					***Mean Scores of COs***
	PO-1	***PO-2***	***PO-3***	***PO-4***	***PO-5***	***PSO-1***	***PSO-2***	***PSO-3***	***PSO-4***	***PSO-5***	
CO-1	*3*	*3*	*2*	*2*	*3*	*3*	*3*	*2*	*3*	*3*	*2.7*
CO-2	*2*	*2*	*3*	*2*	*2*	*3*	*2*	*3*	*2*	*3*	*2.4*
CO-3	*3*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2*	*2.8*
CO-4	*2*	*2*	*2*	*2*	*1*	*2*	*2*	*3*	*2*	*2*	*2.0*
CO-5	*3*	*2*	*3*	*2*	*2*	*3*	*2*	*2*	*3*	*3*	*2.5*
Mean Overall Score											***2.48 (High)***

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UFR11GL01	Language French – 1	4	3

Course Objectives
Familiarize students with the French language through an exploration of francophone culture, traditions, and civilization.
Build fundamental knowledge in listening, speaking, reading, and writing (LSRW) as outlined by the Common European Framework of Reference for Languages (CEFR).
Enable students to understand and use basic grammatical structures and essential vocabulary in context.
Equip students with the skills needed to engage in simple, real-life conversations and interactions in French.
Foster a deeper connection to the language by integrating cultural elements, enhancing motivation and intercultural awareness.

UNIT I **(12 Hours)**

1. Titre - Je Suis
2. Lexique - L'alphabet, les salutations, les loisirs, les nombres
3. Grammaire - Les pronoms personnels sujets, les articles définis et indéfinis, les verbes auxiliaires, les adjectifs de nationalité, l'adjectif interrogatif 'quel'
4. Production orale- se présenter
5. Production écrite - Donner des informations personnelles

UNIT II **(12 Hours)**

6. Titre - Près de moi
7. Lexique – Les lieux, la famille, la situation familiale, les professions
8. Grammaire – les verbes en 'er'au présent, le masculin et le féminin des professions, les adjectifs possessifs
9. Production orale- Demander et dire le lieu d'habitation
10. Production écrite - Présenter et parler de sa famille

UNIT III **(12 Hours)**

11. Titre - Qu'est-ce qu'on mange ?
12. Lexique – les commerces, les commerçants, les aliments, les moyens de paiement
13. Grammaire – le singulier et le pluriel des noms, les prépositions de lieu, les verbes en 'ir'
14. Production orale- faire des courses alimentaires, demander et dire le prix
15. Production écrite - Donner une appréciation, commander au restaurant, créer un menu

UNIT IV **(12 Hours)**

16. Titre - C'est où
17. Lexique – la ville, les monuments, les transports
18. Grammaire – la fréquence, l'impératif, les connecteurs
19. Production orale- demander et indiquer le chemin, se déplacer des transports en commun
20. Production écrite - présenter une ville ou un quartier, créer un guide pour un monument

UNIT V **(12 Hours)**

21. Titre - C'est tendance
22. Lexique – les vêtements, les couleurs, les matières, les objets technologiques, la météo
23. Grammaire – le genre et le nombre des adjectifs, le futur proche, la place des adjectifs, l'adjectif démonstratif
24. Production orale- demander et dire l'utilité d'un produit, parler de la météo
25. Production écrite - Donner une appréciation sur un vêtement, décrire un objet
26. Indian knowledge system- Incorporating hand gestures and expressions to reinforce non-verbal communication in French and assimilating traditional Indian culinary knowledge while learning French food cultures (5%)

Teaching Methodology	Kinesthetic & Multi-Sensory Learning, Rhythm-Based Learning – ex.comptines, Deductive & Explicit Learning- structural approach, oral approach, blended learning, media integration
Assessment Methods	*Oral assessment:* Introduce Oneself – (Rubric –assessed on correct usage of vocabulary, personal pronouns and basic verbs) *TPR activity:* Evaluate comprehension of oral commands like action words. (Rubric –assessed on comprehension, response and reaction time) *Reading comprehension:* Read a simple passage like a personal description, and answer questions. (Rubric –assessed on accuracy of response) *Written assessment:* Write simple structured texts on short personal introduction. (Rubric –Graded on correct grammar, sentence structure, and vocabulary usage)

Books for Study:

1. Mensdorff-Pouilly, L., Opatski, S., Petitmengin, V., Pons, S., Sperandio, C., Djimli, H., &Veldeman-Abry, J. (2022). *Édito A1: Méthode de français* (2nd ed.). Didier FLE, Hatier. (P.1-P.86)

Books for Reference:

1. Dauda, P., Giachino, L., &Baracco, C. (2020). *Génération A1*. Didier.
2. Mérieux, R., &Loiseau, Y. (2012). *Latitudes A1*. Didier.

Websites and e-learning Sources:

1. https://apprendre.tv5monde.com/en
2. https://www.thefrenchexperiment.com
3. https://www.iletaitunehistoire.com
4. https://www.francaisfacile.com
5. https://www.francaisauthentique.com

	Course Outcomes	
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Recognize and use fundamental vocabulary including greetings, while constructing simple sentences with personal pronouns and basic verbs.	**K1**
CO2	Introduce themselves, ask and answer questions about personal details, express preferences, and engage in role-play conversations related to daily life	**K2**
CO3	Differentiate between definite and indefinite articles, form plural and singular nouns, conjugate regular verbs in the present tense, and use adjectives correctly	**K3**
CO4	Ask for and give directions, order food, discuss weather conditions, describe clothing and objects, and create simple structured texts such as menus, guides, and personal descriptions.	**K4**
CO5	Demonstrate awareness of Francophone culture through language use in real-world scenarios, such as public transport, shopping, dining, and professional settings.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
1	**25UFR11GL01**			Language French – 1					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	1	3	2	1	1	2	3	1.9
CO2	3	2	3	3	1	3	2	3	3	3	2.6
CO3	2	2	2	2	2	2	1	2	2	2	1.9
CO4	3	3	3	3	2	3	2	2	2	3	2.6
CO5	3	2	2	3	3	3	3	2	3	3	2.7
Mean Overall Score											**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	**25UHI11GL01**	Language Hindi - 1	**4**	**3**

Course Objectives
To understand the basics of Hindi Language
To make the students to be familiar with the Hindi words
To enable the students to develop their effective communicative skills in Hindi
To introduce the socially relevant subjects in Modern Hindi Literature
To empower the students with globally employable soft skills

UNIT I **(12 Hours)**

1. Swar
2. Vyanjan
3. Barah Khadi
4. Shabd aur Vakya

UNIT II **(12 Hours)**

5. Rishtom ke Naam
6. Gharelu Padartho ke Naam
7. Sangya
8. Hindi Ginthi

UNIT III **(12 Hours)**

9. Sapthah ke Din
10. Sarvanam
11. Vilom Shabd
12. Dr. Abdul Kalam

UNIT IV **(12 Hours)**

13. Sal ke Maheene
14. Shareer ke Ang
15. Visheshan
16. Batcheeth - Dookan mein

UNIT V **(12 Hours)**

17. Janvarom ke Naam
18. Rang
19. Dishayem
20. Adhikal (Introduction)

Teaching Methodology	Peer Instruction Exercise, Videos, PPT, Quiz, Group Discussion
Assessment Methods	Seminar, Quiz, Assignment

Books for Study:

1. *Prathamic Patya Pusthak*, Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Chennai, 2022.
2. M. Ravi Chandran, *Concise Trilingual Dictionary,* Lotus Publications, Madurai, 2021.
3. M. kamathaprasad Gupth, *Hindi Vyakaran,* Anand Prakashan, Kolkatta, 2020.
4. *Madyama Patya Pusthak*, Dakshina Bharath Hindi Prachara Sabha, Thiagaraya Nagar, Chennai, 2022.

Books for Reference:

1. Dr. A. P. J. Abdul Kalam, *Mere sapnom ka Bharath,* Prabath Prakashan, Noida, 2020,
2. *Meri Pratham Hindi Sulekh Shabd Gyaan*, Wonder House Books, Noida, 2022.
3. Aravind Kumar, *Sampoorna Hindi Vyakaran our Rachana,* Lucent publisher, 2022.
4. *Adhunik Hindi Vyakaran our Rachana,* Bharati Bhavan Publishers & distributors, 2024.

5. Acharya Ramchandra Shukla, *Hindi Sahitya Ka Itihas*, Prabhat Prakashan, 2023.

Websites and e-Learning Sources:

1. https://learningmole.com/hindi-alphabet-letters-pronunciation-guide/
2. https://www.careerpower.in/hindi-alphabet-varnamala.html
3. https://www.youtube.com/watch?v=b0UvXnIC8qc
4. https://www.importanceoflanguages.com/learn-hindi-language-guide/
5. https://parikshapoint.com/hindi-sahitya/

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Introduction to Hindi sounds.	**K1**
CO2	Acquisition of Hindi Vocabulary.	**K2**
CO3	Sentence formation in Hindi.	**K3**
CO4	Practical application of grammar.	**K4**
CO5	Justify the social & political conditions of Aadhi Kaal in Hindi Literature.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours/week**			**Credits**
1	**25UHI11GL01**			Language Hindi - 1				**4**			**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scoreof Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	1	3	3	3	1	3	2	2.3
CO2	2	3	2	3	1	2	3	3	3	2	2.4
CO3	3	2	2	2	1	3	2	3	2	3	2.3
CO4	3	1	2	3	2	3	2	3	3	2	2.4
CO5	2	3	3	2	3	2	3	3	1	3	2.5
									Mean overall Score		**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	**25USA11GL01**	Language Sanskrit - 1	**4**	**3**

Course Objectives
To improve knowledge in Sanskrit
To train students in reading Sanskrit words
To introduce the fundamental grammar
To coach ethics and improve self-confident
To train the students to use the tenses in Sanskrit

UNIT I (**12 Hours)**

Introduction to Sanskrit

UNIT II (**12 Hours)**

Subhandha shabda vicaraha (akaara, aakaara, ikaara, iikaara)

UNIT III (**12 Hours)**

Vartamankala lat lakaara vakya prayogaha

UNIT IV (**12 Hours)**

Samskrita sharala vakya paricayaha

UNIT V (**12 Hours)**

Selected verses from good saying in Sanskrit

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

Shadhamanjari

Books for Reference:

1. Kulapathy, K.M., Sarala Samkrit Balabodh, Bharatiya Vidya Bhavan, Munushimarg Mumbai – 4000 007 2021
2. R.S. Vadhyar & Sons, Book – Sellers and publishers, Kalpathi. Palagahat 678003, Kerala, South Inida, Shabdha Manjari 2022
3. Balasubramaniam R, Samskrita Akshatra Siksha, Vangals Publications, 14th Main road, JP Nagar, Bangalore – 78 2020

Websites and e-Learning Sources:

1. https://www.learnsanskrit.org/static/pdf/vyakarana.pdf
2. https://archive.org/details/in.ernet.dli.2015.382597
3. https://openpathshala.com/sanskrit-grammar-basic/3

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO–1	Remember and Recall words relating to objects.	**K1**
CO–2	Understand classified vocabulary.	**K2**
CO–3	Apply nouns and verbs	**K3**
CO–4	Analyze different forms of names and verbs	**K4**
CO–5	Appreciate the good saying of Sanskrit Improve the self-values.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**25USA11GL01**			Language Sanskrit - 1						**4**	**3**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PS02**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	1	1	3	2	3	2	3	2	2	2.2
CO-2	2	2	3	3	1	2	2	3	3	2	2.3
CO-3	3	2	2	2	2	2	2	3	3	2	2.3
CO-4	3	2	2	3	2	3	3	3	2	2	2.3
CO-5	3	2	3	2	3	2	2	3	3	3	2.6
Mean Overall Score											**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UEN12GE01A	**General English – 1:** Pre-Intermediate Stream	5	3

Course Objectives (CO)
To develop basic listening, speaking, reading, and writing skills
To improve comprehension and fluency in both oral and written communication
To learn language rules to create meaningful written and spoken communication
To learn and integrate new vocabulary to expand language proficiency
To construct grammatically correct sentences and engage in simple conversations

UNIT I: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for familiar words in stories
	(Practice)	**:**	"The City Mouse and the Country Mouse"
Reading:	**(Skill)**	**:**	Reading aloud
	(Practice)	**:**	"The Peacock and the Crane" "The Curious Monkey"
Grammar:	**(Practice)**	**:**	Nouns: Types; Gender
Vocabulary:	**(Practice)**	**:**	Kinship terms
Speaking:	**(Skill)**	**:**	Repetition of Minimal Pairs
	(Practice)	**:**	Pronunciation of words
Writing:	**(Skill)**	**:**	Using capital letters correctly in names, the pronoun 'I,' days, months, languages, nationalities, sentence beginnings, and book titles
	(Practice)	**:**	Capitalisation

UNIT II: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to identify phrases and sentences
	(Practice)	**:**	"How to Be Happy in Every Situation"
Reading:	**(Skill)**	**:**	Reading for main ideas
	(Practice)	**:**	"The World is a Mirror"
Grammar:	**(Practice)**	**:**	Countable and Uncountable Nouns; Singular and Plural Nouns; Pronouns
Vocabulary:	**(Practice)**	**:**	Human body vocabulary
Speaking:	**(Skill)**	**:**	Responding to basic questions
	(Practice)	**:**	Simple conversations
Writing:	**(Skill)**	**:**	Writing personal and academic information with correct spelling
	(Practice)	**:**	Using Correct Spelling in Writing

UNIT III: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for main ideas
	(Practice)	**:**	"Magic Pot"
Reading:	**(Skill)**	**:**	Identifying the message of the story
	(Practice)	**:**	Zen story: "Carry On" Zen story: "Harmony"
Grammar:	**(Practice)**	**:**	Adjectives, Articles and Verbs
Vocabulary:	**(Practice)**		Vegetables and Fruits
Speaking:	**(Skill)**		Using 'be' verbs and adjectives to describe people, things and pictures
	(Practice)		Describing People, Things and Pictures
Writing:	**(Skill)**	**:**	Practising correct punctuation in writing
	(Practice)	**:**	Punctuation

UNIT IV: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for the main ideas in the story and expressing one's views about them
	(Practice)	**:**	"A Glass of Milk"
Reading:	**(Skill)**	**:**	Understanding the central idea of the story and sharing personal views

	(Practice)	**:**	"Birbal: The Wise Man"
Grammar:	**(Practice)**	**:**	Simple Present Tense
Vocabulary:	**(Practice)**	**:**	Plants, Trees and Flowers
Speaking:	**(Skill)**	**:**	Describing daily routines using the simple present tense
	(Practice)	**:**	Describing one's own routine and a friend's routine
Writing:	**(Skill)**	**:**	**Writing simple sentences in response to questions and on a given topic**
	(Practice)	**:**	Writing Simple Sentences

UNIT V: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to understand the sequence of ideas
	(Practice)	**:**	A Father and His Son
Reading:	**(Skill)**	**:**	Identifying the implicit idea of the story
	(Practice)	**:**	"The Stone Cutter"
Grammar:	**(Practice)**	**:**	Simple Past Tense
Vocabulary:	**(Practice)**	**:**	Birds, Animals and Insects
Speaking:	**(Skill)**	**:**	Narrating stories, events, or experiences using the simple past tense
	(Practice)	**:**	Narrating a Familiar Story or Past Events
Writing:	**(Skill)**	**:**	Writing a paragraph using a picture by answering questions or describing it.
	(Practice)	**:**	Picture Composition

Teaching Methodology	Lectures, task-based activities, audio-visual listening tasks, guided reading and writing exercises, discussions
Assessment Method	Listening and reading comprehension exercises, verbal presentations, role plays and conversations, writing tasks

Books for Study:
Seeds of English Skills by Dr. M. John Britto, Dr. B. Sam Jerome Sharone, and Dr. S. Sajeev.

	Course Outcomes	
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
CO-1	Recognize basic sounds, words, and simple ideas through listening practice.	**K1**
CO-2	Understand and engage in simple conversations, improving fluency in both oral and written communication.	**K2**
CO-3	Apply grammatical rules to construct meaningful sentences in spoken and written forms.	**K3**
CO-4	Integrate new vocabulary into everyday communication to expand language proficiency.	**K4**
CO-5	Construct grammatically correct sentences and engage in simple conversations, expressing personal experiences and opinions.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**25UEN12GE01A**			**General English – 1:** Pre-Intermediate Stream						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PS02**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	2	3	2	3	2	2	**2.4**
CO2	3	2	2	3	2	3	2	3	2	3	**2.5**
CO3	3	2	2	2	3	2	2	3	2	2	**2.3**
CO4	3	2	2	2	2	2	2	2	2	3	**2.2**
CO5	3	2	3	2	3	2	3	2	3	2	**2.5**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
1	25UEN12GE01B	**General English – 1:** Intermediate Stream	5	3

Course Objectives
To improve students' ability to listen, speak, read, and write in English through interactive and meaningful activities tailored to real-life contexts.
To enable students to use appropriate vocabulary, grammar, and pronunciation to introduce themselves, express opinions, describe people and places, and engage in conversations.
To equip students with reading strategies to comprehend texts, and apply structured writing methods to express ideas coherently.
To develop students' ability to use common grammar structures accurately and expand their vocabulary through word formation techniques.
To help students apply effective learning strategies to enhance their academic and professional success.

Unit 1: What's in a Name? (15 Hours)

1. Listening:	**(Skill)**	Listening for gist
	(Practice)	"Not Good with Names" by Cynthia Win (a TED talk)
2. Reading:	**(Skill)**	Skimming
	(Practice)	"Eli, the Equation"
3. Grammar:	**(Practice)**	Nouns
4. Vocabulary:	**(Practice)**	Forming compound nouns
5. Study Skill:		Using online dictionaries
6. Speaking:	**(Skill)**	Initiating conversations (Greeting – Starting a conversation with new people – Introducing and answering an introduction)
	(Practice)	Introducing oneself and others in conversations
7. Writing:	**(Skill)**	Narrating a personal anecdote – Using capitals and end mark punctuations in sentences
	(Practice)	Guided Composition: The story of my name

Unit 2: Family is Forever! (15 Hours)

1. Listening:	**(Skill)**	Predicting topics
	(Practice)	"Tracing Roots, Telling Stories"
2. Reading:	**(Skill)**	Scanning
	(Practice)	"Home Lost, Family Found"
3. Grammar:	**(Practice)**	Pronouns
4. Vocabulary:	**(Practice)**	Words related to family and relationships
5. Study Skill:		Recognising your learning style
6. Speaking:	**(Skill)**	Talking about your family (family members and relationships, their personalities and your attachment, family routines, and challenges)
	(Practice)	Talking about your family (in conversations)
7. Writing:	**(Skill)**	Narrating events in chronological order – Using punctuations in numbers
	(Practice)	Controlled Composition: My family history

Unit 3: Nothing is Better than a Good Friend (15 Hours)

1. Listening:	**(Skill)**	Listening for main idea
	(Practice)	"Nothing is better than a good friend"
2. Reading:	**(Skill)**	Predicting
	(Practice)	(Jigsaw reading) Fables about friends: (a) "The Hare with Many Friends" – (b) "The Two Fellows and the Bear" – (c) "The Fox and the Stork" – (d) "The Four Friends and a Hunter"
3. Grammar:	**(Practice)**	Adjectives
4. Vocabulary:	**(Practice)**	Forming nouns, adjectives, verbs and adverbs using suffixes
5. Study skill:		Setting and prioritising language learning goals
6. Speaking:	**(Skill)**	Talking about people (Describing people's appearance and their mannerism – Giving your opinion about people – Expressing what you like and dislike in a person)

	(Practice)	Delivering a short talk about one's best friend
7. Writing:	**(Skill)**	Describing people (What they wear, how they move and seem to feel, and where they are) Using comma in sentences.
	(Practice)	Controlled composition: Describing people in given pictures

Unit 4: The Inner Me **(15 Hours)**

1. Listening:	**(Skill)**	Listening to understand pronunciation
	(Practice)	"The bare necessities" from *The Jungle Book*
2. Reading:	**(Skill)**	Previewing a text
	(Practice)	"The Surprising Benefits of Being an Introvert"
3. Grammar:	**(Practice)**	Articles and Quantifiers
4. Vocabulary:	**(Practice)**	Forming words with different meanings using prefixes
5. Study skill:		Planning a study schedule
6. Speaking:	**(Skill)**	Asking about feelings – Expressing one's feelings
	(Practice)	Talking about feelings in different situations
7. Writing:	**(Skill)**	Describing character traits (Writing about what characters would say or do) Using quotation marks and apostrophes in sentences
	(Practice)	Controlled Composition: Cruel Cinderella

Unit 5: Hometown Appetite **(15 Hours)**

1. Listening:	**(Skill)**	Listening for supporting details
	(Practice)	"The Village that Raised Me"
2. Reading:	**(Skill)**	Questioning circles for active reading
	(Practice)	"Homecoming"
3. Grammar:	**(Practice)**	Prepositions of time, place and movement
4. Vocabulary:	**(Practice)**	Changing words from one class to another
5. Study skill:		Tracking progress in learning
6. Speaking:	**(Skill)**	Describing a place
	(Practice)	Talking about your hometown
7. Writing:	**(Skill)**	Describing objects – Using colon in sentences
	(Practice)	Controlled Composition: Writing posts for social media, describing your college campus and classroom

Teaching Methodology	Lectures, Demonstrations, Discussions, Peer-Review Tasks, Role-plays, Pair and group activities
Assessment Tools	Listening and reading comprehension tasks, Individual talks, Role plays, Controlled and guided compositions

Books for Study:

M.S. Xavier Pradheep Singh, J. Amalaveenus, and A. Napoleon. *English and Me* by Viva Books, 2025.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Identify and recall common grammar structures, vocabulary, and pronunciation patterns used in everyday communication.	**K1**
CO2	Demonstrate comprehension of spoken and written texts by summarising key ideas, identifying main points, and making inferences.	**K2**
CO3	Use appropriate vocabulary, grammar, and pronunciation to introduce themselves, express opinions, describe people and places, and engage in meaningful conversations.	**K3**
CO4	Differentiate between various reading and writing strategies, such as skimming, scanning, and structured writing, to effectively interpret and construct texts.	**K4**
CO5	Critically review written and spoken texts for clarity, coherence, and correctness, providing constructive feedback for improvement.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
1	**25UEN12GE01B**		**General English – 1:** Intermediate Stream						**5**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2.5	3	3	2.5	3	3	2.5	2.5	3	2.8
CO2	2.5	3	2.5	2.5	2.5	3	3	2.5	2.5	3	2.7
CO3	3	2.5	2.5	3	3	2.5	2.5	2.5	3	2.5	2.7
CO4	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.5	2.6
CO5	3	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.65
Mean Overall Score											**2.69 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UMA13CC01	**Core Course - 1:** Algebra and Trigonometry	5	4

Course Objectives
To develop a strong foundation in algebraic and trigonometric principles essential for higher mathematical learning.
To enhance students' problem-solving abilities in binomial, exponential, and logarithmic series.
To understand and analyze the structure of equations, their roots, and transformations.
To explore trigonometric expansions and hyperbolic functions for advanced applications.
To apply algebraic and trigonometric techniques in real-world mathematical modelling and computations.

UNIT I **(15 Hours)**

Application of the Binomial theorem to the summation of series-summation of Exponential series-The Logarithmic series (Theorems without proof)-Related Problems

UNIT II **(15 Hours)**

Theory of equations-Irrational roots and Imaginary roots -Relation between roots and coefficients-Sum of the r^{th} powers of roots-transformation of equations. *(Problems only)*

UNIT III **(15 Hours)**

Reciprocal Equations-Standard form - Increasing or decreasing the roots of a given equation - Removal of terms-Form of the quotient and remainder when a polynomial is divided by a binomial-Approximate solution of roots of polynomials by Horner's method. *(Problems only)*

UNIT IV **(15 Hours)**

Expansions of $\cos n\theta$, $\sin n\theta$-Expansion of $\tan n\theta$ in powers of $\tan\theta$- powers of sines and cosines of θ in terms of multiples of θ-Expansions of $\sin\theta, \cos\theta$ and $\tan\theta$ in a series of ascending powers of θ- Related Problems.

UNIT V **(15 Hours)**

Hyperbolic functions-Relation between circular and hyperbolic functions-Formula in hyperbolic functions, Inverse hyperbolic functions-Logarithms of complex quantities-Related Problems.

Teaching Methodology	Chalk and Talk, PPT, Problem solving
Assessment Methods	Snap Test, MCQ, Writing assignments

Books for Study:

1. Pillay, T. K. M., Natarajan, T., & Ganapathy, K. S. (2013). *Algebra Vol. I*. S. Viswanathan Publishers.
   Unit-I *Chapter3-Sec 10, Chapter 4-Sec 3 - 7*
   Unit-II Chapter *6-Sec 1-11, 13, 14, 15.*
   Unit-III *Chapter 6-Sec 16, 17, 18, 19, 30*
2. Narayanan, S., & Pillay, T. K. M. (2013). *Trigonometry*. S. Viswanathan Publishers.
   Unit-IV *Chapter 3-Sec 1-3 (Omitting formation of equations), Sec 4, 5*
   Unit-V *Chapter 4-Sec 1, 2, Chapter 5-Sec 5*

Books for Reference:

1. Burnstine, W. S., & Panton, A. W. *Theory of equations*.
2. Lay, D. C. (2007). *Linear algebra and its applications* (3rd ed.). Pearson Education Asia.
3. Thomas, G. B., & Finney, R. L. (2005). *Calculus* (9th ed.). Pearson Education.
4. Durell, C. V., & Robson, A. (2003). *Advanced trigonometry*. Courier Corporation.
5. Stewart, J., Redlin, L., & Watson, S. (2012). *Algebra and trigonometry*. Cengage Learning.

Websites and eLearning Sources:

1. https://pjk.edu.my/penerbitanPJK/Ebook_BASIC%20ALGEBRA%20(LECTURE%20NOTES%20AND%20WORKSHEET)-compressed.pdf

2. https://en.wikipedia.org/wiki/Algebra
3. https://ncert.nic.in/textbook/pdf/jemh108.pdf

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Recall fundamental concepts of algebra, equations, trigonometric expansions, and hyperbolic functions.	**K1**
CO2	Understand and explain the properties of series, equations, transformations, and trigonometric identities.	**K2**
CO3	Apply algebraic and trigonometric techniques to solve mathematical problems effectively.	**K3**
CO4	Analyze equations, polynomial structures, and trigonometric functions for deeper mathematical insights.	**K4**
CO5	Develop problem-solving strategies and apply mathematical concepts to advanced studies and real-world applications.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**25UMA13CC01**			**Core Course - 1:** Algebra and Trigonometry						**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	2	2	3	2	2	2	**2.1**
CO2	3	2	2	3	2	2	2	2	2	3	**2.3**
CO3	2	3	3	2	2	2	2	2	3	3	**2.4**
CO4	2	2	3	2	2	2	2	3	3	2	**2.3**
CO5	2	2	3	2	2	3	2	3	2	3	**2.4**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UMA13CC02	**Core Course - 2**: Differential Calculus	6	4

Course Objectives
To have the basic skills of differentiation for successive differentiation, and their applications
To have knowledge on successive partial differentiation and total differentiation
To apply partial derivatives to find maxima and minima
To understand the concept of the envelope of the family of curves, evolutes and involutes, polar co-ordinates
To evaluate scalar and vector quantities like gradient, divergent and curl.

UNIT I Successive Differentiation **(18 Hours)**

Introduction (Review of basic concepts) - The n^{th} derivative - Standard results - Fractional expressions - Trigonometrical transformation - Formation of equations involving derivatives - Leibnitz formula for the n^{th} derivative of a product (without proof).

UNIT II Partial Differentiation **(18 Hours)**

Partial derivatives - Successive partial derivatives - Function of a function rule - Total differential coefficient - A special case - Implicit Functions

UNIT III Partial Differentiation (Continued) **(18 Hours)**

Homogeneous functions - Partial derivatives of a function of two variables - Maxima and Minima of functions of two variables - Lagrange's method of undetermined multipliers.

UNIT IV Envelope and Curvature **(18 Hours)**

Method of finding the envelope - Another definition of envelope - Envelope of family of curves which are quadratic in the parameter.

Definition of Curvature - Circle, Radius and Centre of Curvature - Evolutes and Involutes - Radius of Curvature in Polar Co-ordinates

UNIT V Vector Differentiation **(18 Hours)**

Gradient, Divergence and Curl - Definitions, identities and simple problems - Directional derivative and Laplacian - Definition and simple problems.

Teaching Methodology	Chart, PPT, Chalk and Talk, Videos
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Narayanan S & Manickavasagam Pillay T K (2015) *Calculus Volume I*, Viswanathan Publishers Pvt. Ltd.
   Unit I: Chapter 3 (*Sec:*1.1-1.6, 2.1)
   Unit II: Chapter 8 (*Sec:*1.1-1.5)
   Unit III: Chapter 8 (*Sec:*1.6-1.7, 4-5)
   Unit IV: Chapter10 (*Sec:*1.1-1.4, 2.1-2.7)
2. Narayanan S & Manickavasagam Pillay T K (1994) *Vector Algebra and Analysis*, S. Viswanathan Printers & Publishers Pvt. Ltd.
   Unit V: *Chapter 4 (Sec: 6-12)*

Books for Reference:

1. Courant, R. & John, F. (1989). *Introduction to Calculus and Analysis, (Volumes I & II)*, Springer-Verlag, New York, Inc.
2. Apostol, T. *Calculus, Volumes I and II.*
3. Goldberg, S. *Calculus and mathematical analysis*.
4. Arumugam, S. & Thangapandi, I. A. (2008). *Analytical Geometry (3D) and Vector Calculus.* New Gamma Publishing House.

Websites and eLearning Sources:

1. https://theengineeringmaths.com/wp-content/uploads/2017/08/Chapter-1-Successive-Differentiation-.pdf
2. https://tutorial.math.lamar.edu/classes/calciii/partialderivatives.aspx
3. https://www.youtube.com/watch?v=t7VGyM7jOsU

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Acquire basic knowledge successive differentiation, partial and total differentiation, envelope and curvature and Vector differentiation.	**K1**
CO2	Understand the concepts successive differentiation, involutes evolutes, curvatures and divergent and curl of a vector.	**K2**
CO3	Apply Leibnitz formula for n^{th} derivative partial differentiation for maxima and minima, involutes, evolutes and curvature and vector calculus to real life problems	**K3**
CO4	Analyze various method studied	**K4**
CO5	Evaluate n^{th} derivatives, maxima minima, envelopes, curvature and Vector differentiation.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
1	**25UMA13CC02**		**Core Course - 2:** Differential Calculus							**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	2	3	3	2	2	3	**2.2**
CO2	2	3	2	1	2	3	3	2	2	3	**2.3**
CO3	1	2	3	2	3	2	3	2	3	2	**2.3**
CO4	1	2	2	2	2	3	2	3	3	2	**2.2**
CO5	2	3	2	3	1	3	2	3	2	3	**2.4**
										Mean Overall Score	**2.28 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UMA13CC03	**Core Course - 3:** A Foundation Course in Mathematics	2	1

Course Objectives
To strengthen fundamental mathematical concepts to bridge the gap between school and higher education.
To develop problem-solving skills using algebra, trigonometry, calculus, vectors, matrices, functions, and relations.
To enhance analytical thinking and logical reasoning through mathematical applications.
To provide students with a strong foundation in mathematical concepts necessary for advanced studies in science, engineering, and commerce.
To introduce real-world applications of mathematics to build interest and confidence in the subject.

UNIT I **(6 Hours)**

Algebra: Binomial theorem, general term, middle term, problems based on these concepts. Sequences and series (progressions) - arithmetic progression (AP) and geometric progression (GP). Fundamental principle of counting. Factorial n. Permutations and combinations - derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.

UNIT II **(6 Hours)**

Trigonometry: Introduction to trigonometric ratios, proof of sin(A+B), cos(A+B), tan(A+B) formulae. Multiple and sub-multiple angles - sin(2A), cos(2A), tan(2A), etc. Transformations - sum into product and product into sum formulae. Inverse trigonometric functions, sine rule, and cosine rule. Applications of trigonometry in heights and distances.

UNIT III **(6 Hours)**

Calculus: Limits - definition, standard formulae, and problems. Differentiation - first principle, basic rules (uv rule, u/v rule, chain rule), methods of differentiation, applications of derivatives - slope of a curve, maxima and minima. Integration - basic formulas, product rule, substitution method, applications of definite integrals.

UNIT IV **(6 Hours)**

Vectors and Matrices: Vectors - definition, types of vectors, vector operations (addition, scalar multiplication). Dot product and cross product with applications. Matrices - types of matrices, basic operations (addition, multiplication), determinants, inverse of a matrix. Solving simple systems of equations using matrices.

UNIT V **(6 Hours)**

Functions and Relations: Definition of functions and relations. Types of functions - one-one, onto, into, bijective functions. Algebra of functions - sum, difference, product, and quotient of functions. Composition of functions and inverse functions. Graphs of simple functions and transformations.

Teaching Methodology	chalk and talk, PPT, Problem solving
Assessment Methods	Snap Test, MCQ, Writing assignments

Books for Study:

1. NCERT class XI and XII text books.

Books for Reference:

1. Pillay, T. K. M., Natarajan, T., & Ganapathy, K. S. (2013). *Algebra Vol. I*. S. Viswanathan Publishers.
2. Pillay, T. K. M., Natarajan, T., & Ganapathy, K. S. (2013). *Algebra Vol. II*. S. Viswanathan Publishers.
3. Narayanan, S., & Pillay, T. K. M. (2013). *Calculus Vol. I*. S. Viswanathan Publishers.
4. Narayanan, S., & Pillay, T. K. M. (2013). *Calculus Vol. II*. S. Viswanathan Publishers.
5. Narayanan, S., & Pillay, T. K. M. (2013). *Calculus Vol. III*. S. Viswanathan Publishers.
6. Narayanan, S., & Pillay, T. K. M. (2013). *Trigonometry*. S. Viswanathan Publishers.

7. Arumugam, S., & Isaac, A. (2015). *Modern Algebra*. Scitech Publications.

Websites and eLearning Sources:

1. https://tnschools.gov.in/scert?lang=en
2. https://ncert.nic.in/textbook.php

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire knowledge of fundamental mathematical concepts such as trigonometry, differential calculus, series, binomial theorem, and permutations & combinations.	**K1**
CO2	Understand the process of finding the sum of series, derivatives of functions, and trigonometric expansions.	**K2**
CO3	Apply the binomial theorem, trigonometric identities, derivatives, and permutations & combinations to solve mathematical problems.	**K3**
CO4	Analyze mathematical expressions and apply problem-solving techniques in algebra, calculus, and trigonometry.	**K4**
CO5	Develop logical reasoning and mathematical skills for advanced studies and real-world applications.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
1	**25UMA13CC03**	**Core Course - 3:** A Foundation Course in Mathematics								**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	1	1	3	2	3	2	3	**2.2**
CO2	1	2	3	2	3	2	3	2	3	2	**2.3**
CO3	2	3	2	1	2	3	3	2	2	3	**2.3**
CO4	1	2	2	2	3	1	3	2	2	3	**2.1**
CO5	1	2	2	3	1	2	3	2	2	3	**2.1**
										Mean Overall Score	**2.2 (High)**

Evaluation Pattern:

Internal (50 Marks)	**External (50 Marks)**
Component 1 (25 Marks) - Assignment	Written Test
Component 2 (25 Marks) - Written Test	25 qns × 2 marks = 50 Marks

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UMA13AC01	**Allied Course - 1:** Statistics - 1	6	4

Course Objectives
To make the students to gain wide knowledge in the fundamental concepts of Statistics
To understand the idea of random variables and its types
To derive certain values incorporated with random variables
To relate the statistical distributions with the real life situations
To apply statistical techniques to get the solutions to real life problems

UNIT I **(18 Hours)**

Random variables - Distribution function - Discrete random variable - Continuous random variable.

UNIT II **(18 Hours)**

Mathematical expectation - Expectation of a function of a random variable - Properties of expectation - Properties of variance - Covariance.

UNIT III **(18 Hours)**

Moment generating function - Properties of cumulants - Chebychev's inequality (Theorem with proof only) - Binomial distribution (Derivation only for Recurrence relation for the moments).

UNIT IV **(18 Hours)**

Poisson distribution: Properties, Moments of Poisson distribution (Derivation only for Recurrence relation for the moments) - Geometric distribution: Moment generating function of Geometric distribution.

UNIT V **(18 Hours)**

Normal distribution - Moment generating function of Normal distribution (Derivation), Mean deviation about mean - Gamma distribution - Exponential distribution.

Note: For all the distributions from units III, IV, V, statements of the results only without derivations in subsections

Teaching Methodology	Black board, chalk and talk, Demonstration, Problem solving, group discussion, PPT
Assessment Method	MCQ, Unit Tests, Assignments, Online Tests

Books for Study:

1. Gupta, S.C., & Kapoor, V.K. (2002). *Fundamentals of Mathematical Statistics*, (11th Ed.). Sultan Chand and Sons.
   Unit I: *Chapter 5: Sec 5.1-5.4*
   Unit II: *Chapter 6: Sec 6.1 - 6.6*
   Unit III: *Chapter 7: Sec 7.1,7.2 and 7.5,* (*Omit problems in Cumulants*)
   Chapter 8: Sec 8.4(Omit 8.4.3, 8.4.10-8.4.12)
   Unit IV: *Chapter 8: 8.5 (Omit 8.5.10) and 8.7*
   Unit V: *Chapter 9: Sec 9.2 (Omit 9.2.11-9.2.15), 9.5 and 9.8*

Books for Reference:

1. Vittal, P.R. (2004). *Mathematical Statistics*. Margham Publications.
2. Kapur, J.N & Saxena, H.C. (2010). *Mathematical Statistics,* (10th Ed.). S. Chand & Co Ltd.

Websites and eLearning Sources:

1. https://www.geeksforgeeks.org/engineering-mathematics/random-variable/
2. https://www.slideshare.net/slideshow/mathematical-expectation-and-variance/3206338
3. https://www.mgsubikaner.ac.in/PDF/63d8aad289f46.pdf

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Level (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire the knowledge of basic concepts in statistics	**K1**
CO2	Be able to understand various types of random variables and the distributions	**K2**
CO3	Calculate moments, cumulants, moment generating function and various constants of probability distributions	**K3**
CO4	Illustrate the theory of random variables, distribution functions and probability distributions with suitable example.	**K4**
CO5	Be able to find solution of real life problems under the concept of probability and probability distributions.	**K5**

Relationship Matrix												
Semester	**Course Code**			**Title of the Course**							**Hours**	**Credits**
1	**25UMA13AC01**			**Allied Course - 1:** Statistics - 1							**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**		
CO1	3	3	2	2	1	3	3	2	1	2	**2.2**	
CO2	3	3	2	2	1	3	3	2	1	2	**2.2**	
CO3	3	2	2	2	1	3	3	2	1	2	**2.1**	
CO4	3	3	2	2	1	3	3	2	1	2	**2.2**	
CO5	3	3	3	2	1	3	3	2	1	2	**2.3**	
Mean Overall Score											**2.2 (High)**	

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UHE14VE01	**Value Education - 1:** Essentials of Humanity	2	1

Course Objectives
To identify one's own potentials, strengths and weaknesses
To identify various challenges (physical, emotional and social) in adolescence
To consciously overcome one's challenges and move towards self-esteem
To maximize one's own potential in enabling holistic development
To assimilate human values comprehensively

UNIT I: Value Education (6 Hours)

Introduction to values - Characteristics and Roots of Values - Value Education & Value Clarification - Moral Characters - Kinds of Values - Objectives of Values

UNIT II: Human Personality (6 Hours)

Personality: Introduction, Traits, Theories, Integration & Factors influencing the development of personality - Discovering self - Defense Mechanism -Power of positive thinking - Why worry?

UNIT III: Human Development (6 Hours)

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development – Practical Sessions on Health and Wellness

UNIT IV: Responsible Parenthood (6 Hours)

Human Sexuality - Marriage and Family - Sex and Love - Characteristics of Responsible parent - Causes of Marriage disharmony - Art of wise parenting

UNIT V: Gender Equality and Empowerment (6 Hours)

Historical perspective - Women in Independence struggle - Women in Independent India - Education & Economic development - Crimes against Women - Women rights - Time-line of Women achievements in India

Teaching Methodology	Power point
Assessment Methods	Seminars, Reports, Group Discussion, Online Tests, Assignments

Books for Study:

1. Department of Human Excellence. (2023). *Essentials of Humanity.* St. Joseph's College.

Books for Reference:

1. Alex, K. (2009). *Soft Skills.* S. Chand.
2. Norman Vincent Peale (1952). *The Power of Positive Thinking Norman Vincent Peale.* New York Times
3. Kalam, A. A. P. J. (2012). *You Are Unique.* Punya Publishing.

Websites and eLearning Sources:

1. http://livingvalues.net. Accessed 05 March 2021.
2. https://www.psychologytoday.com/us/basics/defense-mechanisms.Accessed 12 March 2025.
3. http://www.apa.org/topics/personality#. Accessed 05 March 2021.
4. http://www.peacecorps.gov/educators/resources/global-issues-gender-equaligy-and-womens-empowerment/. Accessed 05 March 2021.
5. https://www.nextias.com/blog/women-empowerment/Accessed 12 March 2025.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the prescribed values and the dimensions.	**K1**
CO2	Examine themselves by learning the developmental changes happening in the course of their lifetime.	**K2**
CO3	Apply the trained values in the day-to-day life.	**K3**

Relationship Matrix												
Semester	**Course Code**			**Title of the Course**							**Hours**	**Credits**
1	**25UHE14VE01**			**Value Education - 1:** Essentials of Humanity							**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**		
CO1	3	3	3	3	2	3	3	2	3	3	**2.8**	
CO2	3	2	2	3	3	2	3	3	2	2	**2.5**	
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**	
										Mean Overall Score	**2.7 (High)**	

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UTA21GL02	பொதுத்தமிழ் – 2: General Tamil - 2	4	3

கற்றலின் நோக்கங்கள் (Course Objectives)
காப்பியங்களின் தோற்றம், வரையறை, வகைகள் ஆகியவற்றை அறிந்து கொள்ளல்
பெருங்காப்பியம், சிறுகாப்பியம் இடையேயான வேறுபாட்டைக் கண்டறிதல்
சைவ வைணவ சமயப் பாடல்களில் சிறப்பினை ஒப்பிடுதல்
காப்பியங்கள் வெளிப்படுத்தும் விழுமியங்களையும் உணர்தல்
சமூகத்திற்கும், காப்பியத்திற்குமான பிணைப்புகள் குறித்துத் தெரிந்துகொள்ளுதல்

அலகு-1 **(12 மணி நேரம்)**

சிலப்பதிகாரம் - ஆய்ச்சியர் குரவை
மணிமேகலை – ஊர் அலர் உரைத்த காதை
இலக்கிய வரலாறு – சைவம் வளர்த்த தமிழ் முதல் புராணங்கள் முடிய
இலக்கணம் – அகப்பொருள் இலக்கணம்

அலகு-2 **(12 மணி நேரம்)**

திருநாவுக்கரசர் – திருவதிகை வீரட்டானம்
(கூற்றாயினவாறு எனத் தொடங்கும் முதல் 10 பாடல்கள்)
திருவாசகம் - அடைக்கலப்பத்து
(செழுக்கமலத் திரளனநின் எனத் தொடங்கும் முதல் 10 பாடல்கள்)
திருமந்திரம் – மாகேசுர பூசை (11 பாடல்கள்)
சிவவாக்கியர் பாடல்கள் (15 பாடல்கள்)
பாடல் எண்கள் – 16,22,27,33,34,35,37,38,47,81,91,225,237,242,495

அலகு-3 **(12 மணி நேரம்)**

பெரியாழ்வார் திருமொழி – திருப்பல்லாண்டு – தாலப்பருவம் (10 பாடல்கள்
திருமங்கையாழ்வாரின் பெரிய திருமொழி – திருவரங்கம் -1 (10 பாடல்கள்)
கம்பராமாயணம் – கங்கை காண் படலம் - (தேர்ந்தெடுக்கப்பட்ட 35 பாடல்கள்)
பாடல் எண்கள்: 1, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 22, 24, 25, 26, 27, 29, 30, 32,33,35,39,40,41,42,43,47,62,64,65,67,69,70
நற்றமிழ்க் கோவை – முதல் மூன்று கட்டுரைகள்.

அலகு-4 **(12 மணி நேரம்)**

சீறாப்புராணம் – நதி கடந்த படலம் – 1 முதல் 31 முடிய உள்ள பாடல்கள்
கள்வரை நதிமறித்த படலம் – 1 முதல் 16 முடிய உள்ள பாடல்கள்
இலக்கணம் – புறப்பொருள் இலக்கணம்
இலக்கிய வரலாறு – தமிழ் இலக்கண நூல்கள் முதல் சிற்றிலக்கியங்கள் முடிய

அலகு-5 **(12 மணி நேரம்)**

வீரமாமுனிவரின் தேம்பாவணி – (காசா) காசை சேர் படலம்
(1 முதல் 50 முடிய உள்ள பாடல்கள்)
சீனயி (சீனாய்) - மாமலை காண்படலம் -(1 முதல் 56 முடிய உள்ள பாடல்கள்)
நற்றமிழ்க் கோவை – இறுதி மூன்று கட்டுரைகள்.

கற்பித்தல் முறை (Teaching Methods)	விரிவுரை **(Lecture),** காணொளிக் காட்சி **(Videos),** விளக்கக் காட்சி **(PPT presentation)**
மதிப்பீட்டு முறைகள் (Assessment Pattern)	இயங்கலைத்தேர்வு **(Online Test),** நூல் நோக்குத் தேர்வு (open book test) ஒப்படைவு **(Assignment),** வினாடி வினா **(Quiz),** கருத்துரை **(Seminar)**

பாடநூல்கள்:

1. பொதுத்தமிழ் (2025), தமிழாய்வுத்துறை, தூய வளனார் கல்லூரி
2. நற்றமிழ்க் கோவை - கட்டுரைத்தொகுப்பு (2025), தமிழாய்வுத்துறை வெளியீடு, தூய வளனார் கல்லூரி

Websites and eLearning Sources:

1. https://www.tamiluniversity.ac.in/english/library2-/digital-library/
2. https://www.tamilvu.org/ta/library-l3100-html-l3100pl1-132372
3. https://www.tamilvu.org/ta/courses-degree-p202-p2021-html-p202121-28011
4. https://www.chennailibrary.com/vaishnava/naalayiradivyaprabhandham.html

5. https://www.tamilvu.org/ta/library-l4310-html-l4310por-141616
6. https://www.tamilvu.org/slet/l4100/l4100pd2.jsp?bookid=80&pno=287

Course Outcomes

CO No.	***CO–Statements*** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	***Cognitive Levels (K –Levels)***
CO–1	பழந்தமிழர் வாழ்வியலையும் பன்முக ஆளுமைகளையும் அறிவர்	***K1***
CO–2	தமிழரின் பல்துறை அறிவு, மரபு போன்றவற்றை அறிந்து கொள்வர்.	***K2***
CO–3	பெருங்காப்பிய மரபிற்குள் வரும் இலக்கியங்களை அடையாளம் காண்பதோடு அவற்றை விளக்கும் திறனையும் பெறுவர்.	***K3***
CO–4	புராண இதிகாச மரபுகளிலிருந்து, காப்பியம் என்னும் புதிய இலக்கிய வடிவம் உருவான விதத்தை மதிப்பிடுவர்.	***K4***
CO–5	இலக்கிய வரலாறு, இலக்கணம், காப்பியங்கள் ஆகியவற்றைக் கற்பதன் வழி போட்டித் தேர்வுகளை எதிர்கொள்ளும் திறன் பெறுவர்	***K5***

Relationship Matrix											
Semester	***Course Code***			***Title of the Course***						***Hours***	***Credits***
2	***25UTA21GL02***			பொதுத்தமிழ் – *2: General Tamil - 2*						***4***	***3***
Course Outcomes↓	***Programme Outcomes (PO)***					***Programme Specific Outcomes (PSO)***					***Mean Scores of COs***
	PO1	***PO2***	***PO3***	***PO4***	***PO5***	***PSO1***	***PSO2***	***PSO3***	***PSO4***	***PSO5***	
CO-1	*2*	*3*	*2*	*3*	*3*	*3*	*3*	*3*	*3*	*3*	*2.8*
CO-2	*3*	*2*	*2*	*2*	*2*	*3*	*3*	*3*	*2*	*2*	*2.4*
CO-3	*2*	*3*	*1*	*3*	*1*	*3*	*3*	*3*	*1*	*2*	*2.2*
CO-4	*3*	*3*	*2*	*3*	*1*	*3*	*3*	*3*	*1*	*3*	*2.5*
CO-5	*3*	*3*	*2*	*2*	*3*	*3*	*3*	*2*	*2*	*2*	*2.5*
Mean Overall Score											***2.48 (High)***

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	**25UFR21GL02**	Language French – 2	**4**	**3**

Course Objectives
Develop Communicative Competence in French enabling students to engage in simple, real-life conversations and interactions
Master Fundamental Grammar and Vocabulary by understanding and applying essential grammatical structures in context
Explore Francophone Culture and Civilization by integrating cultural elements of French-speaking regions
Enhance Practical Language Use in Everyday Situations
Express Ideas in Different Contexts Using Appropriate Tenses

UNIT I **(12 Hours)**

1. Titre - Qu'est-ce qu'on fait aujourd'hui ?
2. Lexique –l'heure, les activités quotidiennes, la description physique
3. Grammaire –les verbes pronominaux au présent, le passé récent, la fréquence
4. Production orale- demander l'heure, proposer une sortie
5. Production écrite - présenter ses activités quotidiennes, décrire une personne

UNIT II **(12 Hours)**

6. Titre - Chez -moi
7. Lexique – le logement, les meubles, les pièces, l'équipement
8. Grammaire – le passe compose avec avoir, les pronoms COD
9. Production orale- s'informer sur un logement
10. Production écrite - expliquer un problème domestique, écrire une annonce pour un logement

UNIT III **(12 Hours)**

11. Titre - En forme
12. Lexique – les parties du corps, les maladies, les médicaments, les sports
13. Grammaire –Le passé composé avec être, le pronom 'y',
14. Production orale- parler de sa santé, exprimer une émotion positive
15. Production écrite - Donner un conseil, exprimer son accord ou son désaccord

UNIT IV **(12 Hours)**

16. Titre - Bonne vacances
17. Lexique – les destinations, l'hébergement, la réservation, la nature
18. Grammaire – la comparaison, les verbes impersonnels à l'imparfait comme c'était
19. Production orale- réserver une chambre a l'hôtel, décrire une ville ou un paysage
20. Production écrite - réaliser une brochure touristique, écrire une carte postale

UNIT V **(12 Hours)**

21. Titre - Au travail
22. Lexique – les études, les disciplines, les lieux de travail, les taches
23. Grammaire – la durée, les pronoms relatifs
24. Production orale- parler de ses études et son projet professionnel
25. Production écrite - comparer le système scolaire français et indien
26. Indian knowledge system–Highlighting on Gurukulam Education System that focuses on traditional teacher-student relationships, oral learning methods, and holistic education while discussing education systems in India vs. France (5%)

Teaching Methodology	Visual-Linguistic Learning, Descriptive & Interpretative Learning, experiential learning, The Lexical Approach, Differentiated Instruction
Assessment Methods	*Role -play:* A mock phone call on hotel reservation, discuss daily routines, housing, and health. (Rubric – graded on grammatical accuracy, and use of appropriate vocabulary) *Picture description activity:* Describe a landscape or travel destination shown in a picture. (Rubric – Assessed on descriptive abilities and vocabulary use) *Experimental learning task:* Doctor-patient conversation about a health issue, Conduct a mock interview about career plans. (Rubric – Assessed on real-life application of language skills) *Project based assessment*: Create a travel brochure for a French-speaking destination, make a poster comparing education in France and India (Rubric – Assessed on Application of language skills in a creative way) *Written assessment*: Write a short daily routine using time expressions, write a postcard describing a recent trip (Rubric – Assessed on ability to write structured texts related to themes)

Books for Study:

1. Mensdorff - Pouilly, L., Opatski, S., Petitmengin, V., Pons, S., Sperandio, C., Djimli, H., & Veldeman - Abry, J. (2022). *Édito A1: Méthode de français* (2nd ed.). Didier FLE, Hatier. (p.87-p.165)

Books for Reference:

1. Dauda, P., Giachino, L., & Baracco, C. (2020). *Génération A1*. Didier.
2. Mérieux, R., &Loiseau, Y. (2012). *Latitudes A1*. Didier.

Websites and eLearning Sources:

1. https://www.podcastfrancaisfacile.com
2. https://www.flevideo.com
3. https://savoirs.rfi.fr/fr
4. https://www.french4me.net/
5. https://apprendre.tv5monde.com/en

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO1	Talk about daily routines, tell the time, describe people, and propose social outings using appropriate vocabulary and verb structures.	**K1**
CO2	Inquire about housing, describe household items, explain domestic issues, and write advertisements or announcements for accommodations.	**K2**
CO3	Describe body parts, discuss health conditions, give advice, express emotions, and use past tense structures to narrate past experiences.	**K3**
CO4	Make hotel reservations, describe destinations and landscapes, compare experiences, and write postcards or travel brochures.	**K4**
CO5	Discuss education, career plans, and workplace responsibilities while comparing educational systems in France and India.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**25UFR21GL02**			Language French – 2					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	1	1	2	2	2	3	2	2	1.9
CO2	2	2	2	3	1	3	3	2	3	3	2.4
CO3	2	3	2	1	2	2	1	3	2	1	1.9
CO4	3	2	2	2	2	3	2	1	2	3	2.2
CO5	3	3	3	2	3	2	3	2	3	2	2.6
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	**25UHI21GL02**	Language Hindi - 2	**4**	**3**

Course Objectives
To understand the basics of Hindi Language
To make the students to be familiar with the Hindi words
To enable the students to develop their effective communicative skills in Hindi
To introduce the socially relevant subjects in Modern Hindi Literature
To empower the students with globally employable soft skills

UNIT I **(12 Hours)**

1. Moun hi Manthra Hay
2. Letter Writing - Chutti Patra
3. Bakthikal - Namakarn
4. Sarkari Kariyalayom Ka Naam

UNIT II **(12 Hours)**

5. Baathcheeth - Aspathal Mein
6. Letter Writing - Rishthedarom ko Patra
7. Bakthikal - Samajik Paristhithiyam
8. Kriya

UNIT III **(12 Hours)**

9. Premchand
10. Kriya visheshan
11. Letter Writing - Naukari Keliye Avedan Patra
12. Bakthikal - Sahithyik Paristhithiyam

UNIT IV **(12 Hours)**

13. Kabeer ke Dohae
14. Samas
15. Letter Writing - Kitab Maangne Keliye Patra
16. Bakthikal - Salient Features, Main Division

UNIT V **(12 Hours)**

17. Anuvad
18. Sandhi
19. Bakthikal - Visheshathayem
20. Apathit Gadyansh

Teaching Methodology	Peer Instruction Exercise, Videos, PPT, Quiz, Group Discussion
Assessment Methods	Group Discussion, Seminar, Snap Test

Books for Study:

1. Viswanath Tripaty. *(2021). Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd.
2. Kamathaprasad Gupth, M. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Dr. Sadananth Bosalae. *(2020). kavya sarang*, Rajkamal Prakashan.

Books for Reference:

1. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*. Prabhat Prakashan.
2. Krishnakumar Gosamy. (2023). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.
3. Aravind Kumar. (2022). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.
4. Lakshman Prasad Singh. (2021). *Kavya ke sopan*. Bharathy Bhavan Prakashan.

Websites and e-Learning Sources:

1. https://hindigrammar.in/sandhi.html
2. https://www.successcds.net/class10/hindi/samas-in-hindi

3. https://mycoaching.in/kriya-ke-bhed-verb-in-hindi
4. https://namastesensei.in/adverb-in-hindi-examples/
5. https://viahindi.in/hindi-vyakaran/sandhi-paribhasha-prakar-or-udaharan

Course Outcomes		
CO No.	**CO–Statements** On successful completion of the course, the student will acquire thelisted skills	**Cognitive Levels (K-Levels)**
CO1	Find out the Terms & Expressions related to letter writing.	**K1**
CO2	Providing knowledge of Letter writing in Hindi.	**K2**
CO3	Complete the sentences in Hindi using basic grammar.	**K3**
CO4	Analyze the social & political conditions of Devotional period in Hindi Literature.	**K4**
CO5	Justify the human values stressed on the works of Hindi writers	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours/ week**			**Credits**
2	**25UHI21GL02**			Language Hindi – 2				**4**			**3**
Course Outcomes (Cos)	**Programme Outcomes (Pos)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	2	2	3	3	3	2	2	2.5
CO2	1	3	1	2	2	3	3	3	2	3	2.3
CO3	3	2	3	2	2	3	2	3	2	2	2.4
CO4	2	3	3	1	3	2	3	2	1	2	2.2
CO5	3	2	2	2	3	2	3	2	3	2	2.4
								Mean Overall Score			**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	**25USA21GL02**	Language Sanskrit - 2	**4**	**3**

Course Objectives
To bring out the salient aspects of classical Sanskrit poetry
To introduce court epics in Sanskrit
To train students in declensions of pronouns in Sanskrit
To coach the students in the conjugation patterns of verbs in Sanskrit
To offer coaching in morpho-phonemic rules and their applications in Sanskrit

UNIT I **(12 Hours)**

Asmathi usmath tat kim (MFN) sarva naama sabdaha

UNIT II **(12 Hours)**

Sandhi Niyamaah Abhyaash (Guna, Visarga, Dirgha, Vrddhi)

UNIT III **(12 Hours)**

Lang lakaarah Kriyapadaani Prayoga Vivaranam

UNIT IV **(12 Hours)**

Raguvamsaha Pratama sargaha (1 –15 slokas)

UNIT V **(12 Hours)**

Suvacanani Vakya Prayoga Vivaranam

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

1. Saralasamkritham Siksha ,2021
2. Dhaatu Rupa Manjari ,2021

Books for Reference:

1. Paindrapuram Ashram, Srirangam – 620 006 Gopalavimshanthi 2021
2. R. S. Vadhyar & Sons book – Seller and Publishers, Kalpathi, Palghat – 678003, Kerala, South India, shabdha manjari
3. Kulapthy, K.M Saral sankrit Balabodh, Bharathiys Vidya Bhavan, Munshimarg Mumbai – 400007, 2020

Websites and eLearning Sources:

1. https://www.meritnation.com
2. https://www.aplustopper.com
3. https://mycoaching.in/lang-lakar
4. https://sanskritdocuments.org/sites/giirvaani/giirvaani/rv/sargas/01_rv.htm
5. https://resanskrit.com/blogs/blog-post/sanskrit-shlok-popular-quotes-meaning-hindi-english

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO–1	Remembering names of different objects, remembering different verbal forms and sandhi	**K1**
CO–2	Contrast different verbal forms Explain good sayings, Relate good saying to life.	**K2**
CO–3	Apply and build small sentences	**K3**
CO–4	Analyze different forms of Verbs and nouns	**K4**
CO–5	Appreciate subhashitas and Sanskrit poetry	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25USA21GL02**			Language Sanskrit - 2						**4**	**3**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	2	1	3	2	2	2	3	3	2	1	2.1
CO-2	3	2	3	2	2	3	2	3	3	2	2.5
CO-3	2	2	3	2	2	2	2	3	3	1	2.1
CO-4	3	2	3	3	1	2	3	3	3	1	2.4
CO-5	3	2	2	2	3	2	2	3	3	1	2.3
Mean Overall Score											**2.28 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UEN22GE02A	**General English – 2:** Pre-Intermediate Stream	5	3

Course Objectives (CO)
To strengthen listening and speaking skills for identifying key ideas and details
To improve reading comprehension and analyze different texts
To express ideas clearly in conversations and presentations, using correct grammatical structures.
To develop writing skills by creating clear and structured texts
To assess and improve language use in both spoken and written communication

UNIT I: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to respond to story-based questions
	(Practice)	**:**	"The Hare and His Friends"
Reading:	**(Skill)**	**:**	Understanding and interpreting proverbs
	(Practice)	**:**	"Necessity is the Mother of Invention"
Grammar:	**(Practice)**	**:**	Present Continuous Tense; Past Continuous Tense
Vocabulary:	**(Practice)**	**:**	Weather and Seasons
Speaking:	**(Skill)**	**:**	Describing on-going actions in the present and the past to describe real-life situations and activities
	(Practice)	**:**	Ongoing Actions: Present & Past
Writing:	**(Skill)**	**:**	Writing a biography of a famous personality using given details
	(Practice)	**:**	Writing a Biography

UNIT II: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to identify factual details
	(Practice)	**:**	Recycling
Reading:	**(Skill)**	**:**	Reading to convert a story into a meaningful dialogue
	(Practice)	**:**	The Shepherd and the Stranger
Grammar:	**(Practice)**	**:**	Future Expressions: Simple Future & 'Going to'; Simple Present, Present Continuous and Future Continuous Tenses
Vocabulary:	**(Practice)**	**:**	Groceries
Speaking:	**(Skill)**	**:**	Developing conversational fluency by practising conversations on familiar and everyday topics
	(Practice)	**:**	Conversations on Familiar and Everyday Topics
Writing:	**(Skill)**	**:**	Writing clear, respectful and relevant online comments
	Practice	**:**	Writing Online Comments

UNIT III: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening for specific information
	(Practice)	**:**	Telephonic Conversation
Reading:	**(Skill)**	**:**	Reading a news report
	(Practice)	**:**	Iron Age in Tamil Nadu Began 5,300 Years Ago
Grammar:	**(Practice)**	**:**	Present Perfect Tense; Past Perfect Tense
Vocabulary:	**(Practice)**	**:**	Kitchen Utensils and Household Appliances
Speaking:	**(Skill)**	**:**	Using polite expressions in conversations to request, seek permission, grant or refuse permission, and apologise
	(Practice)	**:**	Polite Expressions in Conversations
Writing:	**(Skill)**	**:**	Expressing short reflective ideas in writing
	(Practice)	**:**	Thought for the Day

UNIT IV: **(15 Hours)**

Listening:	**(Skill)**	**:**	Predicting content and vocabulary before listening
	(Practice)	**:**	Our Earth
Reading:	**(Skill)**	**:**	Identifying direct and indirect speech
	(Practice)	**:**	Birbal story: "Hot Iron Test"

Grammar:	**(Practice)**	**:**	Active and Passive Voice
Vocabulary:	**(Practice)**	**:**	Human Diseases
Speaking:	**(Skill)**	**:**	Using polite expressions in conversations to interrupt, make suggestions, and agree or disagree
	(Practice)	**:**	Polite Expressions in Conversations
Writing:	**(Skill)**	**:**	Writing a report on a given topic
	(Practice)	**:**	Report Writing

UNIT V: **(15 Hours)**

Listening:	**(Skill)**	**:**	Listening to understand formal speeches
	(Practice)	**:**	"A Tryst with Destiny" by Jawaharlal Nehru
Reading:	**(Skill)**	**:**	Reading to understand an essay
	(Practice)	**:**	"Secularism"
Grammar:	**(Practice)**	**:**	Adverbs; Prepositions
Vocabulary:	**(Practice)**	**:**	**Occupations**
Speaking:	**(Skill)**	**:**	Delivering a short prepared speech on a familiar or inspiring topic
	(Practice)	**:**	Delivering a Short Speech
Writing:	**(Skill)**	**:**	Writing a clear and well-structured essay on a given topic
	(Practice)	**:**	Essay Writing

Teaching Methodology	Lectures, task-based activities, audio-visual listening tasks, guided reading and writing exercises, discussions
Assessment Method	Listening and reading comprehension exercises, verbal presentations, role plays and conversations, writing tasks

Books for Study:

Dr. M. John Britto, Dr. B. Sam Jerome Sharone, and Dr. S. Sajeev. *Nurturing English Skills*. Emerald Publishers, 2025.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Recognize key ideas and details in spoken and written texts, demonstrating effective listening and comprehension skills.	**K1**
CO2	Understand and interpret different types of texts, enhancing reading comprehension and critical thinking abilities.	**K2**
CO3	Apply correct grammatical structures to express ideas clearly in conversations and presentations.	**K3**
CO4	Analyze and organize ideas to write clear, coherent, and well-structured texts for various purposes.	**K4**
CO5	Evaluate and improve language use, refining both spoken and written communication.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UEN22GE02A**			**General English – 2:** Pre-Intermediate Stream						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PS02**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	2	3	2	3	2	2	**2.4**
CO2	3	2	2	3	2	3	2	3	2	3	**2.5**
CO3	3	2	2	2	3	2	2	3	2	2	**2.3**
CO4	3	2	2	2	2	2	2	2	2	3	**2.2**
CO5	3	2	3	2	3	2	3	2	3	2	**2.5**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
2	25UEN22GE02B	**General English – 2:** Intermediate Stream	5	3

Course Objectives
To develop students' ability to listen, speak, read, and write effectively in English through interactive and contextualised activities.
To improve students' understanding and application of essential grammar concepts, including verb usage, auxiliary verbs, modals, adverbs, and sentence structures.
To equip students with strategies to deduce meanings of unfamiliar words using contextual clues.
To foster students' ability to brainstorm, organise information using graphic organisers, and structure written communication effectively for academic and professional contexts.
To enable students to engage in discussions, express opinions, seek and provide information, and navigate real-life situations confidently through role plays.

Unit 1: My College & Studies **15 Hours**

1. Listening:	**(Skill)**	Distinguishing between main ideas and supporting details
	(Practice)	"A Day in the Life of a College Student" (A conversation)
2. Reading:	**(Skill)**	Recognising the structure of written texts
	(Practice)	"Enter to learn, leave to serve"
3. Grammar:	**(Practice)**	Main Verb
4. Vocabulary:	**(Practice)**	Using synonyms as contextual clues to guess the meaning of unfamiliar words
5. Study skill:		Brainstorming to gather ideas in a group
6. Speaking:	**(Skill)**	Asking for, giving and refusing permission – Requesting – Communication repair: Finding about pronunciation, spelling and meaning.
	(Practice)	Role Play
7. Writing:	**(Skill)**	Writing an outline
	(Practice)	Controlled composition: Writing an outline for a given passage

Unit 2: Travel **15 Hours**

1. Listening:	**(Skill)**	Listening for specific details
	(Practice)	"A Perfect Vacation" (A conversation)
2. Reading:	**(Skill)**	Identifying main ideas and supporting details
	(Practice)	"An Unforgettable Ride"
3. Grammar:	**(Practice)**	Auxiliary Verbs
4. Vocabulary:	**(Practice)**	Using antonyms as contextual clues to guess the meaning of unfamiliar words
5. Study skill:		Mind mapping to visually organise information
6. Speaking:	**(Skill)**	Asking for and giving directions – Asking for and giving information
	(Practice)	Role Play
7. Writing:	**(Skill)**	Writing effective paragraphs
	(Practice)	Free-writing composition: An adventurous journey

Unit 3: My Social Network **15 Hours**

1. Listening:	**(Skill)**	Understanding the sequence of ideas
	(Practice)	"My Virtual Friends" (A conversation)
2. Reading:	**(Skill)**	Comprehending infographics
	(Practice)	"Social Media Etiquette
3. Grammar:	**(Practice)**	Modal Auxiliary Verbs
4. Vocabulary:	**(Practice)**	Using definitions and restatements as contextual clues to guess the meaning of unfamiliar words
5. Study skill:		Using graphic organisers (sequence of events chain, timeline, and storyboard)
6. Speaking:	**(Skill)**	Asking for and giving advice – Asking if someone agrees – Agreeing and disagreeing – Warning someone
	(Practice)	Role Play

7. Writing:	**(Skill)**	Developing stories from hints
	(Practice)	Controlled composition: Developing a story from given hints

Unit 4: Shopping **15 Hours**

1. Listening:	**(Skill)**	Detecting signposts
	(Practice)	"Let's go shopping!" (A conversation)
2. Reading:	**(Skill)**	Recognising transition of ideas
	(Practice)	"Adventures of the Grocery Store"
3. Grammar:	**(Practice)**	Adverbs and WH Question Words
4. Vocabulary:	**(Practice)**	Using examples and illustrations as contextual clues to guess the meaning of unfamiliar words
5. Study skill:		Using graphic organisers (Venn diagram, and cause-and-effect map)
6. Speaking:	**(Skill)**	Offering and accepting help – Asking for and giving opinions – Asking for and saying one's preference – Suggesting – Complaining
	(Practice)	Role Play
7. Writing:	**(Skill)**	Describing actions in a story
	(Practice)	Guided composition: Narrating a story in a comic strip

Unit 5: Ceremonies **15 Hours**

1. Listening:	**(Skill)**	Listening to intonations
	(Practice)	"Happy Birthday to You!" (A conversation)
2. Reading:	**(Skill)**	Understanding moods in a reading passage
	(Practice)	"The Light has Gone out" by Jawaharlal Nehru
3. Grammar:	**(Practice)**	Sentences
4. Vocabulary:	**(Practice)**	Using root words as clues to guess the meaning of words
5. Study skill:		Using graphic organisers (idea wheel, idea web, and concept map)
6. Speaking:	**(Skill)**	Using intonations for different types of sentences – Expressing your feelings and emotions – Congratulating and wishing someone – Expressing sympathy
	(Practice)	Role Play
7. Writing:	**(Skill)**	Expressing emotions in narrative writing
	(Practice)	Controlled composition: Describing emotions and feelings conveyed in a picture story

Teaching Methodology	Lectures, Demonstrations, Discussions, Peer-Review Tasks, Role-plays, Pair and group activities
Assessment Tools	Listening and reading comprehension tasks, Individual talks, Role plays, Controlled and guided compositions

Books for Study:

M.S. Xavier Pradheep Singh, Amalaveenus, and A. Napoleon. English and My World, 2025.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Identify key ideas, supporting details, and organisational patterns in spoken and written texts.	**K1**
CO2	Explain the meaning of conversations and passages by recognising their structure, tone, and purpose.	**K2**
CO3	Use appropriate language functions such as requesting, suggesting, and expressing opinions effectively in real-life interactions.	**K3**
CO4	Compare different communication styles and linguistic features in various types of texts and conversations.	**K4**
CO5	Assess the effectiveness of spoken and written communication, providing constructive feedback for improvement.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UEN22GE02B**			**General English – 2:** Intermediate Stream						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2.5	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.65
CO-2	2.5	3	2.5	2.5	2.5	3	3	2.5	2.5	3	2.7
CO-3	3	2.5	2.5	3	2.5	2.5	2.5	2.5	3	2.5	2.65
CO-4	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.5	2.6
CO-5	3	2.5	2.5	2.5	3	2.5	2.5	2.5	3	2.5	2.65
Mean Overall Score											**2.65 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UMA23CC04	**Core Course - 4:** Analytical Geometry	5	4

Course Objectives
To lay a strong foundation in the equations and properties of conic sections, lines, and planes in two and three dimensions.
To train for applying mathematical techniques to determine angles, direction cosines, and distances between lines and planes.
To explore and solve problems related to systems of planes, orthogonal projections, and the shortest distance between skew lines
To understand the general equation of a sphere, its intersection properties, and conditions for orthogonality between spheres.
To develop the ability to apply principles of geometry to real-world problems in physics, engineering, and computational geometry.

UNIT I **(15 Hours)**

Conic: Polar equation of the conic - tracing the conic - Chord of the conic - Asymptotes of the conic -Equation of the normal, tangent.

UNIT II **(15 Hours)**

Coordinates of a point in space - Angle between two non-coplanar lines - Direction cosines of a line -Relation between Direction Cosines - Projection of a Straight line - Angle between two lines - Direction Cosines of a line - relation between direction cosines - angle between two lines.

UNIT III **(15 Hours)**

The plane - general equation of the first degree - Theorem and its converse - Transformation to the Normal form - Determination of a Plane under given conditions - Systems of Planes - Two Sides of a Plane - Length of the Perpendicular from a Point to a Plane - Joint equation of two planes.

UNIT IV **(15 Hours)**

Representation of Line - Angle between a Line and a Plane - Conditions for a Line to lie in a Plane - Coplanar lines: Condition for the Coplanarity of Lines - Number of Arbitrary constants in the Equations of a Straight Line - The Shortest Distance between two lines - Length of the Perpendicular from a Point to a Line.

UNIT V **(15 Hours)**

Equation of a Sphere - The Sphere through four given points - Plane section of a Sphere - intersection of two spheres - sphere with given diameter - Equations of a Circle - intersection of a sphere and a line - Equation of a Tangent Plane

Teaching Methodology	chalk and talk, PPT, Problem solving
Assessment Methods	Seminar, Snap Test, MCQ, Writing assignments

Books for Study:

1. Manicavachagom Pillay, T. K., & Natarajan, T. (2011). *A textbook of analytical geometry part I: Two dimensions*. S. Viswanathan (Printers and Publishers) Pvt. Ltd.
   Unit-I: *Chapter: 9, Sections: 9, 10, 11, 12, 14, 15*
2. Narayan, S., & Mittal, P. K. (2021). *Analytical solid geometry*. S. Chand Publishing.
   Unit-II: *Chapter: 1: Sec: 1.1, 1.5 - 1.9* (*Pages 01 - 03, 09 - 23)*
   Unit-III: *Chapter 2: Sec: 2.1 - 2.8 (Pages 28 - 45)*
   Unit-IV: *Chapter 3: Sec: 3.1 - 3.7(Pages 56 - 88)*
   Unit-V: *Chapter 6: Sec: 6.1 - 6.6 (Pages 127-149)*

Books for Reference:

1. Bell, R. J. (1937). Coordinate geometry of three dimensions. *Ex*, *5*, 294.
2. Osgood, W. F., & Graustein, W. C. (2016). *Plane and solid analytic geometry*. Macmillan Company.
3. Yates, R. C. (1961). *Analytic geometry with calculus.* Prentice Hall.
4. Loney, S. L. (1905). *Co-ordinate geometry.* Macmillan & Co.

5. Thomas, G. B., & Finney, R. L. (2010). *Calculus and analytical geometry* (9th ed.). Pearson.
6. Duraipandian, P. (1970). *Analytical geometry 3-dimensional.* Emerald Student Edition.
7. Arumugam, S., & Thangapandi, I. A. (2008). *Analytical geometry (3D) and vector calculus.* New Gamma Publishing House.

Websites and eLearning Sources:

1. https://www.khanacademy.org
2. https://ocw.mit.edu
3. https://tutorial.math.lamar.edu
4. https://mathworld.wolfram.com
5. https://www.geogebra.org
6. Coursera: *Calculus: Single Variable Part 3 - Integration & Vector Calculus* (by University of Pennsylvania)
7. edX: *Multivariable Calculus* (by MIT)
8. YouTube:*3D Analytical Geometry & Vector Calculus* (by Professor Leonard)

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Identify the basic concepts of Analytical Geometry (2D & 3D), including equations of lines, planes, and spheres, as well as the fundamental properties of geometric elements.	**K1**
CO2	Comprehend the concepts of the angle between two lines, direction cosines, the normal form of a plane, intercepts of a plane through three points, and the properties of planes and spheres.	**K2**
CO3	Apply the concepts of Analytical Geometry to real-life problems - solving geometric relations in two and three dimensions - shortest distance between points, lines, and planes.	**K3**
CO4	Analyze the equations of lines, planes, and spheres, examine conditions for intersection, and determine orthogonality and coplanarity in geometric systems.	**K4**
CO5	Evaluate the importance of angles between planes and the shortest distance between skew lines, and to assess the role of geometric properties in spatial analysis and problem-solving.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
2	**25UMA23CC04**		**Core Course - 4:** Analytical Geometry						**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	3	2	3	2	3	**2.3**
CO2	1	3	2	2	2	3	3	2	3	2	**2.3**
CO3	2	1	3	2	3	2	3	3	2	2	**2.3**
CO4	2	3	2	3	1	3	2	3	2	3	**2.4**
CO5	1	2	3	2	3	2	3	2	1	3	**2.2**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UMA23CC05	**Core Course - 5:** Integral Calculus	6	4

Course Objectives
To acquire knowledge of Integrals and its geometrical applications
To have in-depth understanding on the concepts of definite integrals and understand the concepts of reduction formulae
To apply double and triple integrals to find areas and volumes
To evaluate Improper integrals using Beta and Gamma Functions
To analyse the relationship between line surface and volume integrals

UNIT I **(18 Hours)**

Integration of Rational and Irrational Functions- Integration Models

UNIT II **(18 Hours)**

Properties of Definite integrals - Integration by Parts- Reduction Formulae for $x^n e^{ax}$, $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$, $\tan^n x$, $\cot^n x$, $\sec^n x$, $\text{cosec}^n x$, $x^m (\log x)^n$, $e^{ax} \cos bx$ - Bernoulli's Formula

UNIT III **(18 Hours)**

Area Under Plane Curves - Area of a Closed Curves - Length of a Curve - Area of Surface of revolution - Multiple Integrals - Evaluation of Double and Triple Integrals (Cartesian Co- Ordinates only).

UNIT IV **(18 Hours)**

Improper Integrals- Beta and Gamma Functions- Recurrence formula of Gamma Functions - Properties of Beta Functions - Relation between Beta and Gamma Functions - Evaluation of Definite Integrals Using Gamma Functions.

UNIT V **(18 Hours)**

Vector Integration: The line integral - Volume integral - Surface integral - Gauss divergence theorem - Stoke's theorem - Green's theorem (2D only) (Omit proofs of these three theorems & problems only).

Teaching Methodology	Chalk and talk, PPT
Assessment methods	MCQ, Snap Test

Books for Study:

1. Narayanan, S. & Manicavachagam, T. K.P. (2013). *Calculus (Major), Volume - II,* S. Viswanathan Printers &Publishers.
   - **Unit I:** *Chapter 1* (*Sec7-10*)
   - **Unit II:** *Chapter 1* (*Sec11-14,15.1*)
   - **Unit III:** *Chapter 2* (*Sec 1,4,5*) *Chapter 5* (*Sec1-4*)
   - **Unit IV:** *Chapter 7* (*Sec2-5)*
2. Narayanan., & Manickavasagam, P. (1994). *Vector Algebra and Analysis.* S. Viswanathan Printers & Publishers Pvt. Ltd. (For Unit IV & V)
   - **Unit V:** *Chapter 6 (Sec: 2-6, Pages 136-158; Sec: 9-10, Pages 163-177)*

Books for Reference:

1. Venkataraman, M.K. (1988). *Engineering Mathematics, Vol 2.* The National Publishing Company.
2. Thomas & Finney (2006). *Calculus,* (9thEd.). Pearson Education.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=gNLr23ziZuM
2. https://www.youtube.com/watch?v=8RglPC4gDys
3. https://www.youtube.com/watch?v=czt5Wmj_rvI
4. https://www.youtube.com/watch?v=9_m36W3cK74

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Acquire basic knowledge of all integral models and methods.	**K1**
CO2	Understand the concepts of reduction formulae, length of curve, surface areas as integrals and Beta, Gamma functions.	**K2**
CO3	Apply integrals to solve problems in a range of mathematical applications.	**K3**
CO4	Analyze improper integrals and identify infinite summation as an appropriate definite integral.	**K4**
CO5	Evaluate areas, length of a curve and surface of revolution occurring in real life problems using multiple integrals and Gamma functions. illustrate the importance of line integral, surface integral and volume integral.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**25UMA23CC05**			**Core Course - 5:** Integral Calculus					**6**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	2	3	3	2	2	3	**2.2**
CO2	2	3	2	1	2	3	3	2	2	3	**2.3**
CO3	1	2	3	2	3	2	3	2	3	2	**2.3**
CO4	1	2	2	3	1	2	3	2	2	3	**2.1**
CO5	1	2	2	2	3	1	3	2	2	3	**2.1**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UMA23AC02	**Allied Course - 2:** Statistics - 2	6	4

Course Objectives
To incorporate basic types of sampling and various data handling procedures
To analyse and apply appropriate data testing techniques
To understand the relationship between the variables or attributes in a given data set
To utilize statistical tools for drawing meaning full inferences
To examine the truthfulness or falseness of the assumed hypothesis using suitable statistical tools

UNIT I: Large Sample Theory (18 Hours)

Introduction-Types of Sampling- Parameter and Statistic -Tests of significance - Procedure for testing of hypothesis - Test of significance for large samples - Sampling of attributes - Sampling of variables.

UNIT II: Exact Sampling Distributions - I (18 Hours)

Introduction - Derivation of the Chi-square distribution - MGF of Chi-square distribution -Applications of Chi-square distribution.

UNIT III: Exact Sampling Distributions - II (18 Hours)

Introduction - Student's t-distribution -Applications of t-distribution -F-distribution - Applications of F-distribution.

UNIT IV: Statistical Inference - I (18 Hours)

Introduction - Characteristics of estimators - Unbiasedness - Consistency -Efficient and Most Efficient Estimators - Sufficiency (Definition only)-Methods of Estimation - Method of Maximum Likelihood Estimation - Method of moments.

UNITV: Correlation (18 Hours)

Introduction - Meaning of Correlation - Scatter diagram - Karl Pearson's Coefficient of Correlation - Rank Correlation.

Teaching Methodology	Chalk and Talk method, Problem solving
Assessment Method	MCQ, Snap Test

Books for Study:

1. Gupta, S. C. & Kapoor, V. K. (2002). *Fundamentals of Mathematical Statistics*, (11th Ed.). Sultan Chand and Sons.
   - **Unit I** *Chapter 14: Full*
   - **Unit II** *Chapter15:Sec15.1- 15.3, 15.6(Omit 15.6.4-15.6.7)*
   - **Unit III** *Chapter 16:Sec16.1-16.3, 16.5-16.6*
   - **Unit IV** *Chapter 17:Sec-17.1,17.2(Omit MVU Estimators and theorems on MVU Estimators), 17.6 (Omit 17.6.2 and 17.6.4)*
   - **Unit V** *Chapter 10: Sec10.1-10.4, 10.7.*

Books for Reference:

1. Vittal, P. R. (2004). *Mathematical Statistics*. Margham Publications.
2. Kapur, J. N.& Saxena, H. C. (2010). *Mathematical Statistics*, (20thEd.). S. Chand & Co Ltd.

Course Outcomes		
CO No.	**CO Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recognize the parameters and statistics to test the significance of sampling	**K1**
CO2	Examine the characteristics of estimators such as unbiasedness, consistency, efficiency and sufficiency	**K2**
CO3	Derive the various measures of Chi-square, t and F distributions	**K3**
CO4	Illustrate the statistical distributions Chi-square, t and F with examples	**K4**
CO5	Analyse the data statistically by Correlation coefficients and rank correlations	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UMA23AC02**			**Allied Course - 2:** Statistics - 2						**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	2	2	2	3	3	2	2	2	**2.1**
CO2	2	3	1	2	2	2	2	3	3	2	**2.2**
CO3	2	3	2	1	3	2	2	3	2	2	**2.2**
CO4	3	2	3	3	1	2	2	2	3	2	**2.3**
CO5	3	1	2	2	2	2	3	2	2	3	**2.2**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UHE24AE02	**Ability Enhancement Compulsory Course - 2:** Environmental Studies	2	1

Course Objectives
To enable students connect themselves with nature
To Impart knowledge of the concept of Biodiversity
To create awareness of the causes and consequences of various pollution
To help them recognize the available natural resources and the need to sustain them
To enable them to Identify the environmental problems and offer alternatives by making interventions both individually and collectively

UNIT I: Introduction to Environmental Studies (6 Hours)

Introduction -Subsystems of Earth - Scope and Importance - Various Recycling Methods - Environmental Movements in India – Eco- Feminism - Public awareness - Suggestions to conserve environment

UNIT II: Natural Resources (6 Hours)

Introduction - Food Resources - Land Resources - Forest resources - Mineral Resources - Water Resources - Energy Resources

UNIT III: Ecosystems, Biodiversity and Conservation (6 Hours)

Kinds of Ecosystem - General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids - Levels of Biodiversity - Biodiversity at Global Level- Hot spots of Biodiversity - Endangered and Endemic Species - Value of Biodiversity - Threats to Biodiversity - Conservation of Biodiversity

UNIT IV: Environmental Pollution (6 Hours)

Air Pollution - Water Pollution - Oil Pollution - Soil Pollution - Marine Pollution - Noise Pollution - Thermal Pollution - Radiation Pollution

UNIT V: Environmental Organizations and Treatise (6 Hours)

United Nations Environment Program (UNEP) - International treaties on Environmental protection - Ministry of Environment, Forest and Climate Change - Important National Environmental Acts and rules- Environmental Impact assessment

Teaching Methodology	Power point and Field visit
Assessment Methods	Seminar, Group Discussion.

Books for Study:

1. Department of Human Excellence, (2025). *Environmental Studies.*

Books for Reference:

1. Rathor, V.S. & Rathor B. S. (2013). *Management of Natural Resources for Sustainable Development*. Daya Publishing House.
2. Sharma P.D. (2010). *Ecology and Environment*, (8th Ed.). Rastogi Publications.
3. Agrawal, A &Gibson, C.C. (2001). *Introduction: The Role of Community in Natural Resource Conservation.* Rutgers University Press.

Websites and eLearning Sources

1. https://www.unep.org/
2. http://moef.gov.in/en/
3. https://www.ipcc.ch/reports/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Identify the concepts related to global ecology and the environment	**K1**
CO2	Comprehend the natural resources and environmental organizations	**K2**
CO3	Apply the acquired knowledge to sensitize individuals and public about the environmental crisis	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
2	**25UHE24AE02**		**Ability Enhancement Compulsory Course - 2:** Environmental Studies						**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
										Mean Overall Score	**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UHE24VE02	**Value Education - 2:** Fundamentals of Human Rights	2	1

Course Objectives
To sensitize students about various human rights and their importance
To empower them with the right understanding of human rights
To enable them to understand the Fundamental rights and the duties in the constitution of India
To help them comprehend the background, principles and the articles of UDHR
To make them involved in activities to defend human rights

UNIT I: Human Rights - An Introduction (6 Hours)

Introduction- Classification of Human Rights- Scope of Human Rights-Characteristics of Human Rights - Challenges for Human Rights in the 21st Century.

UNIT II: Historical Development of Human Rights (6 Hours)

Human Rights in Pre-World War Era- Human Rights in Post-World War Era- Evolution of International Human Rights Law - the General Assembly Proclamation- Institution Building, Implementation and the Post- Cold War Period. The ICC.

UNIT III: India and Human Rights (6 Hours)

Introduction-Preamble to Indian Constitution - Classification of Fundamental Rights-Salient Features of Fundamental Rights-and Fundamental Duties.

UNIT IV: Human Rights of Women and Children (6 Hours)

Women's Human Rights- Issues related to women's rights - and Rights of Women's and Children

UNIT V: Human Rights Violations and Organizations (6 Hours)

Human Rights Violations - Human Rights Violations in India - the Human Rights Watch Report - Human Rights Organizations - NHRC - SHRC.

Teaching Methodology	Power point, Handouts and Group discussion
Assessment Methods	Seminars, Group Discussion, Assignments.

Books for Study:

1. Department of Human Excellence, (2021). *Techniques of Social Analysis: Fundamentals of Human Rights.*

Books for Reference:

1. Venkatachalem. (2005). The *Constitution of India, Giri Law House.*
2. Naik, V. &Shany, M. (2011). *Human rights education and training*, Crescent Publishing Corporation.
3. Neera, B. (2011). *Human Rights Content and Extent.* Swastika Publications.

Websites and eLearning Sources:

1. https://www.un.org/en/universal-declaration-human-rights/
2. https://www.ilo.org/global/lang--en/
3. https://www.amnesty.org/en/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Identify the importance and the values of human rights	**K1**
CO2	Understand the historical background and the development of Human Rights and the related organizations	**K2**
CO3	Apply the provisions of National and International human rights to themselves and the society	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**25UHE24VE02**			**Value Education - 2:** Fundamentals of Human Rights					**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
Mean Overall Score											**2.1 (Medium)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
3	25UTA31GL03	பொதுத்தமிழ் – 3: General Tamil - 3	4	3

கற்றலின் நோக்கங்கள் (Course Objectives)
சங்க இலக்கியங்களின் இன்றியமையாமையை அறிந்து கொள்ளுதல்
இலக்கியத்தினை நுட்பமாக அறிதலின் வழியாக ஆற்றுப்படுத்தும் திறன் பெறுதல்
இலக்கிய அறநெறிகளைத் தற்கால வாழ்வியலில் பயன்படுத்தும் திறன் பெறுதல்
திணை, துறைகளைப் பகுத்தாராயும் அறிவு பெறுதல்
இலக்கிய இலக்கண நுட்பங்களை வாழ்வியலோடு ஒப்பிடுதல்

அலகு – 1 : **(12 மணி நேரம்)**

குறுந்தொகை: குறிஞ்சித் திணை - பரணர் பாடல் (199), முல்லை - ஔவையார் பாடல் (99), மருதம் - கொல்லிக்கண்ணனார் பாடல் (34), நெய்தல் - கச்சிப்பேட்டு நன்னாகையார் பாடல் (172), பாலை - வெண்பூதி பாடல் (174)

நற்றிணை: குறிஞ்சி - கபிலர் பாடல் (194), முல்லை - இடைக்காடனார் பாடல் (142), மருதம் – உறையூர்க் கதுவாய்ச் சாத்தனார் பாடல் (370), நெய்தல் - அறிவுடைநம்பி பாடல் (15), பாலை - கணக்காயனார் பாடல் (24)

ஐங்குறுநூறு: குறிஞ்சி - அன்னாய் வாழிப் பத்து - அன்னாய் வாழி வேண்டன்னை நம் படப்பை (203), முல்லை - செவிலி கூற்றுப் பத்து - மறியிடைபடுத்த மான்பிணைபோல (401), மருதம் - வேட்கைப் பத்து - வாழி ஆதன் வாழி அவினி (01), நெய்தல் - வெள்ளாங்குருகுப் பத்து - வெள்ளாங் குருகின் பிள்ளை (157), பாலை - உடன்போக்கின் கண் இடைச் சுரத்து உரைத்த பத்து - அறம்புரி அருமறை நவின்ற (387)

புறநானூறு: பிசிராந்தையார் (67), அரிசில் கிழார் (146), காக்கைப்பாடினி (278), அள்ளூர் நன்முல்லையார் (306), பரணர் (352)

அலகு – 2 : **(12 மணி நேரம்)**

சிறுபாணாற்றுப்படை

இலக்கணம் - யாப்பு

அலகு – 3 : **(12 மணி நேரம்)**

கலித்தொகை: குறிஞ்சிக்கலி – திருந்திழாய்! கேளாய் எனத் தொடங்கும் பாடல் (64), முல்லைக்கலி – கண் அகன் இரு விசும்பில் எனத் தொடங்கும் பாடல் (101), மருதக்கலி - நறவினை வரைந்தார்க்கும் எனத் தொடங்கும் பாடல் (98), நெய்தல்கலி - இவர்திமில் எறிதிரை எனத் தொடங்கும் பாடல் (135) பாலைக்கலி - அறனின்றி அயல்தூற்றும் எனத் தொடங்கும் பாடல் (2)

பதிற்றுப்பத்து: குமட்டூர்க் கண்ணனாரின் புண் உமிழ் குருதி (11), பாலைக் கௌதமனாரின் கயிறு குறு முகவை (22)

இலக்கிய வரலாறு: சங்க இலக்கியங்கள், சங்க இலக்கியங்களின் தனித்தன்மைகள்

அலகு – 4 : **(12 மணி நேரம்)**

அகநானூறு: அளிநிலை பொறாது அமரிய முகத்தள் எனத் தொடங்கும் பாடல் (5) , திதலை மாமை தளிர்வனப்பு எனத் தொடங்கும் பாடல் (135), திருந்துஇழை நெகிழ்ந்து எனத் தொடங்கும் பாடல் (387)

தனிப்பாடல் திரட்டு:- பிறவிக் குணமும் பழக்கமும் (196), கொடியது (242), பெரியது (244), அரியது (245), இதுவே நலம் (223)

இலக்கிய வரலாறு: பதினெண்கீழ்க்கணக்கு நூல்கள்

அலகு – 5 : **(12 மணி நேரம்)**

திருக்குறள்: இனியவை கூறல் (10), நட்பு ஆராய்தல் (80)

பழமொழி நானூறு: ஆற்றவும் கற்றார் அறிவுடையார் எனத் தொடங்கும் பாடல் (40), வைத்தனை வைப்பென்று எனத் தொடங்கும் பாடல் (95), உடைப்பெருஞ் செல்வத்து எனத் தொடங்கும் பாடல் (154), தத்தமக்குக் கொண்ட எனத் தொடங்கும் பாடல் (276), நோக்கி அறிகல்லா எனத் தொடங்கும் பாடல் (337)

இனியவை நாற்பது:- முதல் பத்து பாடல்கள் (1-10)

இலக்கணம் - அணி

நாடகம் - விந்தனின் வாழப்பிறந்தவன்

கற்பித்தல் அணுகுமுறை (Teaching Methodology)	**விரிவுரை** (Lecture), **காணொளிக் காட்சி** (Videos), **விளக்கக் காட்சி** (PPT presentation)
மதிப்பீட்டு முறைகள் (Assesment methods)	**கருத்துரை**(Seminar), **குழுக் கலந்துரையாடல்** (Group Discussion), **உடனடித்தேர்வு** (Snap Test), **ஒப்படைவு** (Assignment)

பாடநூல்:

1. பொதுத்தமிழ்-3(2025), தமிழாய்வுத்துறை, தூய வளனார் கல்லூரி

பார்வை நூல்கள்:

1. சுப்பிரமணியன். ச. வே (உ.ஆ.), (2003), சங்க இலக்கியம் , கோவிலூர் மடாலயம்

2. கன்னியப்பன்.சிவ (உ.ஆ.), (2004),தனிப்பாடல் திரட்டு, முல்லை நிலையம்

Websites and eLearning Sources:

- *https://learnsangamtamil.com/*
- *https://www.tamilvu.org/library/*

Course Outcomes		
CO No.	***CO-Statements*** **இப்பாடத்தின் நிறைவில் மாணவர்கள்**	***Cognitive Levels (K-Level)***
CO1	சங்க இலக்கியத்தின் தனித்தன்மைகளை அறிவர்	***K1***
CO2	ஆற்றுப்படை இலக்கியங்களைக் கற்பதன் வழி ஆற்றுப்படுத்தும் முறையை இனங்காண்பர்	***K2***
CO3	இலக்கிய நெறிகளை நடப்பியலில் பயன்படுத்துவர்	***K3***
CO4	திணை துறைகளை நன்கு கற்பதன் வாயிலாகப் பாடல்களைப் பகுப்பாய்வர்	***K4***
CO5	யாப்பு, அணியைக் கற்பதன் வாயிலாகப் புதிய இலக்கிய வடிவங்களைப் படைக்கும் திறன் பெறுவர்.	***K5***

Relationship Matrix												
Semester	***Course Code***			***Title of the Course***							***Hours***	***Credits***
3	***25UTA31GL03***			பொதுத்தமிழ் - 3: General Tamil - 3							***4***	***3***
Course Outcomes	***Programme Outcomes (POs)***					***Programme Specific Outcomes (PSOs)***					***Mean Score of COs***	
	PO1	***PO2***	***PO3***	***PO4***	***PO5***	***PSO1***	***PSO2***	***PSO3***	***PSO4***	***PSO5***		
CO1	*1*	*2*	*2*	*2*	*1*	*3*	*3*	*2*	*3*	*2*	*2.1*	
CO2	*3*	*2*	*1*	*3*	*2*	*3*	*2*	*2*	*3*	*1*	*2.2*	
CO3	*3*	*2*	*1*	*3*	*2*	*3*	*2*	*2*	*3*	*2*	*2.3*	
CO4	*1*	*3*	*2*	*1*	*2*	*3*	*2*	*2*	*2*	*3*	*2.1*	
CO5	*2*	*3*	*2*	*2*	*1*	*3*	*2*	*2*	*2*	*2*	*2.1*	
										Mean Overall Score	***2.16 (High)***	

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	**25UFR31GL03**	Language French – 3	**4**	**3**

	Course Objectives
1	Remember and Construct Narratives applying the *passé composé* with time indicators to recount past events
2	Understand and express personal memories using the *imparfait* in spoken and written communication to articulate likes, dislikes, and past events.
3	Analyze and interpret different housing options and engage in role-play scenarios to negotiate effectively.
4	Describe physical appearance and personality traits using appropriate adjectives, possessives, and comparatives to describe oneself
5	Evaluate future possibilities in science and communication, expressing hopes and possibilities using the *futur simple* and *conditionnel*

UNIT – I **(12 Hours)**

1. Titre - Nouvelles vies
2. Lexique – Parcours de vie, la vie personnelle, scolaire et professionnelle
3. Grammaire – le passé composé -formation, la phrase négative, les indicateurs de temps
4. Production orale- exprimer son intention de faire quelque chose
5. Production écrite - organiser une activité de loisir

UNIT – II **(12 Hours)**

6. Titre - Je me souviens
7. Lexique – le souvenir : la mémoire, les paysages : à la mer, à la montagne
8. Grammaire – l'imparfait -formation, les pronoms 'y' et 'en', la place de l'adjectif
9. Production orale- exprimer le fait d'aimer et de ne pas aimer
10. Production écrite - raconter un souvenir

UNIT – III **(12 Hours)**

11. Titre - Comme à la maison
12. Lexique – le logement et la location, les frais et les services, le cadre de vie
13. Grammaire – les pronoms relatifs, la comparaison, la condition
14. Production orale- jeu de rôle – louer un logement
15. Production écrite - Décrire un logement

UNIT – IV **(12 Hours)**

16. Titre - Tous pareils, tous différents
17. Lexique – l'apparence physique, les traits de caractère
18. Grammaire – les adjectifs indéfinis, les pronoms possessifs, la comparaison
19. Production orale- faire un compliment
20. Production écrite - faire le portrait physique de quelqu'un

UNIT – V **(12 Hours)**

21. Titre - En route vers le futur
22. Lexique – les sciences et les techniques, les technologies de communication
23. Grammaire – le futur simple, la condition avec 'si', le pronom 'on'
24. Production orale- exprimer un espoir – imaginer à l'avenir
25. Production écrite - Décrire l'utilité d'un objet
26. Indian knowledge system - Analyzing narrative structures in Indian epics vs. French literature by comparing the Mahabharata's moral stories especially the Panchatantra stories to French fables. Practicing French future tense by making simple predictions about personal life by referencing Indian astrology (5%)

Teaching Methodology	Project-Based Chronological Learning (PBL), Digital Media Integration, Genre-Specific Writing Approach, Scenario-based learning (SBL)
Assessment Methods	*Podcast creation:* Students record a short podcast episode on "Childhood Memory". (Rubric – assessed on ability to construct narratives using past tenses and expressing experiences. *Debate:* Debate on "Apartment vs. House: Students must compare housing options, rental costs, and services. (Rubric – evaluated on analytical skills through structured argumentation) *Timeline narrative activity:* Create a timeline about "A Typical College Day" (Rubric – Assessed on the ability to recall and construct a chronological narrative using past) *Letter writing:* Write a letter to a friend describing personal experiences. Write a formal inquiry to a landlord about an apartment (Rubric – Assessed on formal and informal written communication skills)

Books for Study:

1. Fafa, C., Gajdosova, F., Horquin, A., Pasquet, A., Perrard, M., Petitmengin, V., Sperandio, C., Dodin, M., &Veldeman-Abry, J. (2022). *Édito A2: Méthode de français* (2nd ed.). Didier FLE, Hatier. (p.13 – p.77)

Books for Reference:

1. Dauda, P., Giachino, L., &Baracco, C. (2016). *Génération A2*. Didier.
2. Girardet, J., &Pecheur, J. (2017). *Écho A2* (2nd ed.). CLE International

Websites and eLearning Sources:

1. https://www.bbc.co.uk/bitesize/subjects/zc7xpv4
2. https://conjuguemos.com/
3. https://www.busuu.com/en/course/learn-french-online
4. https://www.duolingo.com/learn
5. https://www.newsinslowfrench.com/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Recall using vocabulary related to personal, academic, and professional life, and compose narratives using the *passé composé* and time indicators.	**K1**
CO2	Express experiences and preferences using *imparfait*to recount memories, express likes and dislikes accurately in spoken and written communication.	**K2**
CO3	Comparedifferent housing options and interpret rental-related expenses and services, and engage in role-play scenarios to negotiate accommodations.	**K3**
CO4	Characterise personal traits by describing physical appearance and personality traits, apply possessive and indefinite adjectives, and formulate comparisons effectively.	**K4**
CO5	Discuss advancements in science and communication, express hopes and possibilities using the *futur simple* and *conditionnel*structures.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
3	**25UFR31GL03**		Language French – 3						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	2	3	1	3	3	3	2.5
CO2	3	2	3	3	1	2	2	2	2	2	2.2
CO3	3	1	3	3	2	2	2	2	1	1	2.0
CO4	2	2	2	2	2	1	2	1	1	1	1.6
CO5	2	3	3	2	2	2	3	3	3	3	2.6
Mean Overall Score											**2.18 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UHI31GL03	Language Hindi - 3	4	3

Course Objectives
To appreciate the features of Modern Hindi Prose
To understand the Hindi literature in association with the contemporary requirements
To enable the students to develop their effective communicative skills in Hindi
To strengthen the language competence among the students
To empower the students with globally employable soft skills

UNIT I **(12 Hours)**

1. Tera Sneh na Khovoom
2. Samband Bodak
3. Reethikal - Namakarn
4. Chitra Varnan (Basic)

UNIT II **(12 Hours)**

5. Paribakshik Shabdavali
6. Smuchaya Bodak
7. Reethikal - Samajik Paristhithiya
8. Vachan Badalo

UNIT III **(12 Hours)**

9. Vismayadi Bodak
10. Reethikal - Sahithyik Paristhithiyam
11. Beerbal ki Chadurai
12. Patra-Patrikao mein Prakashit Gadyansho ka Patan(Basic)

UNIT IV **(12 Hours)**

13. Avikary Shabdh
14. Reethikal - Main Divisions
15. Ling Badalo
16. Karak

UNIT V **(12 Hours)**

17. Reethikal - Visheshathayem
18. Anuvad
19. Bahu Ki Vidha (One Act Play)
20. Bathcheeth - Kaksha mein

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Case Based Problem Solving
Assessment Methods	Quiz, Seminar, Assignment

Books for Study:

1. Dr. Sanjeev Kumar Jain. (2023). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.
2. Kamathaprasad Gupth, M. (2021). *Hindi Vyakaran*, Anand Prakashan.
3. Dr. Sadananth Bosalae. (2020). *kavya sarang*. Rajkamal Prakashan.

Books for Reference:

1. Ramdev. (2021). *Vyakaran Pradeep*. Hindi Bhavan.
2. Lakshman Prasad Singh. (2022). *Kavya Ke Sopan*. Bharathy Bhavan Prakashan.
3. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.
4. Krishnakumar Gosamy. (2023). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.

Websites and eLearning Sources:

1. https://www.hindwi.org/poets/jaishankar-prasad/all
2. https://youtu.be/e9wK-pYfVPc

3. https://www.amarujala.com/kavya/sahitya/sumitranandan-pant-best-hindi-poems
4. https://mycoaching.in/samuchchay-bodhak-kya-hai
5. https://www.subhshiv.in/2021/06/avikari-shabd.html

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of the course, the student will acquire thelisted skills	
CO1	Categorize the poetics in some selective poems.	**K1**
CO2	Practical application of grammar.	**K2**
CO3	Justify the social & political conditions of Riti Kaal in Hindi Literature.	**K3**
CO4	Find out the dialects of Hindi language.	**K4**
CO5	Illustrate the importance given to family ethics by the youth in the modern period according to "Bahoo Ki vidha" One Act play.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
3	**25UHI31GL03**	Language Hindi - 3								**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	3	2	3	2	1	3	2	2.4
CO2	3	2	3	2	2	3	2	3	2	3	2.5
CO3	3	2	2	3	1	3	2	3	2	3	2.4
CO4	2	3	3	2	3	2	3	3	2	1	2.4
CO5	3	2	2	3	3	2	1	3	2	3	2.4
Mean Overall Score											**2.42 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	**25USA31GL03**	Language Sanskrit - 3	**4**	**3**

Course Objectives
To introduce simple poetry in Sanskrit
To give an exposure to the Vedas and Vedangas
To acquaint students with epics and puranas
To train students in conjugation of verbs in future tense
To introduce Upasarga-s and their role in verb formations

UNIT I **(12 Hours)**

Ramodantam, Balakandam (1-15 verses)

UNIT II **(12 Hours)**

Ramodantam, Balakandam (15-30 verses)

UNIT III **(12 Hours)**

Vedas – Vedangas vivaranam

UNIT IV **(12 Hours)**

Asta dasha Purana and Dashopanishads

UNIT V **(12 Hours)**

Upasargas and Bhavishyat Kaalah Vakya Prayoga

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

1. VEDIC LITERATURE
2. RAMODANTAM

Books for Reference:

1. Parameshwara, Ramodantam, LIFCO Chennai 2020
2. R. S. Vadhyar & Sons, Book – sellers and publishers, Kalpathu, Palaghat – 678003, Kerala, south India, History of Sanskrit Literature 2021
3. Kulapathy, K.M Saral Sanskrit Balabodh, Bharathita vidya bhavan, Munshimarg Mumbai – 400 007 2020

Websites and eLearning Sources:

1. https://www.scribd.com/doc/210917188/Sri-Ramodantam-Sanskrit-Text-With-English-Translation
2. http://www.sushmajee.com/ms-ppp/text/ved-notes.pdf
3. https://occr.org.in/publication/Vedanga.pdf
4. https://www.forgottenbooks.com/en/download/TheThirteenPrincipalUpanishadsTranslatedFromtheSanskrit_10017247.pdf
5. https://www.learnsanskrit.org/guide/uninflected-words/the-upasarga/

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Remember Characters and events of Ramayana	**K1**
CO2	Understand social ethics and moral duties.	**K2**
CO3	Apply the values learnt, in day-to-day life	**K2**
CO4	Appreciate the Vedic Philosophy	**K3**
CO5	Evaluate and create new words with upasargas	**K4**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**25USA31GL03**			Language Sanskrit - 3					**4**		**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	2	3	3	3	3	3	2	1	2.3
CO2	3	3	2	3	3	2	2	3	3	3	2.7
CO3	3	3	1	3	3	1	1	3	3	3	2.4
CO4	2	2	1	2	3	2	2	3	2	1	2.0
CO5	3	3	2	3	2	2	3	3	3	2	2.6
Mean Overall Score											**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
3	25UEN32GE03B	**General English - 3:** English for Science - 1	5	3

Course Objectives
To enable the students to comprehend the local and global issues through the lessons.
To enable the students to do the tasks centering on Skill Development and Grammar.
To empower the students with interactive skills.
To enhance their taste for reading that will naturally develop their vocabulary power and sentence structures
To develop the listening, speaking and writing skills of students through the prescribed texts.

UNIT I: Encounter Between Humans and Aliens (15 Hours)

1. "They're Made Out of Meat" by Terry Bisson
2. Vocabulary in Context: Meat Words
3. Writing: Informal Letter Writing
4. Speaking: Role Play
5. Grammar: Present Perfect Tense

UNIT II: Life After Death (15 Hours)

6. "The Egg" by Andy Weir
7. Vocabulary in Context: Cide Words
8. Writing: Formal Letter Writing
9. Speaking: Description of a Picture
10. Grammar: Present Perfect Continuous Tense

UNIT III: In Communion with Nature (15 Hours)

11. "A Tiger in the House" by Ruskin Bond
12. Vocabulary in Context: Animals and their babies
13. Writing: Job Application Writing (Writing Covering Letter and Curriculum Vitae)
14. Speaking: Description of an Advertisement
15. Grammar: Past Perfect Tense

UNIT IV: Mystery of Venus (15 Hours)

16. "All Summer in a Day" by Ray Bradbury
17. Vocabulary in Context: Rain Words
18. Writing: Drafting Invitation and Brochure
19. Speaking: Short Academic Presentation
20. Grammar; Past Perfect Continuous

UNIT V: Think Before You Trash (15 Hours)

21. "My Frog Recycles All His Trash" by Kenn Nesbitt
22. Vocabulary in Context: Ecological Words
23. Writing: Preparing an Advertisement
24. Speaking: Welcome Address and Vote of Thanks
25. Grammar: Future Perfect Tense and Future Perfect Continuous Tense

* Speaking Components are meant only for internal tests

Teaching Methodology	Lecture, Multimedia Presentations, Discussion and Enacting
Assessment Methods	Speaking, reading, listening and written tests

Books for Study:

1. Francis, V., Dr. D.R. Edwin Christy and Dr. D. Loyola Innaci. *Lingua Science – I*, St. Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference:

1. Wilfred, D. Best. *Students Companion*. HarperCollins Publishers, 2020.

2. Wren & Martin. *Middle School English Grammar and Composition,* S Chand Publishing, 2023.
3. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*, Rupa Classics, 2013.

Websites and eLearning Sources:

1. https://jerrywbrown.com/wp-content/uploads/2020/02/They-are-made-out-of-meat-Bisson-Terry.pdf
2. https://www.are.na/block/12921440
3. https://pdfcoffee.com/andy-weir-the-egg-pdf-pdf-free.html
4. https://mrsdelcarmen.weebly.com/uploads/3/0/9/0/30908551/a_tiger_in_the_house_by_ruskin_bond.pdf
5. https://poetry4kids.com/poems/my-frog-recycles-all-his-trash/
6. https://www.stcypriansprimaryacademy.co.uk/wp-content/uploads/2021/01/All-Summer-in-a-Day-by-Ray-Bradbury.pdf

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Identify and comprehend the local and global issues through the lessons	**K1**
CO2	Use interactive skills	**K2**
CO3	Develop the Listening and Reading Skills of the learners through teacher-led reading practice	**K3**
CO4	Enhance their Listening, Reading, Speaking, and Writing Skills	**K4**
CO5	Develop their Creative and Critical Thinking and Speaking Skills	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UEN32GE03B**			**General English - 3:** English for Science - 1						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	2.4
CO2	2	2	3	2	3	3	2	3	2	2	2.3
CO3	2	3	2	3	2	2	3	2	3	2	2.4
CO4	2	2	3	2	3	3	2	3	2	3	2.5
CO5	2	2	2	3	2	2	2	3	2	2	2.2
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UMA33CC06	**Core Course - 6:** Sequences and Series	5	4

Course Objectives
To get a good foundation of classical analysis
To understand the behavior of monotonic functions.
To study the behavior of convergence of series by using tests.
To solve problems related to sequence and series.
To realize the concepts of sequences and series and their applications in various fields of sciences.

UNIT I **(15 Hours)**

Sequences - Bounded Sequences - Monotonic Sequences - Convergent Sequences - Divergent and Oscillating Sequences.

UNIT II **(15 Hours)**

Algebra of limits - Behavior of Monotonic functions.

UNIT III **(15Hours)**

Some Theorems on Limits - Subsequences - Limit points - Cauchy Sequences.

UNIT IV **(15 Hours)**

Series - Infinite Series - Cauchy's general Principle of Convergence-Comparison Test Theorem and Test of Convergences using Comparison Test.

UNIT V **(15 Hours)**

Test of convergence using D'Alembert's ratio test - Cauchy's root test - Alternating Series - Absolute Convergence.

Teaching Methodology	Chalk and Talk, PPT
Assessment Methods	MCQ, Snap Test, Seminar

Books for Study:

1. Arumugam, S., Isaac, T.A, & Somasundaram, A. (2019). *Sequences and Series*. Yes Dee Publishing Pvt Ltd.
   Unit I: *Chapter 3 (Sec: 3.1 - 3.5; Pages: 41 - 56)*
   Unit II: *Chapter 3 (Sec: 3.6 - 3.7; Pages: 56-82)*
   Unit III: Chapter 3 (Sec: 3.8 - 3.11; Pages: 82 - 103)
   Unit IV: Chapter 4 (Sec: 4.1 - 4.2; Pages: 112 - 128: Sec: 4.3 Pages: 149, 152 -158)
   Unit V: Chapter 4 (Relevant Sections only, Pages 131,132,135-140,145&147-150), Chapter 5 (Sec: 5.l - 5.2; Pages:157 - 167)

Books for Reference:

1. Kumar, A., & Kumaresan, S. (2015). *Real Analysis*, CRC Press.
2. Malik, S. C. (2021). *Principles of Real Analysis*, (5th Ed.). New Age International Private Limited.
3. Mapa, (2021), *Introduction to Real Analysis*, Ninth Edition, Levant Books, India

Website and e-Learning Source:

1. https://www.cimt.org.uk/projects/mepres/alevel/pure_ch13.pdf
2. https://www3.nd.edu/~lnicolae/Hon_Calc_Lectures.pdf
3. https://people.math.osu.edu/fowler.291/sequences-and-series.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Acquire knowledge in sequences and series.	**K1**
CO2	Understand the behavior of sequences and series of real numbers.	**K2**
CO3	Apply related theorems and techniques to solve problems on sequences and series.	**K3**
CO4	Analyze the structure and properties of sequences and series	**K4**
CO5	Justify the concepts of sequences and series.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UMA33CC06**			**Core Course - 6:** Sequences and Series						**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	3	3	2	2	3	**2.2**
CO2	1	2	2	3	1	2	3	2	2	3	**2.1**
CO3	1	2	3	2	3	2	3	2	3	2	**2.3**
CO4	2	3	2	1	2	3	3	2	2	3	**2.3**
CO5	1	2	2	2	3	1	3	2	2	3	**2.1**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UMA33CC07	**Core Course - 7:** Differential Equations	6	4

Course Objectives
To recognize and implement solution techniques to solve first order differential equations concisely.
To solve second order linear differential equations with constant and variable coefficients using various methods.
To model and solve real-world phenomena using differential equations.
To classify partial differential equations and obtain their solutions systematically.
To utilize Laplace transformations for solving differential equations.

UNIT I: Differential equations of the first order **(18 Hours)**

Definitions - solutions of differential equations - Formation of differential equations - Solutions of first order and first degree equations - Variable separable - Homogeneous equations - Non-homogeneous equations - Linear equations - Bernoulli's equation - Exact differential equations - Equations of first order but of higher degree

UNIT II: Linear Differential equations **(18 Hours)**

Linear equations with constant coefficients - Particular integral - Special methods for finding P.I (When X is of the form $e^{ax}, cosax, \sin ax, xm, e^{ax}\,V(x)$) - Linear equations with variable coefficients - Equations reducible to the linear homogeneous equation - Variation of parameters.

UNIT III: Partial Differential Equations **(18 Hours)**

Introduction - Derivation of Partial Differential Equations - Different integrals of partial differential equations - Equations solving by direct integration - The standard types of first order equations - Lagrange's equation - Charpit's method.

UNIT IV: The Laplace Transform **(18 Hours)**

Definitions - Properties of Laplace transform - Laplace transform of periodic functions - Evaluating integrals using Laplace transform - The inverse transforms - solving linear DE with constant coefficients using Laplace transforms.

UNIT V: Fourier series **(18 Hours)**

Definitions - Expression of *f(x)* as a trigonometric series - Even and odd functions - properties of odd and even functions - Half range Fourier series - Change of interval.

Teaching Methodology	Chart, PPT, chalk and talk
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Narayanan, S. & Pillay, T.K.M. (2019). *Calculus, Volume III*, Ananda Book Depot, Chennai - 600 018.
   Unit I: *Chapter 1 - Sections 1.1 - 1.3, 2.1 - 2.5, 3.1 - 3.3, 5.1 - 5.4. (Page No: 1-26, 33-36)*
   Unit II: *Chapter 2 - Section 1.1 - 1.2, 2, 3, 4(a, b, c, d), 8, 8.1-8.3, 9, 10. (Page No: 49 - 75, 81 - 95.)*
   Unit III: *Chapter 4 - Section 1, 2.1 - 2.2, 3, 4, 5.1 - 5.5, 6, 7. (Page No: 115 - 153.)*
   Unit IV: *Chapter 5 - Sections: 1, 2, 3, 5. 6, 7, 8. (Page No: 154 - 165, 168 - 189.)*
   Unit V: *Chapter 6 - Sections: 1 - 6 (Page No: 202 - 234.)*

Books for Reference:

1. Raisinghania, M.D. (2017). *Ordinary and Partial Differential Equations*. S Chand & Co Ltd.
2. Narayanan, S., & Pillay, T.K.M. (2015). *Differential equations and its applications*. S. Viswanathan Pvt Ltd.
3. Venkatraman, M.K. *Engineering Mathematics - III-year part* B. National Publishing Company.

Website and eLearning Sources:

1. https://ocw.mit.edu/courses/18-03sc-differential-equations-fall-2011/
2. https://www.khanacademy.org/math/differential-equations

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Acquire knowledge on basic concepts of ordinary and partial differential equations, Laplace transforms and Fourier series.	**K1**
CO2	Understand the classification of differential equations and its solutions, properties of Laplace transforms and Fourier series.	**K2**
CO3	Apply differential equations, Laplace Transforms and Fourier series to solve problems in a range of mathematical applications.	**K3**
CO4	Analyze the properties of Laplace transform and examine the solutions of ordinary and partial differential equations.	**K4**
CO5	Evaluate general solutions of ordinary and partial differential equations using various methods and evaluate periodic functions in terms of its Fourier series expansions.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UMA33CC07**			**Core Course - 7:** Differential Equations						**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	2	3	2	2	2	**2.1**
CO2	2	3	2	1	2	3	3	2	2	3	**2.3**
CO3	1	2	3	2	3	2	3	2	3	2	**2.3**
CO4	1	2	2	3	2	2	3	2	2	3	**2.2**
CO5	1	2	2	2	3	1	3	2	2	3	**2.1**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UMA33AO01A	**Allied Optional - 1:** Physics - 1	4	3

Course Objectives
To acquire the knowledge behind the sound waves, the basics of electricity and magnetism, properties of liquids and solids and optical instruments.
To understand the different types of sound waves, different properties of solids, liquids and entropy for different thermodynamic process.
To classify and discuss the types of voltages and currents, working of different optical devices and different defects.
To calculate acoustical, elastic constants, viscosity, surface tension, refractive index and to apply the concepts of kinetic theory of gases and liquefaction of gases in real cases.
To categorize the types of motion and modes of sound waves, bending of beams, thermodynamics process and to analyze the effect of electric and magnetic fields in conductors, the dispersion, deviation and defects in optics.

UNIT I: Waves and Oscillations (12 Hours)

Simple harmonic motion and circular motion - composition of two simple harmonic motions at right angles (periods in the ratio 1:1) - Lissajous figures - uses - Laws of transverse vibrations of strings - verification of Melde's string - transverse and longitudinal modes - determination of A.C. frequency using sonometer (steel and brass wires) - Ultrasonics - production - application and uses - Acoustics of buildings - reverberation - Absorption coefficient - Requirements for a good auditorium.

UNIT II: Properties of Matter (12 Hours)

Elasticity: Elastic constants - energy stored in a stretched wire - bending of beams - expression for bending moment - Young's modulus by non-uniform bending - torsion in a wire - determination of rigidity modulus by torsional pendulum.

Viscosity: Streamline flow and turbulent flow- Coefficient of viscosity - Poissuelle's formula - Comparison of Viscosities - burette method - Stoke's law - terminal velocity - viscosity of highly viscous liquids.

Surface tension: Molecular theory of surface tension - excess pressure inside a drop and bubble - variation of surface tension with temperature.

UNIT III: Thermal Physics (12 Hours)

Postulates of kinetic theory of gases - Joule-Kelvin effect - Porous plug experiment - theory of Porous plug Experiment - Liquefaction of gases - Linde's process - adiabatic demagnetization -Helium I and II Thermodynamic equilibrium - laws of thermodynamics - entropy - change ofentropy in reversible and irreversible processes.

UNIT IV: Electricity and Magnetism (12 Hours)

Capacitor - energy of charged capacitors - loss of energy due to sharing of charges - Biot - Savart's law - magnetic induction at a point on the axis of a circular coil carrying current - EMF induced in a coil rotating in a magnetic filed - Mean value of alternating current - RMS values of a ac current and voltage- Electric circuit - switch and its types - fuses - circuit breaker - Relays - P.O. Box: measurement of resistance - Potentiometer: calibration of ammeter.

UNIT V: Geometrical Optics (12 Hours)

Refraction - Normal refraction - Refractive index by microscopy - air cell method - refraction through a prism and thin prism - Spectrometer - determination of refractive index - combination of two small angled prisms to produce dispersion without deviation and deviationwithout dispersion - direct vision spectroscope - defects of images - coma, Distortion -Aberrations - spherical aberration in lenses - methods of minimizing spherical aberration - Chromatic aberration in lenses - Expression for longitudinal chromatic aberrations.

Teaching Methodology	Chalk and Talk, Demo Videos, PPT, Hand-outs
Assessment Methods	Seminar, Snap Test, MCQ, Online Quiz, Assignment

Books for Study:

1. Murugesan, R. (2015), *Allied Physics* (Reprint), S Chand and Co. Publications.

Unit	Book	Chapter	Section
I	1	1	1.1, 1.3, 1.4, 1.7,1.8, 1.9, 1.10, 1.11, 1.12,1.13, 1.14, 1.15, 1.16, 1.17
II	1	2	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.12, 2.13, 2.14, 2.15, 2.17, 2.19, 2.20, 2.21, 2.22, 2.24, 2.25, 2.27, 2.28, 2.30
III	1	3	3.1, 3.4, 3.5, 3.6, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.15, 3.16, 3.17, 3.18, 3.20, 3.21, 3.22
IV	1	4	4.1, 4.2, 4.3, 4.5, 4.6, 4.7, 4.8, 4.9, 4.11, 4.12, 4.16, 4.17, 4.18, 4.19, 4.20
V	1	5	5.1, 5.2, 5.3, 5.5, 5.6, 5.10, 5.13, 5.14, 5.15, 5.16, 5.17, 5.18, 5.19, 5.22, 5.23, 5.24

Books for Reference:

1. Halliday. D, Resnick. R, & Walker. J (2010). *Fundamental of Physics*, (9th Ed.). John Wiley & Sons.
2. Schaltz, M.E (2011). *Grob's Basic Electronics* (11th Ed.). McGraw Hill.
3. Mathur, D.S (2016). *Elements of Properties of Matter (Reprint*). S. Chand and Co. Publications.
4. Garg, S.G., Bansal, R.M., & Gosh, C.K. (2012). *Thermal Physics*. Tata-McGraw Hill Publications.

Websites and eLearning Sources:

1. https://archive.nptel.ac.in/courses/115/106/115106119/
2. https://archive.nptel.ac.in/courses/112/105/112105183/
3. https://archive.nptel.ac.in/courses/115/105/115105129/
4. https://archive.nptel.ac.in/courses/115/106/115106122/
5. https://archive.nptel.ac.in/courses/115/107/115107131/

(subject to availability - not to be used for exam purpose)*

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire knowledge of physics fundamentals involved in waves, and oscillation, properties of materials, thermal physics, electricity, magnetism and ray optics	**K1**
CO2	Understand the different properties of a physical matter, vibration in strings and sonometer, kinetic theory of gases, electrical circuits, electric, magnetic induced effects and dispersive power of a prism.	**K2**
CO3	Apply the concepts of ray optics and electricity and magnetism, wave oscillations in real life problems like defects in images, aberration in lenses, electrical circuits and acoustics of buildings	**K3**
CO4	Examine the physics knowledge learned from class room with real life problems.	**K4**
CO5	Evaluate the properties of different physics matters, optical phenomena in prism and dynamics of charges.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**25UMA33AO01A**			**Allied Optional - 1:** Physics - 1					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	1	2	3	2	1	2	2	**2.0**
CO2	3	3	2	2	2	3	2	2	2	2	**2.3**
CO3	3	3	2	3	2	3	3	3	2	2	**2.6**
CO4	3	3	2	3	2	3	2	3	2	2	**2.5**
CO5	3	3	2	3	2	3	3	3	2	2	**2.6**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UMA33AO01B	**Allied Optional - 1:** Accounts - 1	6	4

Course objectives:
To facilitate the students to understand systematic and scientific methods of Book keeping
To provide the practical knowledge about the preparation of financial statements such as Income statements and balance sheet
To give practical understanding regarding the process of preparation of final accounts of non-trading organizations
To make the students to understand the concept of single-entry system of book keeping and its conversion into double entry system of book keeping
To offer clear insight about the process of rectification of errors and preparation of Banking reconciliation statement

UNIT – I Introduction of Financial Accounting 18 HOURS

Accounting- Different types – Financial accounting - Book Keeping –Meaning – objectives - Principles, Concepts and Conventions – Type of accounts – Golden rules of recording – Journal Subsidiary Books (purchase book, sales book, purchase return book, sale return book & Cash book –Ledger.

UNIT – II Accounts for Sole Trader 18 HOURS

Trial balance–Trading, Profit and Loss Accounts, Balance Sheet of Sole Trader (closing stock, outstanding expenses, prepaid expenses, income receivable, income received in advance, depreciation and provision for bad debts.

UNIT – III Accounts for non-trading concerns 18 HOURS

Accounts for non-trading concerns- Receipts and payment account Vs Income and Expenditure account- Preparation of Income and Expenditure Account from Receipts and Payment Accounts (simple adjustments).

UNIT – IV Single Entry System 18 HOURS

Single Entry System-Defects of single - entry system – Double entry system Vs single entry system – Calculation of profit/loss-net worth method conversion method

UNIT – V Rectification of Errors 18 HOURS

Errors –Classification- Rectification- Suspense Account- - Preparation of Bank Reconciliation Statement.

Teaching Methodology	Chalk & Talk, Videos, PPTs, Demonstration and Creation of Models
Assessment Method	Snap Test, Quiz, Open Book test

Theory 20% and Problems 80%

Books for Study:

1. R.L. Gupta & M. Radhaswamy, "Financial Accounting", Sultan Chand & Sons, New Delhi (2017)

Books for Reference:

1. SP. Jain &K.L. Narang, "Advanced Accountancy", Volume I, Kalyani Publishers, New Delhi (2015)
2. Reddy TS and Murthy, Financial Accounting (2020), Margham Publications, Chennai (2020)

Websites and eLearning Sources:

1. https://www.coursera.org/learn/wharton-accounting
2. https://www.coursera.org/courses?query=financial%20accounting
3. https://onlinecourses.nptel.ac.in/noc23_mg65/preview

Course Outcomes		
CO No.	**CO – Statements**	**Cognitive Levels (K – Level)**
	On successful completion of this course, students will be able to	
CO1	Describe the accounting concepts, conventions and rules used in journalizing business transactions	**K1**
CO2	Prepare Trial Balance, Final Accounts and Bank Reconciliation Statement	**K2**
CO3	Calculate surplus / deficit of Non-Profit Organizations through Income and Expenditure Account	**K3**
CO4	Differentiate Single Entry from Double Entry system of accounting	**K4**
CO5	Classify and rectify errors by applying accounting rules	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours/Week**	**Credits**
3	**25UMA33AO01B**			**Allied Optional - 1:** Accounts - 1						**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	2	2	2	2	2	**2.2**
CO2	3	2	2	2	2	2	3	2	3	3	**2.4**
CO3	2	3	2	3	2	3	2	3	3	3	**2.6**
CO4	2	2	2	1	2	2	2	1	2	2	**1.8**
CO5	3	2	3	3	1	3	1	3	2	1	**2.2**
										Overall Mean Score	**2.2**
											High

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UHE34VE03A	**Value Education - 3:** Social Ethics - 1	2	1

Course Objectives
To gain a comprehensive understanding of the principles advocated in social ethics.
To examine the different types of political systems in a thorough manner.
To comprehend the role and obligations of the educated youth.
To evaluate the conduct of the elected representatives in a detailed manner.
To thoughtfully analyze the various forms of cyber-crime.

UNIT I: Introduction to Social Ethics (6 Hours)

Social ethics, social ethics and social responsibility, social ethics play an important role on the areas, religion influences social changes and vice versa, secularism. Social ethics and corporate dynamics, forms of social ethics.

UNIT II: The Economic and Political System of Today (6 Hours)

Planned economy and communism - market economy and capitalism- socialism - mixed economy -the emerging market economy - political system- totalitarian system- oligarchic system.

UNIT III: Integrity in Public Life National Integration (6 Hours)

What is Integrity, Public Life, Integrity and Public Life, Integrity in a Democratic State, India as Democratic State, Behavior of a elected representative of India, Noticeable degradation acts of elected Representatives, Suggestions to stem this rot, Types of integrity, Transparency can be a guarantee for integrity.

UNIT IV: Cyber Crime (6 Hours)

Business Ethics, Business ethics permeates the whole organization, measuring business ethics, The Vital factors highlighting the importance of business ethics, Cyber-crime, Strategies in committing Cyber Crimes, Factors aiding Cyber Crime, computer Hacking, Cyber Bullying, Telecommunications piracy, Counter Measures to Cyber Crime, Ethical Hacking.

UNIT V: Social Integration (6 Hours)

Global challenges, the future is with the Educational Youth, Cost of the Sacrifice, Crusaders against corruption, Responsibility of the Educated Youth, Positive Global Scenario, right to Education, Eradicating gender inequality, Sustainable Human Development, Social Integration, Elimination Crime, Integration with Global Market

Teaching Methodology	Lecture, PPT, Power point
Assessment Methods	Online Test, Group Discussions

Books for Study:

1. Department of Human Excellence. (2021). *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference:

1. Arora, R.K. (2014). *Ethics, Integrity and Values*. Public Service Paperback.
2. Cunningham, D. (2004). *There's something happening here: The new left, the Klan, and FBI counterintelligence*. Berkeley: University of California Press.
3. Mali, P. (2017). *Cyber law & Cyber Crimes simplified*. Cyber Info Media Paperback.
4. Richardson, M. (2019). *Cyber Crime: Law and Practice Hardcover - Import*.

Websites and eLearning Sources:

1. https://cybercrime.gov.in/
2. https://open.lib.umn.edu/sociology/chapter/14-2-types-of-political-systems/
3. https://www.esv.org/resources/esv-global-study-bible/social-ethics/
4. https://en.wikipedia.org/wiki/Political_system

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Know the responsibility of the educated youth.	**K1**
CO2	Understand the values prescribed under social ethics.	**K2**
CO3	Apply their minds critically to the various types of cyber-crime.	**K3**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours/Week**		**Credits**
3	**25UHE34VE03A**		**Value Education - 3:** Social Ethics - 1						**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	2	2	3	2	2	**2.3**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UHE34VE03B	**Value Education - 3:** Religious Doctrine - 1	2	1

Course Objectives
To impart knowledge to students about Salvation History
To familiarize students with the life and mission of Jesus Christ
To help Students understand the Holy Spirit
To empower students on Gospel Values
To equip the students about Mother Mary

UNIT I **(6 Hours)**

God of salvation

UNIT **(6 Hours)**

Life & Mission of Jesus Christ

UNIT III **(6 Hours)**

The Holy Spirit

UNIT IV **(6 Hours)**

Gospel Values

UNIT V **(6 Hours)**

Mary, the mother of God

Teaching Methodology	Power point, Assignment and Group discussion
Assessment Methods	Online Test, Group Discussions

Books for Study:

1. Department of Human Excellence. (2022). *Fullness of Life.* St. Joseph's College, Tiruchirappalli.

Books for Reference:

1. (1994). *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India.
2. Holy Bible (NRSV).

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Understand the Salvation History	**K1**
CO2	Grasp to the life and purpose of Jesus Christ	**K2**
CO3	Live out the teachings of the Gospel	**K3**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours/Week**		**Credits**
3	**25UHE34VE03B**			**Value Education - 3:** Religious Doctrine - 1					**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	3	3	3	2	2	**2.5**
CO3	2	2	3	3	2	2	3	3	3	3	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25USS34SE01	**Skill Enhancement Course – 1:** Soft Skills	2	1

Course Objectives
To help students understand, practice, and improve their communication skills
To enable students with effective presentation skills
To help students attend interviews confidently and participate effectively in group discussions
To make students realise their potential and excel on personal as well as professional grounds
To develop the thinking skills of students for better performance in competitive exams, interviews and u discussions

UNIT I Communication Skills (6 Hours)

Basics of Communication: Importance of Good Communication Skills, Types of Communication Skills, Verbal Communication, Non-verbal Communication, Tips for Improving Nonverbal Communication, Communication Styles, Barriers to Communication, Ways To Improve Communication Skills, Practicum. *Professional Grooming*: How to Create the Impact for that First Impression, Presentation Skills, Developing Handouts, Developing Notes, Adding Visual and Audio Effects, Practicum

UNIT II Resume Writing & Interview Skills (6 Hours)

*Resume Writing***:** The Purpose of a Resume, Finding a Job & Making a Career, Length of Resume, Order of Resume, Tailoring the Resume, What your Resume should include, Some Tips for Listing a Bachelor's degree on Your Resume, What NOT to put on your Resume, Formatting Resume, Difference between Resume, Biodata and Curriculum Vitae, Preparation of a Resume *Interview Skills***:** Meaning of Interview, Types of Interviews, How to get ready for the big day?, Appropriate Attire, Etiquette, Mastering the Art of Meet and Greet, Resume - Points to Remember, Practicum *Group Discussion:* Why is GD Essential?, Factors that influence GD, Outcome of GD, Tips for participation in a GD, Useful phrases for GD, Success Tips in GD, Practicum.

UNIT III Personal Effectiveness (6 Hours)

Self-Discovery: Characteristics of Personality, Kinds of Self, Who am I?, Personality Inventory Table *Goal Setting*: Why do Goal Setting?, Goal Setting Process, Smart Goals

UNIT IV Numerical Ability (6 Hours)

Average, Simple Interest, Compound Interest, Profit and Loss, Area, Volume and Surface Area

UNIT V (6 Hours)

Verbal Reasoning: Series Completion, Analogy. *Non-Verbal Reasoning.*

Teaching Methodology	Chart, PPT, chalk and talk, Video Presentation

Books for Study:

1. Balaiah, J., & Joy, J. L. (2024). Straight from the Traits: Securing Soft Skills, (Revised 3rd Ed.). St. Joseph's College, Tiruchirappalli.

Books for Reference:

1. Aggarwal, R.S. (2010). A Modern Approach to Verbal and Non-Verbal Reasoning, S. Chand.
2. Balaiah, J. & Joy, J. L. (2018). Winners in the Making: A primer on soft skills. St. Joseph's College, Tiruchirappalli.
3. Covey S. R. (2004). The 7 Habits of Highly Effective People: Restoring the Character Ethic (Rev. ed.). Free Press.
4. Egan, G. (1994). The Skilled Helper (5th Ed.). Pacific Grove, Brooks/Cole.
5. Khera, S. (2014). You Can Win. Macmillan Books.
6. Martin, Y. (2005). Hiring the Best: A Manager 's Guide to Effective Interviewing and Recruiting, (5th Ed.). Adams Media.
7. Sankaran, K., & Kumar, M. (2010). Group Discussion and Public Speaking, (5th Ed.). M.I. Publishers.
8. Trishna. (2012). How to do well in GDS & Interviews, (3rd Ed.). Pearson Education.

Websites and eLearning Sources:

1. https://www.indeed.com/career-advice/resumes-cover-letters/communication-skills
2. https://www.seek.com.au/career-advice/article/50-communication-skills-for-the-workplace-your-resume
3. https://southeast.iu.edu/career/files/power-phrases.pdf
4. https://dese.ade.arkansas.gov/Files/20201209124449_Professional-Communication.docx
5. https://www.dol.gov/sites/dolgov/files/ETA/publications/00-wes.pdf
6. https://www.tmu.ac.in/other_websites/cdoe.tmu.ac.in.old/study-material/28-08-2024/COMMON/SEMESTER_2/MAIN_SOFT_SKILLS.pdf
7. https://byjus.com/maths/profit-and-loss-questions/
8. https://www.indiabix.com/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Analyse problems directed at testing their cognitive abilities	**K1**
CO2	Present the best of themselves as job seekers and communicate effectively in all contexts	**K2**
CO3	Assess themselves, set goals, and manage conflicts that are expected of a good leader	**K3**
CO4	Enhance numerical ability required for the employees for various transactions	**K4**
CO5	Develop aptitude skills required by the employers	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**	**Credits**	
3	**25USS34SE01**		**Skill Enhancement Course - 1:** Soft Skills						**2**	**1**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	2	2	2	2	3	2	3	2.5
CO2	2	3	3	2	3	3	2	3	2	2	2.5
CO3	2	2	3	3	2	3	3	3	2	2	2.5
CO4	2	2	3	3	2	3	3	3	2	2	2.5
CO5	2	2	3	3	2	3	3	3	2	2	2.5
Mean Overall Score											**2.5 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
4	25UTA41GL04B	General Tamil – 4: அறிவியல் தமிழ் (Scientific Tamil)	4	3

கற்றலின் நோக்கங்கள் (Course Objectives)
அன்றாட வாழ்வில் அறிவியலின் செல்வாக்கை அறிந்துகொள்ளுதல்
பண்டைத்தமிழர் வாழ்வில் இடம்பெற்ற அறிவியல்கூறுகளைக் கண்டறிதல்
திரைப்படம், நூல் போன்றவற்றைத் திறனாய்வு நோக்கில் ஆராய்தல்
தமிழர்தம் பண்பாடும் அறிவியலும் கொண்ட தொடர்பைப் புலப்படுத்துதல்
படைப்பாற்றல் திறனைக் கண்டறிந்து அறிவியல் படைப்புகளை உருவாக்கல்

அலகு - 1 **(12 மணி நேரம்)**

கணிதவியல்: பார்ப்பார்க்கு அல்லது பணிபு அறியலையே(பதிற்றுப்பத்து : 63) - விசும்பில் ஊழி - ஊழ்-ஊழ் செல்லக் (பரிபாடல் : திருமால் : 4-15) - கண்ணுங்கால் கண்ணும் கணிதமே (சிறுபஞ்சமூலம் :92) - உண்ணாது வைக்கும் பெரும்பொருள் (இன்னா நாற்பது -16)

உயிரியல்: தொல்காப்பியம் : மரபியல் : (27-33) - சிறுவீ ஞாழல் (நற்றிணை 195) - நீடுவெயில் உழந்த (அகநானூறு 335) - வள் இதழ் ஒண் செங்காந்தள் (குறிஞ்சிப்பாட்டு 61-98) -வாள்வரி வயமான் (அகநானூறு 99) -புல்லாகிப் பூடாய்ப் புழுவாய் மரமாகிப் (திருவாசகம்- சிவபுராணம் 26-32

உரைநடைக்கட்டுரை: வியக்க வைக்கும் தமிழரின் அறிவியல்

பயன்முறை கற்றல்: வலைப்பூக்கள் உருவாக்கம்- அறிவியல்கலைச்சொல்லாக்கம்

அலகு - 2 **(12 மணி நேரம்)**

நீரியல்: அம்ம வாழி தோழி (குறுந்தொகை 287) -அம்ம வாழி, தோழி கைம்மிக (அகம் 141: 1-11) -முழங்கு முந்நீர் முழுவதும் வளைஇப் (புறநானூறு-18) -வீங்கு விளிம்பு உரீஇய விசை அமை நோன் சிலை (அகநானூறு-175) -விசும்பு ஆடு பறவை வீழ் பதிப் படர (குறிஞ்சிப்பாட்டு 46-53)- **திருக்குறள்** வான்சிறப்பு - **பதார்த்த சிந்தாமணி :** குளத்து சலந்தானே கொடிதான (27) - ஏரிசலம் வாதமிகு மதுவே (31) -அருவிநீர் மேக மகற்நுங் (39)

ஆழிப்பேரலை: வாழ்க எம் கோ மன்னவர் (சிலப்பதிகாரம் -காடுகாண் காதை15-22)- தீங்கனி நாவல் ஓங்கும்இத் தீவிடை (மணிமேகலை-பீடிகை கண்டு பிறப்புணரந்த காதை (17-22)

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

புதினம்: இரா.நடராசன் : சர்க்கஸ்.காம்

அலகு - 3 **(12 மணி நேரம்)**

உலகியல்: நிலம் தீ நீர் வளி விசும்போடு (தொல்.பொருள் 635) - நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று 14:1-4) - மண் திணித்த நிலனும் (புறம் 2 1-6)

வானியல்: செஞ்ஞா யிற்றுச் செலவும் (புறம் 30 1-7) - ஆடு இயல் அழல் குட்டத்து புறநானூறு (229) - நெடுவயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று 24:1-26)

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் வெளிப்படும் நீர் மேலாண்மையியல்

பயன்முறை கற்றல்: நூல் – திறனாய்வு

அலகு - 4 **(12 மணி நேரம்)**

மருத்துவம்: திருக்குறள்: மருந்து - இரும்பனம் புடையல் ஈகை வான்கழல் (பதிற்றுப்பத்து -42) – ஏற்றி இறக்கி இருகாலும் பூரிக்கும் – (திருமந்திரம் 571) - இல்லையே வாதம் எழில்நடை கோழியாம் (கர்ப்ப வாகடத் திரட்டு-23)

அணு இயற்பியல்: மணிமேகலை : சமயக் கணக்கர் தந்திறங் கேட்ட காதை (105-165) - மேவிய சீவன் வடிவது சொல்லிடில் (திருமந்திரம் –ஏழாம் தந்திரம் 29:1) - அணுவில் அணுவினை ஆதிபிரானை (திருமந்திரம் –ஏழாம் தந்திரம் 28:2) - அண்டப் பகுதியின் உண்டைப் பிறக்கம் (திருவாசகம்- திருவண்டப் பகுதி 106) - அண்டங்கள் எல்லாம் அணுவாக (திருவிளையாடல் புராணம் –அணுவியல் (பாயிரம்-6) - செகத்தையெல்லாம் அணுவளவுஞ் சிதறா வண்ணஞ் (தாயுமானவர் – தந்தை தாய் 6)

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

பயன்முறை கற்றல்: திரைப்படத் திறனாய்வு- ஆவணப் படத்திறனாய்வு

அலகு - 5 **(12 மணி நேரம்)**

கட்டடவியல்: வானம் ஊன்றிய மதலை போல (பெரும்பாண் : 346-351) - விரி கதிர் பரப்பிய வியல் வாய் மண்டிலம் (நெடுநல்வாடை 72-88) - காடுகொன்று நாடாக்கி (பட்டினப்பாலை 283-288) - பெருக்காறு சடைக்கணிந்த பெருமான் சேரும் (தேவாரம் 2801)

பகுத்தறிவியல்: ஓசை உள்ள கல்லை (சிவவாக்கியர் -412)- நட்டகல்லைத் தெய்வமென்று (சிவவாக்கியர்-482)

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்;

பயன்முறை கற்றல்: பழமொழிகளில் அறிவியல், மூலிகைகளைக் கண்டறிதல்

கற்பித்தல் அணுகுமுறை *(Teaching Methodology)*	விரிவுரை ***(Lecture),*** காணொளிக் காட்சி ***(Videos),*** விளக்கக் காட்சி ***(PPT presentation)***
மதிப்பீட்டு முறைகள் *(Assesment methods)*	வலைப்பூ உருவாக்கம், திரைப்படத் திறனாய்வு, மூலிகை சேகரிப்பு, நூல் திறனாய்வு

பாட நூல்கள்:

1. தமிழாய்வுத்துறை (2025), அறிவியல் தமிழ், தூய வளனார் தன்னாட்சிக் கல்லூரி
2. இரா.நடராசன்; (2010), சர்க்கஸ்.காம், Books for Children
3. மூர்த்தி அ.கி. (2001), அறிவியல் கலைச்சொல் அகராதி, மணிவாசகர் பதிப்பகம்.

பார்வை நூல்கள்:

1. அரிமாப்பாமகன்.ஆ (2017), சங்க இலக்கியத்தில் சூழலியல், இராசகுணா பதிப்பகம்
2. குழந்தைசாமி.வா.செ., (2001), அறிவியல்தமிழ், பாரதி பதிப்பகம்

Websites and eLearning Sources:

- https://www.tamilcomputingjournal.org/?page_id=2622
- https://archive.org/details/dli.jZY9lup2kZl6TuXGlZQdjZl3lMyy
- https://thamizhiyal.com/?p=2775
- https://www.valaitamil.com/jan-month-Article_19160.html

Course Outcomes

CO No	***CO–Statements*** **இப்பாடத்தின் நிறைவில் மாணவர்கள்**	***Cognitive Levels (K –Levels)***
CO -1	அன்றாட வாழ்வில் அறிவியலின் செல்வாக்கை அறிந்துகொள்வர்	***K1***
CO -2	பண்டைத்தமிழர் வாழ்வில் இடம்பெற்ற அறிவியல்கூறுகளைக் கண்டறிவர்	***K2***
CO -3	திரைப்படம், நூல் போன்றவற்றைத் திறனாய்வு நோக்கில் ஆராய்வர்	***K3***
CO -4	தமிழர்தம் பண்பாடும் அறிவியலும் கொண்ட தொடர்பைப் புலப்படுத்துவர்	***K4***
CO -5	படைப்பாற்றல் திறனைக் கண்டறிந்து அறிவியல் படைப்புகளை உருவாக்கும் திறன் பெறுவர்	***K5***

Relationship Matrix											
Semester	***Course Code***			***Title of the Course***						***Hours***	***Credits***
4	***25UTA41GL04B***			*General Tamil – 4: அறிவியல் தமிழ் (Scientific Tamil)*						***4***	***3***
Course Outcomes↓	***Programme Outcomes (PO)***					***Programme Specific Outcomes (PSO)***					***Mean Scores of COs***
	PO-1	***PO-2***	***PO-3***	***PO-4***	***PO-5***	***PSO-1***	***PSO-2***	***PSO-3***	***PSO-4***	***PSO-5***	
CO-1	*3*	*2*	*3*	*2*	*2*	*3*	*3*	*2*	*2*	*2*	*2.4*
CO-2	*2*	*3*	*3*	*2*	*3*	*2*	*3*	*2*	*3*	*2*	*2.5*
CO-3	*3*	*2*	*2*	*3*	*3*	*3*	*2*	*3*	*3*	*3*	*2.7*
CO-4	*2*	*3*	*3*	*2*	*2*	*3*	*2*	*3*	*3*	*2*	*2.5*
CO-5	*3*	*1*	*2*	*3*	*2*	*2*	*3*	*2*	*3*	*3*	*2.4*
									Mean Overall Score		***2.5 (High)***

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	**25UFR41GL04**	Language French – 4	**4**	**3**

Course Objectives
Express preferences and opinions with precision using quantity expressions, and pronouns to convey satisfaction or dissatisfaction.
Describe Health Conditions and provide medical advice using appropriate grammatical structures to engage in meaningful discussions
Communicate Effectively in Social and Professional Settings by expressing desires and requests and using polite expressions
Exchange Travel Information and construct well-structured narratives to recount journeys
Enhance communication through structured language with contextually appropriate statements across various topics

UNIT – I **(12 Hours)**

1. Titre - En cuisine
2. Lexique – les aliments, la restauration, les goûts et les sensations
3. Grammaire – les quantités et le pronom ‘en’, la restriction ‘ne…que’, l’obligation
4. Production orale- communiquer au restaurant
5. Production écrite - exprimer sa satisfaction et son insatisfaction

UNIT – II **(12 Hours)**

6. Titre - A votre sante
7. Lexique – les corps et la sante, la médecine et les urgences
8. Grammaire – les pronoms COD et COI, le superlatif, les pronoms interrogatifs
9. Production orale- parler des problèmes de santé
10. Production écrite - Donner un conseil pour une condition médicale

UNIT – III **(12 Hours)**

11. Titre - Dans les médias
12. Lexique – les médias audios et les réseaux sociaux
13. Grammaire – la cause et la conséquence, le subjonctif, la place des pronoms
14. Production orale- exprimer son intérêt et sa préférence
15. Production écrite - faire une critique positive et négative

UNIT – IV **(12 Hours)**

16. Titre - Consommer responsable
17. Lexique – la consommation, les catégories de produits, le travail manuel
18. Grammaire – le conditionnel présent – formation et emploi, le gérondif
19. Production orale- demander et proposer un service
20. Production écrite - exprimer un souhait ou un désir

UNIT – V **(12 Hours)**

1. Titre - Envies d’ailleurs
2. Lexique – le voyage, l’hébergement, le séjour, le tourisme
3. Grammaire – le passé composé et l’imparfait dans le récit, les pronoms démonstratifs
4. Production orale- demander des renseignements sur un voyage
5. Production écrite - parler d’une visite touristique
6. Indian knowledge system - Writing travel narratives based on ancient Indian pilgrimage sites and comparing with French monuments. Using French quantity expressions and pronouns to describe Ayurvedic food portions and dietary balance and offering Ayurvedic-based medical advice**.** (5%)

Teaching Methodology	L'approche communicative (Communicative Language Teaching -CLT), Genre-Based Approach, Experimental learning, Flipped Classroom Approach
Assessment Methods	*Role-Play:* Restaurant Experience: waiter and customer ordering food and expressing opinions on the meal. (Rubric – graded on usage of expressions related to food and grammatical accuracy) *Written assessment:* Write a short critique of a social media platform, movie, or advertisement. (Rubric – assessed on ability to express opinions and logical argumentation) *Travel Blog or Postcard Writing:* Write a blog post or postcard describing a recent travel experience, using descriptive language (Rubric – assessed on structured narrative writing in a travel context and usage of past tenses) *Group Debate:* Media & Society: Debate the impact of social media on education. (Rubric – graded on critical thinking, Argument clarity and participation

Books for Study:

1. Fafa, C., Gajdosova, F., Horquin, A., Pasquet, A., Perrard, M., Petitmengin, V., Sperandio, C., Dodin, M., &Veldeman-Abry, J. (2022). *Édito A2: Méthode de français* (2nd ed.). Didier FLE, Hatier. (p.83 – p.152)

Books for Reference:

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Génération A2*. Didier.
2. Girardet, J., &Pecheur, J. (2017). *Écho A2* (2nd ed.). CLE International

Websites and eLearning Sources:

1. https://cuisine-facile.com/
2. https://www.france.fr/en/
3. https://www.sncf-connect.com/
4. https://www.routard.com/
5. https://sante.lefigaro.fr/

Course Outcomes		
CO No.	**CO–Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K –Levels)**
CO1	Apply vocabulary related to food by using quantity expressions and pronoun to communicate satisfaction or dissatisfaction in oral and written contexts.	**K1**
CO2	Identify and describe health conditions, construct superlative forms, and formulate medical advice using appropriate grammatical structures.	**K2**
CO3	Express opinions, preferences, and critiques about various media platforms, apply cause-and-consequence structures	**K3**
CO4	Utilize vocabulary related to consumption, express desires and requests effectively in professional and social interactions.	**K4**
CO5	Request and provide travel-related information and describe tourist experiences using demonstrative pronouns and structured narratives.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**25UFR41GL04**			Language French – 4					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	1	3	2	1	2	2	1.8
CO2	2	2	2	3	1	2	2	2	2	2	2.0
CO3	2	3	2	3	3	2	2	3	1	1	2.2
CO4	3	3	3	2	3	3	1	2	2	2	2.4
CO5	3	2	2	3	2	2	2	1	1	2	2.0
Mean Overall Score											**2.08 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	**25UHI41GL04**	Language Hindi - 4	**4**	**3**

Course Objectives
To strengthen the language competence among the students
To equip students with cinematic perspective by comparative studies of Hindi literature
To enable the students to develop their effective communicative skills in Hindi
To strengthen the language competence among the students
To incept research-oriented aspirations among students

UNIT I **(12 Hours)**

1. Prathyay
2. Char Bhai
3. Adhunik Kaal - Introduction
4. Adhunik Kal – Namakarn

UNIT II **(12 Hours)**

5. Chitra Varnan (Advanced)
6. Paryayvachy Shabdh
7. Bathcheeth - Hotel mein
8. Adhunik Kal - Samajik Paristhithiyam

UNIT III **(12 Hours)**

9. Upasarg
10. Thulsi ke Dhoe
11. Apathit Gadyansh
12. Adhunik Kal – Sahithyakar

UNIT IV **(12 Hours)**

13. Review- Book/Film
14. Paryavaran Pradookshan
15. Adhunik Kal - Main Divisions
16. Anuvad

UNIT V **(12 Hours)**

17. Kaal
18. Patra-Patrikao mein Prakashit Gadyansho ka Patan (Advanced)
19. Sapnom Kee Home Delivery (Novel)
20. Adhunik Kal - Visheshathayem

Teaching Methodology	Debate Participation, Videos, PPT, Quiz, Project Work
Assessment Methods	Quiz, Snap Test, Group Discussion

Books for Study:

1. Dr. Sadananth Bosalae. (2022). *kavya sarang*. Rajkamal Prakashan.
2. Kamathaprasad Gupth, M. (2021). *Hindi Vyakaran*. Anand Prakashan.
3. Dr. Sanjeev Kumar Jain. (2022). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.

Books for Reference:

1. Rajeswar Prasad Chaturvedi. (2021). *Hindi vyakarana*. Upakar Prakashan.
2. Ramdev. (2021). *Vyakaran Pradeep*. Hindi Bhavan.
3. Krishnakumar Gosamy. (2023). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.
4. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.
5. Mamta Kaliya. (2022). *Sapno Ki Home Delivery*. Lokbharti Prakashan.

Websites and eLearning Sources:

1. https://youtu.be/xmr-DaQ3LhA
2. https://mycoaching.in/adhunik-kaal
3. https://m.sahityakunj.net/entries/view/bhartiya-sahitya-mein-anuvad-kee-bhoomika
4. https://mycoaching.in/upsarg-in-hindi
5. https://kalingaliteraryfestival.com/speakers/mamta-kalia/

Course Outcomes		
CO No.	**CO–Statements** On successful completion of the course, the student will acquire the listed skills.	**Cognitive Levels (K –Levels)**
CO1	List out the social conditions prevailed in Modern Period which are depicted in Hindi Literature.	**K1**
CO2	Discuss the dialects of Hindi language.	**K2**
CO3	Illustrate the works of some eminent Hindi Writers related to society.	**K3**
CO4	Evaluate the film & Literary works in Hindi.	**K4**
CO5	Analyze the human values expressed in life and literature of Hindi Novelist “Mamatha Kaliya”.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours / week**		**Credits**
4	**25UHI41GL04**			Language Hindi – 4					**4**		**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	3	2	3	2	3	1	2.4
CO2	3	2	3	3	2	3	2	3	1	2	2.4
CO3	3	2	2	3	2	2	1	3	2	3	2.3
CO4	3	2	3	1	3	3	2	3	3	2	2.5
CO5	3	2	2	3	3	2	3	2	3	3	2.6
									Mean Overall Score		**2.44 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	**25USA41GL04**	Language Sanskrit - 4	**4**	**3**

Course Objectives
To give an exposure to Sanskrit drama in general
To showcase the structure of pre-kalidasan plays in Sanskrit
To coach students in Sanskrit morphology
To acquaint students with the structures of Sanskrit syntax
To impart communicative skills in Sanskrit by training in the functional aspects of the language

UNIT I **(12 Hours)**

Samskrita Vyavahara sahasri vakiya Prayogaha

UNIT II **(12 Hours)**

Lot Lakaarah, Prayaogh Kartari Vaakyaani

UNIT III **(12 Hours)**

Naatakasya Itihaasah Vivaranam, Thuva and Tum Suffixs

UNIT IV **(12 Hours)**

Karnabhaaram, Naatakasya Visistyam

UNIT V **(12 Hours)**

Samskrita Racanani Vubhavoga

Teaching Methodology	Videos, PPT, Blackboard, Demonstration, Exercises
Assessment Methods	Seminar, Quiz, Group Discussion.

Books for Study:

1. Karnabhavam & Literature Language
2. Dhaatu Manjari
3. Samskrita Vyavahara Sahasri (A Collection of One Thousand Sentances),Samskrita Bharati, Delhi,2021

Books for Reference:

1. R. S. Vadhyar & Sons, Book – sellers and publishers, Kalpathu, Palghat – 678003, Kerala, south India, History of Sanskrit Literature 2021
2. Kulapathy, K.M Saral Sanskrit Balabodh, Bharathita vidya bhavan, Munshimarg Mumbai – 400 007 2020
3. Samskrita Bharathi, Aksharam 8 th cross, 2nd phase Giri nagar Bangalore Vadatu sanskritam - Samaskara Binduhu 2021

Websites and eLearning Sources:

1. https://sanskritdocuments.org/doc_z_misc_major_works/daily.pdf
2. https://www.learnsanskrit.org/guide/verbs-1/karmani-and-bhave-prayoga/
3. https://ia902903.us.archive.org/7/items/in.ernet.dli.2015.102820/2015.102820.The-Sanskrit-Drama-In-Its-Origin-Development-Theory-And-Practice.pdf
4. https://archive.org/details/oafI_karna-bharam-karnas-burden-of-bhasa-with-dr.-sudhakar-malaviya-gokuldas-sanskrit
5. https://sanskritwisdom.com/composition/essays/sanskrit-language/

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Understand human behaviors by studying dramas	**K1**
CO2	Remember and identifying Mahabharata characters and events	**K2**
CO3	Apply the morals learnt in day-to-day life	**K3**
CO4	Appreciate ancient Sanskrit dramas	**K4**
CO5	Create new conversational sentences and to Improve self-character (Personality Development)	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25USA41GL04**			Language Sanskrit - 4						**4**	**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	3	3	3	3	3	2	2.4
CO2	2	2	3	3	2	3	2	3	3	2	2.5
CO3	3	3	2	3	2	1	1	3	3	3	2.4
CO4	2	2	3	2	3	3	3	3	2	3	2.6
CO5	2	3	3	3	2	1	3	3	3	2	2.5
Mean Overall Score											**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
4	25UEN42GE04B	**General English - 4:** English for Science - 2	5	3

Course Objectives
To expand vocabulary by learning and using context-specific words.
To improve writing through practice in reports, reviews, and social media posts.
To master grammar by focusing on question tags and subject-verb agreement.
To enhance speaking skills through debates and discussions.
To appreciate literature and science to boost creative thinking.

UNIT I: Simple Ways to Explore Nature **(15 Hours)**

1. "Marie Curie Biographical" Taken from The Nobel Prize
2. Vocabulary in Context: Radioactive Elements
3. Writing: Media Reports
4. Speaking: Expansion of a Proverb
5. Grammar: Question Tag

UNIT II: The Limits of Human Knowledge **(15 Hours)**

1. "The Marry Month of May" by O. Henry
2. Vocabulary in Context: Seasonal Words
3. Writing: Book or Film Review
4. Speaking: Debate
5. Grammar: WH Questions

UNIT III: Difference Between Original and Copy **(15 Hours)**

1. "The story of Dolly the sheep" taken from Natural World, Science and Technology, Scotland
2. Vocabulary in Context: Cloning Words
3. Writing: E-mail Etiquette
4. Speaking: Group Discussion
5. Grammar: Yes or No Questions

UNIT IV: The Other Worlds **(15 Hours)**

1. "The Star" by Arthur C. Clarke
2. Vocabulary in Context: Astronomical Words
3. Writing: Writing for Social Media (Blogs, Twitter, Instagram and Facebook)
4. Speaking: Story Telling
5. Grammar: Conditional Sentences

UNIT V: Scientific Temparament **(15 Hours)**

1. "The Particle Dance" by Emily Dickinson
2. Vocabulary in Context: Scientific Instruments
3. Writing: Creating Digital Profile
4. Speaking: Spin a Yarn
5. Grammar: Subject Verb Agreement

* Speaking Components are meant only for internal tests

Teaching Methodology	Lecture, Multimedia Presentations, Discussion and Enacting
Assessment Tools	Speaking, reading, listening and written tests

Books for Study:

1. Francis, V., Dr. D.R. Edwin Christy and Dr. D. Loyola Innaci. *Lingua Science – II,* St. Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference:

1. Wilfred, D. Best. *Students Companion*. Harper Collins Publishers, 2020.
2. Dickinson, Emily. *The Complete Poems of Emily Dickinson*, Back Bay Books, 1973.

Websites and eLearning Sources:

1. https://www.nobelprize.org/prizes/physics/1903/marie-curie/biographical/
2. https://www.gutenberg.org/files/59637/59637-h/59637-h.htm
3. https://www.nms.ac.uk/discover-catalogue/the-story-of-dolly-the-sheep
4. https://sites.uni.edu/morgans/astro/course/TheStar.pdf
5. https://poemverse.org/short-poems-about-science/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Identify and comprehend the local and global issues through the lessons	**K1**
CO2	Use interactive skills	**K2**
CO3	Develop the Listening and Reading Skills of the learners through teacher-led reading practice	**K3**
CO4	Improve their General Writing Skills such as Note-Taking, Note- Making Précis Writing, Paragraph Writing, and Writing Short Essays on Current	**K4**
CO5	Develop their Creative and Critical Thinking and Speaking Skills	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UEN42GE04B**			**General English - 4:** English for Science - 2						**5**	**3**
Course Outcome (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	2	3	2	3	2	2.4
CO2	2	2	3	2	3	3	2	3	2	2	2.3
CO3	2	3	2	3	2	2	3	2	3	2	2.4
CO4	2	2	3	2	3	3	2	3	2	3	2.5
CO5	2	2	2	3	2	2	2	3	2	2	2.2
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UMA43CC08	**Core Course - 8:** Operations Research (Internship Embedded Course)	5	4

Course Objectives
To gain a deep understanding of Linear programming problems and methods.
To provide knowledge of quantitative approach of solving optimization problems.
To acquire the knowledge of LPP, Transportation problems, Queuing and network.
To develop the skills to evaluate the solution of LPP, Transportation problems and measures of Queuing and network models.
To know how to apply the concepts of OR in real life problems.

UNIT I **(15 Hours)**

Linear programming problem - Mathematical formulation - Illustrations on Mathematical formulation on Linear Programming Problems Graphical solution method - some exceptional cases - Canonical and standard forms of Linear Programming Problem - simplex method.

UNIT II **(15 Hours)**

Use of Artificial Variables (Big M method - Two phase method) - Degeneracy in Linear programming - Duality in Linear Programming - General primal - dual pair - Formulating a Dual problem - Primal - dual pair in matrix form - Dual simplex method.

UNIT III **(15 Hours)**

Transportation problem - LP formulation of the TP - Solution of a TP - Finding an initial basic feasible solution (NWCM - LCM -VAM) Degeneracy in TP - Transportation Algorithm (MODI Method) - Assignment problem - Solution methods of assignment problem - special cases in assignment problem.

UNIT IV **(15 Hours)**

Queuing theory - Queuing system - Classification of Queuing models - Poisson Queuing systems Model I (M/M/l) (∞/FIFO)- Games and Strategies -Two person zero sum - Some basic terms - the maximin-minimax principle - Games without saddle points - Mixed strategies - graphic solution of 2xn and mx2games.

UNIT V **(15 Hours)**

PERT and CPM - Basic components - logical sequencing - Rules of Network construction Critical Path analysis - Probability consideration in PERT.

Teaching Methodology	Chalk and talk, Lectures, PPT
Assessment Method	MCQ, Written Test

Books for Study:

1. Swarup, K., Gupta, P.K., &Mohan, M. (2007). *Operations Research*, (13th Ed.). Sultan Chand and Sons.
   UNIT I: Chapter 2 (Sec 2.1 - 2.4), Chapter 3 (Sec 3. l - 3.5) Chapter 4 (Sec 4. 1 , 4.3)
   UNIT II: Chapter 4 (Sec 4.4), Chapter 5 (Sec 5.1 - 5.4, 5.9)
   UNIT III: Chapter10 (Sec 10.1, 10.2, 10.8, 10.9, 10.12, 10.13) Chapter11 (Sec 11.1-11.4)
   UNIT IV: Chapter 21 (Sec 21.1, 21.2, 21.7 - 21.9) Chapter 17 (Sec 17.1 - 17.6)
   UNIT V: Chapter 25 (Sec 25.1 - 25.4, 25.6, 25.7)

Books for Reference:

1. Sundaresn. V., Subramanian, G.K.S., & Ganesan. K. (2002). *Resource Management Techniques*. A.R. Publications.
2. Taha, H.A. (2002). *Operation Research: An introduction.* (7th Ed.). Pearson Prentice Hall.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=2Q_0CMQsQwc
2. https://www.youtube.com/watch?v=4dHzHv5Xar0
3. https://www.youtube.com/watch?v=qSwhrn2c5AA&t=753s

4. https://www.youtube.com/watch?v=4H9dMn919cs&list=PLwdnzlV3ogoX2OHyZz3QbEYFhbqM7x275

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Level (K -Level)**
CO1	Acquire the knowledge of LPP, Transportation problems, Queuing and network.	**K1**
CO2	Understand the quantitative approach of solving optimization problems.	**K2**
CO3	Apply the concept of OR in real life problems.	**K3**
CO4	Analyze complex real life problems.	**K4**
CO5	Evaluate the solution of LPP, Transportation problems and measures of Queuing and network models.	**K5**

Relationship Matrix												
Semester	**Course Code**			**Title of the Course**					**Hours**			**Credits**
4	**25UMA43CC08**			**Core Course - 8:** Operations Research (Internship Embedded Course)					**5**			**4**
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	3	3	3	2	2	3	**2.3**
CO2	2	3	2	1	2	3	3	3	2	2	3	**2.3**
CO3	2	2	3	2	3	3	2	3	2	3	2	**2.3**
CO4	2	2	2	3	2	3	2	3	2	2	3	**2.4**
CO5	2	2	2	2	3	3	1	3	2	2	2	**2.2**
											Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UMA43CC09	**Core Course - 9**: Modern Algebra	6	4

Course Objectives
To introduce and delve deeply into the concepts of Group theory
To introduce the concepts of Ring Theory and Ideals in a Ring.
To introduce polynomial rings and study their properties.
To introduce the basic concepts of Boolean Algebra
To introduce the concepts of ideals

UNIT I **(18 Hours)**

Groups -Introduction - Definition and Examples - Elementary Properties of a Group - Equivalent definitions of a Group - Permutation Groups.

UNIT II **(18 Hours)**

Subgroups - Cyclic Groups - Order of an Element – Cosets.

UNIT III **(18 Hours)**

Lagrange's Theorem - Normal Subgroups and Quotient Groups – Isomorphism - Homomorphisms.

UNIT IV **(18 Hours)**

Rings - Definition and Examples - Elementary Properties of Rings - Isomorphism.

UNIT V **(18 Hours)**

Types of Rings – Subrings- Ideals - Quotient rings - Maximal and Prime Ideals.

Teaching Methodology	Chart, PPT, chalk and talk
Assessment Methods	Seminar, MCQ

Books for Study:

1. Arumugam, S., & Isaac, T.A. (2016). Modern Algebra, SciTech Publications (India) Private
   UNIT I: Chapter 3 (Sec 3.0 -3.4)
   UNIT II: Chapter 3 (Sec 3.5 -3.8)
   UNIT III: Chapter 3 (Sec 3.8 -3.11)
   UNIT IV: Chapter 4 (Sec 4.1 -4.3)
   UNIT V: Chapter 4 (Sec 4.4, 4.6-4.9)

Books for Reference:

1. Santhanam. G. (2017). Algebra. Alpha Science International Ltd.
2. Santiago, M.L. (2001). Modern Algebra. Tata McGraw-Hill Publishing Co. Ltd.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	Acquire knowledge of basic theories in Groups and Rings.	**K1**
CO2	Understand the basic properties of Groups and Rings.	**K2**
CO3	Apply the fundamental ideas of Groups and Rings to diverse situation in Physics, Chemistry, Computer Science, Engineering and other mathematical Contexts.	**K3**
CO4	Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from Group and Ring theory.	**K4**
CO5	Locate and use theorems relating to Groups and Rings to solve real life problems.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**	**Credits**	
4	**25UMA43CC09**		**Core Course - 9**: Modern Algebra						**6**	**4**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	2	3	3	2	3	2	**2.6**
CO5	2	2	3	2	1	3	2	3	2	1	**2.1**
Mean Overall Score											**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UMA43AO02A	**Allied Optional - 2:** Physics - 2	4	3

Course Objectives
To acquire knowledge about interference, diffraction, structure, behaviour and properties of atoms based on vibrational modes.
To acquire and recall nuclear models, nuclear properties, fundamental concepts of relativity and logic gates.
To understand the theoretical and experimental concepts of interference, diffraction and propagation of light, nuclear reactions, various quantum numbers, eigen values and eigen functions.
To apply the concepts of optics, atomic, nuclear and digital electronics for solving problems.
To analyze the behaviour of interference, diffraction and polarization, orbital and spin motion, nuclear reactions and relativistic concepts.

UNIT I: Physical Optics **(12 Hours)**

Velocity of light - Michelson's method - Interference: colours of thin films - Air wedge - Determination of diameter of a thin wire by air wedge - test for Optical flatness. Diffraction - Fresnel'sexplanation of rectilinear propagation of light - theory of diffraction and specific rotating power of transmission grating - Normal incidence - polarization - Brewster's law - double Refraction - optical activity - polarimeter.

UNIT II: Atomic Physics **(12 Hours)**

Atom model - vector Atom model - quantum numbers associated with vector atom model - coupling schemes - Pauli's exclusive principle - magnetic dipole moment of electron due to orbital and spin motion - Bohr magneton - spatial quantization - Stern Gerlach experiment.

UNIT III: Nuclear Physics **(12 Hours)**

Nuclear model - liquid drop model - magic numbers, shell model - nuclear Energy - mass defect - binding energy - Radiation detectors - ionization chambers - GM counter - nuclear fission - Bohr and wheeler theory - chain Reaction - atom bombs - nuclear fusion - calculation of energy releasedin a fusion - nuclear reactor - Source of solar energy: proton -proton cycle - Carbon-nitrogen cycle.

UNIT IV: Elements Of Relativity And Quantum Mechanics **(12 Hours)**

Frame of reference - Galilean transformation - Postulates of theory of relativity - Lorentz transformation equations - derivation - length contraction - time dilation - uncertainty principle - postulates of wave mechanics - wave nature of matter - types of operators - Schrodinger's time dependent and time independent equation - Eigen functions and Eigen values - The particle in abox (infinite Square well potential).

UNIT V: Electronics **(12 Hours)**

Basic Electronics: Semiconductors, *pn* junction diode - Zener diode and characteristics - voltage regulator - LED - Common emitter transistor amplifier (principle) - Transistor RC coupled amplifier.
Digital electronics: Logic gates - NAND and NOR gates - Universal building blocks - Boolean algebra - De Morgan's theorem - verification.

Teaching Methodology	Chalk and Talk, Demo Videos, PPT, Hand-outs
Assessment Methods	Seminar, Snap Test, MCQ, Online Quiz, Assignment

Books for Study:

1. Murugesan, R (2015). *Allied Physics* (*Reprint*). S Chand and Co. Publications.

Unit	Book	Chapter	Section
I	1	6	6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, 6.14, 6.17, 6.19, 6.20
II	1	7	7.1, 7.2, 7.3, 7.4, 7.7.6, 7.7, 7.8
III	1	8	8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.10, 8.11, 8.12, 8.13, 8.14, 8.16, 8.17, 8.18
IV	1	9	9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.10, 9.12, 9.13, 9.14, 9.15, 9.18, 9.19
V	1	10	10.1, 10.2, 10.3, 10.4, 10.5, 10.6, 10.11, 10.12, 10.13, 10.14, 10.15, 10.16, 10.17, 10.18, 10.19, 10.21

Books for Reference:

1. Halliday, D., Resnick, R., & Walker, J. (2010). *Fundamental of Physics,* (9th Ed.). John Wiley & Sons.
2. Schaltz, M.E. (2011). *Grob's Basic Electronics,* (11th Ed.). McGraw Hill.
3. Beiser, A. (2009). *Concepts of Modern Physics.* Special Indian Edition, Tata McGraw Hill.
4. Murugeshan, R & Kiruthiga, S. (2009). *Modern Physics,* (14th Ed.). S. Chand & Co.

Websites and eLearning Sources:

1. https://archive.nptel.ac.in/courses/115/107/115107131/
2. https://archive.nptel.ac.in/courses/115/105/115105100/
3. https://archive.nptel.ac.in/courses/115/103/115103101/
4. https://archive.nptel.ac.in/courses/115/101/115101011/
5. https://nptel.ac.in/courses/117106086

(subject to availability - not to be used for exam purpose)*

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Able to acquire knowledge about the fundamentals of physics discipline such as optics, atomic and nuclear physics, elements of relativity, quantum mechanics and electronics.	**K1**
CO2	Understand the concepts of interference, diffraction, polarization, structure of atom, nucleus and its properties, relativistic phenomena, quantum wavefunction and electrical circuits.	**K2**
CO3	Apply the optical, electrical, atomic and nuclear concepts learned in the classroom for problem solving.	**K3**
CO4	Analyse the atomic, optical, nuclear and electrical properties learned from class room with real life problems.	**K4**
CO5	Evaluate the different atomic models and analysis the different optical phenomena observed in day to day life.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**25UMA43AO02A**			**Allied Optional - 2:** Physics - 2					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	1	2	3	2	1	2	2	**2.0**
CO2	3	3	2	2	2	3	2	2	2	2	**2.3**
CO3	3	3	2	3	2	3	3	3	2	2	**2.6**
CO4	3	3	2	3	2	3	2	3	2	2	**2.5**
CO5	3	3	2	3	2	3	3	3	2	2	**2.6**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UMA43OP01A	**Allied Optional Practical:** Physics	2	2

Any 16 of the following

1. Young's modulus – Non uniform bending – cantilever
2. Young's modulus – cantilever
3. S. T. – Method of drops
4. S. T. – Capillary rise
5. Viscosity – variable pressure head
6. Concave lens – f, R, μ
7. Air wedge – Thickness of wire
8. Newton's Rings R
9. Spectrometer –solid prism
10. Spectrometer – Grating (Normal Incidence)
11. M1/M2 – Tan A and Tan B simultaneous method
12. Absolute determination of M and H
13. P.O. Box – Temp. Coefficient
14. Potentiometer – Ammeter calibration
15. Potentiometer – R and □
16. Field along the axis of the coil
17. Sonometer – Frequency of tuning fork
18. Junction diode characteristics
19. Zener diode characteristics
20. Logic gates – ICs
21. Jolly's bulb

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UMA43AO02B	**Allied Optional - 2:** Accounts – 2	6	4

Course objectives:
To familiarise the students with the theoretical concepts of various elements of cost and preparation of cost sheet
To give basic idea about the process of managerial decision making
To highlight various tools and techniques available for managerial decision making
To give practical understanding of application of ratio analysis and cash flow analysis,
To make to understand the application and uses of budgeting control and marginal costing techniques

UNIT – I Introduction to Cost Accounting 18 HOURS

Cost Accounting – Components of cost – Methods and techniques of Costing -Preparation of cost sheet – various stages in cost sheet –WIP - valuation of closing stock of finished goods - tender & quotation.

UNIT – II Cash flow Statement 18 HOURS

Cash flow Statement – meaning – cash flow from operating activities, investment activities and financing activities - preparation of cash flow statement As per AS3 (simple problems)

UNIT – III Working Capital Management 18 HOURS

Working capital management- meaning- Types of working capital - components of working capital - Calculation of working capital

UNIT – IV Marginal Costing 18 HOURS

Marginal costing – Marginal cost- Contribution – PV Ratio – BEP – Margin of safety – CVP - decision making (simple problems)

UNIT – V Budgeting Control 18 HOURS

Budgeting control- preparation of cash budget- sales budget- production budget- production cost budget- flexible budget

Teaching Methodology	Chalk & Talk, Videos, PPTs, Demonstration and Creation of Models
Assessment Method	Snap Test, Quiz, Open Book test

Theory 20% and Problems 80%

Books for Study:

1. Reddy TS and Murthy A, Cost Accounting (2012), Margham Publications, Chennai (Unit-I).
2. Reddy TS and Murthy A, Management Accounting (2012), Margham Publications, Chennai. (Unit-II, III, IV & V)

Books for Reference:

1. S.N. Maheswari, (2017), Cost Accounting, S. Chand& Co, New Delhi.
2. Jain SP &Narang KL, (2014), Cost Accounting Principles and Practice, Kalyani Publishers, New Delhi (2018)

Websites and eLearning Sources:

1. https://icmai.in/studentswebsite/Foundation-Papers.php
2. https://icmai.in/studentswebsite/E-LKR.php
3. https://elearn.nptel.ac.in/shop/nptel/cost-accounting/

Course Outcomes		
CO No.	**CO - Statements**	**Cognitive Levels (K – Level)**
	On successful completion of this course, students will be able to	
CO1	Remember and recall the various concepts of cost accounting	**K 1**
CO2	Demonstrate the preparation of cash flow statements.	**K2**
CO3	Analyse the various valuation methods of working capital management.	**K3**
CO4	Examine the different methods of calculating marginal costing.	**K4**
CO5	Critically evaluate the budgeting control techniques.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours/Week**	**Credits**
4	**25UMA43AO02B**			**Allied Optional - 2:** Accounts – 2						**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	2	2	2	2	2	**2.2**
CO2	3	2	2	2	2	2	3	2	3	3	**2.4**
CO3	2	3	2	3	2	3	2	3	3	3	**2.6**
CO4	2	2	2	1	2	2	2	1	2	2	**1.8**
CO5	3	2	3	3	1	3	1	3	2	1	**2.2**
Overall Mean Score											**2.2**
											High

Semester	Course Code	Title of the Course	Hours / Week	Credits
4	25UHE44VE04A	**Value Education - 4:** Social Ethics - 2	2	1

Course Objectives
To understand the significance of natural resources and strive to coexist harmoniously with nature.
To implement strategies for disaster management within the community.
To evaluate the significance and distinctions between science and religion.
To recognize the importance of maintaining a healthy lifestyle.
To utilize counseling techniques to address and resolve individuals' issues.

UNIT I: Harmony with Nature (6 Hours)

What is environment, why should we think of harmony, longing for human well-being, Principles to conserve environmental resources, causes of disharmony, the fruits of harmony with nature, Forest resources, Water resources, Mineral resources, Food resources, Fruits of disharmony, Economic values and growth, Environmental Ethics, Guidelines to live in harmony with nature, Towards life-centered system for better quality of life. Harmony with animal kingdom.

UNIT II: Issues Dealing with Science and Religion (6 Hours)

What is Science, Science and Religion, Social Relevance of Science and Technology, Science and technology for social justice, Difference caused by Science and Technology, Need for indigenous technology, Science, Technology and Innovation Policy of India.

UNIT III: Public Health (6 Hours)

Health related issues, Health Care in India vs Developed Countries, Health and Heredity, Public Health - The Indian Scenario, Objectives of public health in India, Public Health System in India, Failure on the public health front, Role of the central government, Hospitals Services in India, Health and Abortion, Health and Drug Addiction, Drug abuse.

UNIT IV: Disaster Management (6 Hours)

Disaster Management, Types of disaster, plans of disaster management, Technology to manage natural disasters and catastrophes, Disaster Management, Rehabilitation and Reconstruction, Human-induced disaster, First Aid, The importance of First-aid, Disaster Declaration and Response.

UNIT V: Counseling for Adolescents (6 Hours)

High Risk Behaviours, Developmental Changes in Adolescents, Key Issues of the Adolescents, need for Counseling, Nature of Counseling, Counseling Goals, does helping help? The Good and the Bad news. Importance of Career Guidance Counseling.

Teaching Methodology	Power point, Assignment and Group discussion
Assessment Methods	Online Test, Group Discussions, Seminar, Assignment

Books for Study:

1. Department of Human Excellence. (2021). *Formation of Youth*, St Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference:

1. Albert, D., & Steinberg, L. *Judgment and decision making in adolescence*: Journal of Research on
2. Adolescence, page no: 211-224 (2011).
3. Larry, R. C. (2000). *Disaster Management and Preparedness,* Lewis Publications.
4. Hurlock, E.B. (2001). *Developmental Psychology: A: Life-Span Approach*. (5th Ed.). Tata McGraw-Hill.
5. Sangha., & Kamaljit. (2015). *Ways to Live in Harmony with Nature: Living Sustainably and*
6. *Working with Passion.* Australia, Woods lane Pty Limited.

Websites and eLearning Sources:

1. https://en.wikipedia.org/wiki/Disaster_management_in_India
2. https://ndma.gov.in/
3. https://talkitover.in/services/child-adolescent-counselling/
4. https://www.nipccd.nic.in/schemes/adolescent-guidance-centre-19#gsc.tab=0

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Know the value of natural recourses and to live in a harmony with nature.	**K1**
CO2	Apply the plans of disaster management in the society.	**K2**
CO3	Analyse the importance and differences of science and religion.	**K3**

Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UHE44VE04A**			**Value Education - 4:** Social Ethics - 2						**2**	**1**
Course Outcome	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	3	2	3	3	**2.8**
CO2	3	2	2	3	3	2	3	3	2	2	**2.5**
CO3	2	3	3	3	2	3	3	3	3	3	**2.8**
										Mean Overall Score	**2.7 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UHE44VE04B	**Value Education - 4:** Religious Doctrine - 2	2	1

Course Objectives
To explore the rich historical background of the Catholic Church
To explore and comprehend the Sacraments practiced by the Catholic Church
To incorporate Christian Prayer into daily routines
To reflect on personal growth through the lens of Sacraments and Christian Prayer
To promote unity by embracing universal values from various religions

UNIT I **:** The Catholic Church **(6 Hours)**

UNIT II **:** Sacraments of Initiation **(6 Hours)**

UNIT III **:** Sacraments of Healing & at the Service of Community **(6 Hours)**

UNIT IV **:** The Christian Prayer **(6 Hours)**

UNIT V **:** Harmony of Religions **(6 Hours)**

Teaching Methodology	Power point, assignment, and Group discussion
Assessment Methods	Seminars, Group Discussion, Online Tests, Assignments

Books for Study:

1. Department of Human Excellence (2022). Fullness of Life, St Joseph's College (Autonomous), Tiruchirappalli.

Books for Reference:

1. (1994). *Compendium: Catechism of the Catholic Church.* Bengaluru: Theological Publications in India. Holy Bible (NRSV).

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Understand the history of the Catholic Church	**K1**
CO2	Examine and grasp the Sacraments of the Catholic Church	**K2**
CO3	Apply the Christian Prayer to their everyday life	**K3**

Semester	Course Code			Title of the Course						Hours	Credits
4	25UHE44VE04B			**Value Education - 4:** Religious Doctrine - 2						2	1
Course Outcome	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	2	3	2	2	3	3	**2.7**
CO2	3	2	2	2	3	3	3	3	2	2	**2.5**
CO3	2	2	3	3	2	2	3	3	3	3	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
4	25UMA44SE02	**Skill Enhancement Course – 2:** MATLAB	2	1

Course Objectives
To give basic knowledge about MATLAB to the students to program the mathematical calculations
To train the students to work with computers the commands in MATLAB
To motivate the students to program the mathematical formulae using MATLAB tool.
To train the students in mastering the techniques in it.
To motivate the students to apply the techniques in their major subject.

UNIT I **(6 Hours)**

Basics of MATLAB: MATLAB windows - On-line help - Input-output - File Types - Platform dependence - General commands.

UNIT II **(6 Hours)**

Interactive Computation: Matrices and Vectors - Matrices and Array Operations.

UNIT III **(6 Hours)**

Character Strings - A Special note on Array Operations - Command line functions.

UNIT IV **(6 Hours)**

Plotting Simple graphs - Applications: Linear Algebra - Data Analysis and Statistics - Numerical Integration.

UNIT V **(6 Hours)**

Graphics: Basic 2-D plots - Specialized 2-D plots - 3-D plots - View - Rotate view - Mesh and surface plots.

Teaching Methodology	Black board, Demonstration, PPT, ICT tools
Assessment Method	Lab Practical, Unit Tests, Online Tests

Books for Study:

1. Rudra Pratap**,** *Getting started with MATLAB,* Oxford University Press, 2009.
   Unit I: *Chapter I (Sec 1.6(ONLY))*
   Unit II: *Chapter III (Sec 3.1- 3.2)*
   Unit III: *Chapter III (Sec 3.3- 3.5)*
   Unit IV: *Chapter III (Sec 3.8) & Chapter V (Sec 5.1.1-5.1.4, 5.3-5.4)*
   Unit V: *Chapter VI (Sec 6.1-6.1.3, 6.1.6, 6.3-6.3.3)*

Books for Reference:

1. Brain R Hunt, Ronald L Lipsman and Jonathan M Rosenberg, *A Guide to MATLAB for Beginners and Experienced Users,* Cambridge University Press, 2003
2. MATLAB, *An Introduction with Applications,* Amos Gilat, John Wiley & Sons 2009.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=I2rmwC506Tg&list=PLp6ek2hDcoNAyvh2A1y628-9fzXq6pXuf&index=2
2. https://www.youtube.com/watch?v=83S48Fs9WhY&list=PLN0RkuJdh4J3LTMae7lLSQ3mTfzKB_e_r&index=2
3. https://www.youtube.com/watch?v=vL4IcyC7WDU&list=PLN0RkuJdh4J3LTMae7lLSQ3mTfzKB_e_r&index=3

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Acquire the knowledge of the basics of MATLAB and to write and compile simple programs and graphics.	**K1**
CO2	Understand the main features of MATLAB program development environment to enable their usage in the higher learning.	**K2**
CO3	Apply MATLAB built in functions provided to solve all types of mathematical and scientific problems and to use the graphics.	**K3**
CO4	Analyse the program for correctness, determine/estimate/predict the output and verify it under simulation environment using MATLAB tools.	**K4**
CO5	Evaluate and handle the data using inbuilt functions, and create graphical images to represent the mathematical or scientific phenomena.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UMA44SE02**			**Skill Enhancement Course – 2:** MATLAB						**2**	**1**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	2	2	2	1	3	3	2	2	3	2.2
CO-2	2	3	2	1	2	3	3	2	2	3	2.3
CO-3	1	2	3	2	3	2	3	2	3	2	2.3
CO-4	1	2	2	3	1	2	3	2	2	3	2.1
CO-5	1	2	2	2	3	1	3	2	2	3	2.1
										Mean Overall Score	2.2 (High)

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UMA44SL03	**Self-Learning:** History of Mathematics	-	2

Course Objectives
To know Life of Newton, Gauss, Riemann and Euler
To acquaintance with the development of Algebra
To familiarity of Invention of Differential Calculus
To know the life of Eratosthenes, Dirichlet, Henri Poincare and Emmy No ether
To learning the great achievements of Mathematicians

UNIT I

Isaac (Sir) Newton 1642-1727) England- Archimedes of Syracuse (287-212 BC) Greek domain- Johann Carl Friedrich Gauss (1777-1855) Germany - Leonhard Euler (1707-1783) Switzerland- Georg Friedrich Bernhard Riemann (1826-1866) Germany- Joseph-Louis (Comte de) Lagrange (1736-1813) Italy, France - Euclid of Alexandria (ca 322-275 BC) Greece/Egypt- David Hilbert (1862-1943) Prussia, Germany- Gottfried Wilhelm von Leibniz (1646-1716) Germany.

UNIT II

Pierre de Fermat (1601-1665) France- Évariste Galois (1811-1832) France-René Descartes (1596-1650) France- Johann Peter Gustav Lejeune Dirichlet (1805-1859) Germany- Srinivasa Ramanujan Iyengar (1887-1920) India- Carl G. J. Jacobi (1804-1851) Germany- Brahmagupta 'Bhillamalacarya' (589-668) Rajasthan (India).

UNIT III

Georg Cantor (1845-1918) Russia, Germany -Augustin-Louis Cauchy (1789-1857) France - Arthur Cayley (1821-1895) England - Pythagoras of Samos (ca 578-505 BC) Greek domain - Aryabhata (476-550) Ashmaka & Kusumapura (India) - Leonardo 'Bigollo' Pisano (Fibonacci) (ca 1170-1245) Italy - William Rowan (Sir) Hamilton (1805-1865) Ireland - Diophantus of Alexandria (ca 250) Greece, Egypt

UNIT IV

BháscaraÁchárya (1114-1185) India - Jean-Baptiste le Rondd' Alembert (1717-1783) France Joseph Liouville (1809-1882) France - Ferdinand Gotthold Max Eisenstein (1823-1852) Germany - Jacob Bernoulli (1654-1705) Switzerland - Johannes Kepler (1571-1630) Germany - Jacques Salomon Hadamard (1865-1963) France - Jean Baptiste Joseph Fourier (1768-1830) France.

UNIT V

Albert Einstein (1879-1955) Germany, Switzerland, U.S.A. - Galileo Galilei (1564-1642) Italy - Henri Léon Lebesgue (1875-1941) France - Johann Bernoulli (1667-1748) Switzerland - Felix Hausdorff (1868-1942) Germany - George Pólya (1887-1985) Hungary - Siméon Denis Poisson (1781-1840) France - Adrien Marie Legendre (1752-1833) France.

Teaching Methodology	Online Platform
Assessment Methods	MCQ

Books for Study:

1. http://fabpedigree.com/james/mathmen.htm#

Books for Reference:

1. Boyer, C.B., & Merzbach, U. (2011). *History of Mathematics*, (3rd Ed.). John Wiley & Sons,
2. Bell, E.T. (1986). *Men of Mathematics*. Published by Simon & Schuster.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire the knowledge in history of mathematics.	**K1**
CO2	Understand how the ancient mathematicians worked together as a team to develop mathematical research	**K2**
CO3	Classify the history of mathematics through the time of its invention	**K3**
CO4	Identify significant role of mathematician in human development and promoting social harmony and analyze how the mathematical research was developed over the period of time.	**K4**
CO5	Assess creative and flexible thinking by seeing historical evidence that there are different ways to view a mathematical concept.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UMA44SL03**			**Self-Learning:** History of Mathematics						**-**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	3	2	3	2	3	1	2	3	3	**2.3**
CO2	2	2	3	1	2	3	2	2	2	3	**2.2**
CO3	2	2	2	1	3	1	3	2	3	3	**2.2**
CO4	2	3	2	1	1	3	2	3	3	3	**2.3**
CO5	1	2	2	1	2	3	2	2	2	3	**2.0**
										Mean Overall Score	**2.2(High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA53CC10	**Core Course - 10:** Real Analysis	6	4

Course Objectives
Enlighten on the foundational properties of sets, sequences, and real numbers:
Analyze limits of functions in both the real line and general metric spaces, and explore the properties of continuous functions.
Acquaint metric spaces as a generalization of the real line, and to enlighten on the concepts of open sets, closed sets and other topological properties within these spaces.
Enlighten on the fundamentals of Riemann integrals, understand its properties, and connect it to the concept of derivatives.
Enlighten on key theorems of calculus like Rolle's Theorem, the Mean Value Theorem, the Fundamental Theorems of Calculus, Taylor's Theorem and their applications.

UNIT I: Sets and Sequences of Real numbers (18 Hours)

Equivalence - Countability - Real numbers - Least upper bounds - Limit superior and limit inferior - Cauchy sequences.

UNIT II: Limits and Metric spaces (18 Hours)

Limit of a function on the real line - Metric spaces - Limits in metric spaces - Functions continuous at a point on the real line -Reformulation.

Unit III: Continuous functions on Metric spaces (18 Hours)

Functions continuous on a metric space - Open sets - Closed sets - Discontinuous functions on R^1.

UNIT IV: Riemann integrals and Derivatives (18 Hours)

Definition of the Riemann integral - Properties of the Riemann integral - Derivatives.

UNIT V: Calculus (18 Hours)

Rolle's Theorem - The law of the mean - Fundamental theorems of calculus - Improper integrals - Taylor's theorem.

Teaching Methodology	Chalk and talk, Lectures, PPT.
Assessment Methods	Seminar, Web based Assignments, Snap test/MCQ test

Books for Study:

1. Richard R. Goldberg. (2020). *Methods of Real Analysis.* Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
   Unit I: *Chapter 1: Sections: 1.5 - 1.7; Chapter 2: 2.9 &2.10*
   Unit II: *Chapter 4: Sections:4.1 - 4.3*
   [Omit examples4&5 in section 4.2C]; Chapter 5: Sections 5.1 & 5.2
   Unit III: *Chapter 5: Sections: 5.3 - 5.6*
   Unit IV: *Chapter 7: Sections: 7.2, 7.4 & 7.5*
   Unit V: *Chapter 7: Sections: 7.6 - 7.9; Chapter 8: Section 8.5*

Books for Reference:

1. Malik, S.C., & Arora, S. (2009). *Mathematical Analysis*. New Age International (P) Limited Publishers, New Delhi.
2. Narayan, S. (1974). *Elements of Real Analysis*. S. Chand & Company Pvt. Ltd, New Delhi.
3. Bartle, Donald R. Sherbert (2014). *Introduction to Real Analysis***.** John Wiley & Sons, Inc., Fourth edition.

Website and e-Learning Source:

1. https://www.cimt.org.uk/projects/mepres/alevel/pure_ch13.pdf
2. https://www3.nd.edu/~lnicolae/Hon_Calc_Lectures.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Level (K - Level)**
CO1	Demonstrate a thorough understanding of sets, sequences, real numbers, and their properties, including completeness, countability, and limits.	**K1**
CO2	Define, evaluate, and analyze limits and continuity of functions in both the real line and in general metric spaces.	**K2**
CO3	Define the Riemann integral, understand its properties, and apply it to solve integration problems and connect the concepts of integration and differentiation.	**K3**
CO4	Apply major theorems, including Rolle's Theorem, the Mean Value Theorem, the Fundamental Theorems of Calculus, and Taylor's Theorem to solve problems and analyze functions.	**K4**
CO5	Develop the ability to construct and understand mathematical proofs related to the concepts covered in the course.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UMA53CC10**			**Core Course - 10:** Real Analysis						**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	2	3	3	2	2	2	3	**2.4**
CO2	3	2	3	3	2	2	3	2	2	3	**2.5**
CO3	3	3	2	2	2	3	3	3	2	2	**2.5**
CO4	2	2	3	2	2	2	2	3	3	2	**2.3**
CO5	3	2	2	3	2	3	2	2	2	3	**2.4**
										Mean Overall Score	**2.42 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA53CC11	**Core Course - 11:** Linear Algebra	6	4

Course Objectives
To learn how linear algebra is ubiquitous in mathematics
To study abstract algebraic concepts intertwining geometric ideas.
To study the fundamental notions of vector spaces viz linear dependence, basis and dimension and linear transformation.
To know the matrix theory concepts
To apply linear algebra techniques and solve problems.

UNIT I **(18 Hours)**

Vector Space - Subspaces - Linear Transformation - Span of a set

UNIT II **(18 Hours)**

Linear Independence - Basis and Dimension -Rank and Nullity.

UNIT III **(18 Hours)**

Matrix of a linear transformation - Inner product space -Definition and examples - Orthogonality-Orthogonal Complement.

UNIT IV **(18 Hours)**

Algebra of Matrices - Types of Matrices - The Inverse of a Matrix -Elementary Transformations - Rank of a matrix.

UNIT V **(18 Hours)**

Characteristic equation and Cayley Hamilton Theorem - Eigenvalues and Eigenvectors - Bilinear forms - Quadratic forms.

Teaching Methodology	Chalk and Talk, PPT
Assessment Methods	MCQ & Snap Test

Books for Study:

1. Arumugam, S., & Isaac, T.A. (2012). *Modern Algebra*, SciTech Publications (India) Ltd.
   Unit I Chapter 5 (Sec 5. 1 - 5.4)
   Unit II Chapter 5 (Sec 5.5 - 5.7)
   Unit III Chapter 5 (Sec 5.8), Chapter 6 (Sec 6.1 - 6.3)
   Unit IV Chapter 7 (Sec 7. l - 7.5)
   Unit V Chapter 7 (Sec 7.7, 7.8) Chapter 8 (Sec 8.1, 8.2)

Books for Reference:

1. Herstein, I.N. (1975). *Topics in algebra*, (2nd Ed.). John Wiley & Sons (Asia).
2. Strang, G. (2016). *Introduction to Linear Algebra*, (5th Ed.). Wellesley-Cambridge Press.
3. Kumaresan, S. (2000). *Linear Algebra - A Geometric Approach*, (1st Ed.). Prentice Hall Publisher.

Website and e-Learning Source:

1. https://www.khanacademy.org/math/linear-algebra
2. https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Understand the concepts of vector spaces, subspaces, bases, dimension and their properties	**K1**
CO2	Relate matrices and linear transformations, compute Eigen values and Eigen vectors of linear transformation	**K2**
CO3	Learn properties of inner product spaces and determine orthogonality in inner product spaces	**K3**
CO4	Obtain various variants of diagonalization of linear transformation	**K4**
CO5	Realize importance of a linear transformation and its canonical form	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
5	**25UMA53CC11**	**Core Course - 11:** Linear Algebra								**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**PSO 2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	2	3	2	2	3	2	2	**2.4**
CO2	2	3	3	2	2	2	3	2	2	2	**2.3**
CO3	3	2	3	2	3	3	2	2	2	2	**2.3**
CO4	3	3	2	2	2	3	2	3	2	2	**2.4**
CO5	2	3	3	2	1	3	3	2	2	3	**2.4**
Mean Overall Score											**2.35 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA53CC12	**Core Course - 12:** Mechanics	6	3

Course Objectives
To introduce the laws of Forces and their properties
To understand friction laws and its properties
To solve problems in Catenary using its properties
To analyze the behavior of motion of objects
To apply the concepts of behavior of elastic bodies real life problems

UNIT I **(18 Hours)**

Law of parallelogram of forces - Law of triangle of forces - Lami's theorem- Resolution of forces - Components of a force along two given directions.

UNIT II **(18 Hours)**

Forces of friction- Laws of friction-Limiting Friction- Limiting equilibrium-Cone of friction- Angle of friction - Equilibrium of a body on a rough inclined plane - Problems on Friction.

UNIT III **(18 Hours)**

Equation to common catenary-Tension at any point-Geometrical properties of common catenary.

UNIT IV **(18 Hours)**

Motion in a plane without air resistance-path of a projectile-Time of flight- Horizontal range-Motion of a projectile up an inclined plane.

UNIT V **(18 Hours)**

Fundamental laws of impact-Impact of a smooth sphere on a fixed smooth plane-Direct impact of smooth elastic spheres - oblique impact of smooth elastic spheres.

Note: 50% of the question paper shall be book works and 50% of the questions may be problems.

Teaching Methodology	Chalk and Talk method, Problem solving, Snap Test
Assessment Methods	Snap test, Seminar, MCQ

Books for Study:

1. Venkataraman, M. K. (2007). *Statics*, (12thEd.). Agasthiar Pubishers.
   Unit I: Chapter 2, Sections 2.1 to 2.12
   Unit II: Chapter 7, Sections 7.1 to 7.13
   Unit III: Chapter 11, Sections 11.1 to 11.6
2. Venkataraman, M. K. (2006). *Dynamics*, (12thEd.). Agasthiar Publications.
   Unit IV: Chapter 6, Sections 6.1 to 6.10, 6.12 to 6.16
   Unit V: Chapter 8, Sections 8.1 to 8.11

Books for Reference:

1. Dharmapadham, A.V. *Statics*. S. Viswanathan Printers & Publishers PVT. Ltd.
2. Narayanan, S. (1985). *Statics*. S. Chand & Company Ltd, New Delhi.
3. Dharmapadham, A. V. (2006). *Dynamics*. S. Viswanathan Printers & Publishers Pvt Ltd.
4. Khanna, M. L. (2004). *Dynamics*. Jai Prakash Nath and Company.

Websties and eLearning Sources:

1. https://www.youtube.com/watch?v=UkMSSEr2tRY
2. https://www.youtube.com/watch?v=ljDIIMvx-eg

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Acquire knowledge of Statical and Dynamic forces.	**K1**
CO2	Understand the nature of forces, their resultants and resolutions.	**K2**
CO3	Apply the properties of various forces acting on a body both in static and dynamic positions.	**K3**
CO4	Analyze the acquired knowledge in solving real life problems on friction, catenary and projectile.	**K4**
CO5	Evaluate the impact of forces on the equilibrium of a body while varying magnitude and direction of forces.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UMA53CC12**			**Core Course - 12:** Mechanics						**6**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	3	3	2	2	2	**2.1**
CO2	3	2	2	2	2	3	2	2	3	3	**2.4**
CO3	3	2	2	2	2	3	3	2	2	3	**2.4**
CO4	2	3	2	3	2	3	3	2	3	2	**2.5**
CO5	2	3	2	3	2	2	2	3	2	2	**2.3**
										Mean Overall Score	**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA53ES01A	**Discipline Specific Elective - 1:** Combinatorics	4	3

Course Objectives
To introduce fundamental combinatorial concepts and counting techniques.
To develop problem-solving skills using recurrence relations and generating functions
To explore advanced combinatorial methods such as multinomials and inclusion-exclusion principles.
To analyze permutations, Euler functions, and combinatorial problems with restrictions.
To apply combinatorial principles to Fibonacci sequences, symmetry, and enumeration problems.

UNIT I **(12 Hours)**

Basic Combinatorial Numbers - stirling numbers of the second kind -Recurrence formula for Pnm.

UNIT II **(12 Hours)**

Generating functions -Recurrence relations- Bell's formula.

UNIT III **(12 Hours)**

Multinomials - Multinomial theorem- Inclusion and Exclusion principle.

UNIT IV **(12 Hours)**

Euler function -Permutations with forbidden positions -the Menage Problem

UNIT V **(12 Hours)**

Problem of Fibonacci -Necklace problem - Burnside's lemma

Teaching Methodology	Chart, PPT, chalk and talk
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. V. Krishnamurthy, Combinatorics Theory and Applications East West Press. 2002.
   Unit I - *Chapter I, Section 1, Pages 5-22*
   Unit II - *Chapter I, Section 2, Pages 29-48.*
   Unit III- *Chapter I, Section 4,5, Pages 66-77.*
   Unit IV- *Chapter I, Section 5,6, Pages 77-94*
   Unit V- *Chapter I, Section 6, and Chapter II - Section 1, Pages 94-111*

Books for Reference:

1. Theory and problems of combinatorics- Schaums outline series, McGraw Hill.

Course Outcomes		
CO No.	**CO- Statement**	**Cognitive Level (K- level)**
	On successful completion of this course, students will be able to	
CO1	Understand and apply basic combinatorial numbers, including Stirling numbers of the second kind, and recurrence formulas for permutations.	**K1**
CO2	Utilize generating functions and recurrence relations to solve combinatorial problems, including Bell's formula.	**K2**
CO3	Apply multinomial theorems and the principle of inclusion-exclusion in problem-solving.	**K3**
CO4	Analyze Euler functions and solve permutation problems involving forbidden positions, including the Menage problem.	**K4**
CO5	Solve Fibonacci-related problems, apply Burnside's lemma, and analyze combinatorial structures such as necklaces.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UMA53ES01A**			**Discipline Specific Elective - 1:** Combinatorics						**4**	**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	1	3	2	2	1	2	**2.1**
CO2	3	2	2	3	1	3	2	3	2	3	**2.4**
CO3	3	1	2	3	1	3	1	3	1	3	**2.1**
CO4	2	2	3	2	2	3	2	3	3	2	**2.4**
CO5	2	2	2	2	1	2	2	2	2	3	**2.0**
Mean Overall Score											2.2(High)

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA53ES01B	**Discipline Specific Elective - 1:** Number Theory	4	3

Course Objectives
To apply Euclid's Division Lemma, divisibility rules, and the Fundamental Theorem of Arithmetic to solve problems involving integers and Diophantine equations.
To solve linear Diophantine equations and work with congruences, including Fermat's and Wilson's Theorems.
To utilize the Chinese Remainder Theorem and polynomial congruences in problem-solving and cryptographic applications.
To analyze multiplicative arithmetic functions, the Möbius Inversion Formula, and the structure of residue systems and primitive roots.
To examine the contributions of Srinivasa Ramanujan to number theory and their impact on modern mathematical research.

UNIT I **(12 Hours)**

Euclid's Division Lemma-Divisibility - The Linear Diophantine Equation - The Fundamental Theorem of Arithmetic.

UNIT II **(12 Hours)**

Permutation, Combinations - Basic Properties of congruence's - Residue Systems - Linear Congruence- The Theorems of Fermat and Wilson Revisited.

UNIT III **(12 Hours)**

The Chinese Remainder Theorem - Polynomial congruence's-Combinatorial Study of Phi of n - Formulae for Euler's phi function, sigma function and d(n).

UNIT IV **(12 Hours)**

Multiplicative Arithmetic Function - The Mobius Inversion Formula- Properties of Reduced Residue Systems- Primitive roots Modulo n p.

UNIT V **(12 Hours)**

Sums of Squares: Lambert series -Sums of Two Squares- Sums of Four Squares- Sums of Six Squares

Teaching Methodology	PPT, chalk and talk
Assessment Methods	Seminar, Snap Test, MCQ, Library Record

Books for Study:

1. Andrews, G.E. (1984). *Number Theory*. Hindustan Publishing Corporation.
   Unit I: *Chapter 2(Sec 2.1-2.4 Pages 12-29)*
   Unit II: *Chapter 3(Sec 3.1 Pages 30-35) Chapter 4 (Sec 4.1-4.2 Pages 49-55) Chapter 5 (Sec 5.1-5.2 Pages 58-65)*
   Unit III: *Chapter 5 (Sec 5.3-5.4 Pages 66-74) Chapter 6 (Sec 6.1 -6.2 Pages 75-84)*
   Unit IV: *Chapter 6 (Sec 6.3-6.4, Pages 85-92) Chapter 7 (Sec 7.1-7.2, Pages 93-99)*
2. Bruce C. Berndt (2006), *Number Theory in the Spirit of Ramanujan*, *Student Mathematical Library,* vol. 34, American Mathematical Society (AMS)
   Unit V: *Chapter 3(Sec 3.1-3.4, Pages 55-67)*

Books for Reference:

1. Malik, S.B. (1998). *Basic Number Theory.* Vikas Publishing House Private Limited.
2. Chowdhury, K.C. (2007). *A First Course Theory of Numbers*. Asian Books Private Limited.
3. Niven, I. (2008). *An Introduction to the Theory of Numbers,* (5th Ed.). Wiley Publishers.

Websites and eLearning Sources:

1. https://ocw.mit.edu/courses/18-781-theory-of-numbers-spring-2012/

2. https://www.numbertheory.org/ash/
3. https://www.open.edu/openlearn/science-maths-technology/introduction-number-theory/content-section-0
4. https://cameroncounts.wordpress.com/wp-content/uploads/2013/11/nt.pdf
5. https://artofproblemsolving.com/school/course/intro-numbertheory

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Recall fundamental concepts of number theory, including divisibility, congruences, Diophantine equations, residue systems, and sums of squares.	**K1**
CO2	Explain key principles such as modular arithmetic, permutations, arithmetic functions, primitive roots, and number representations.	**K2**
CO3	Apply number-theoretic techniques to solve problems involving equations, congruences, and arithmetic functions.	**K3**
CO4	Analyze important theorems like Fermat's, Wilson's, the Chinese Remainder Theorem, and Möbius inversion with examples.	**K4**
CO5	Evaluate advanced topics, including Ramanujan's contributions and sums of squares, and their applications in modern mathematics.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UMA53ES01B**			**Discipline Specific Elective - 1:** Number Theory						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	1	2	3	2	2	3	3	**2.2**
CO2	2	2	1	2	2	2	3	3	3	3	**2.3**
CO3	1	2	1	2	1	3	2	3	3	2	**2.0**
CO4	2	1	2	2	2	2	3	3	3	3	**2.4**
CO5	2	1	2	3	2	3	2	2	3	3	**2.3**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA53ES02A	**Discipline Specific Elective - 2:** Graph Theory	4	3

Course Objectives
To gain knowledge of fundamental graph concepts, including isomorphism and subgraphs.
To understand matrix operations on graphs and their connectivity properties.
To explore the characteristics of Eulerian and Hamiltonian graphs.
To study the properties and structure of trees and directed graphs.
To analyze the properties and characterization of planar graphs.

UNIT I **(12 Hours)**

Introduction - The Konigsberg Bridge Problem - Introduction- Definition and Examples - Degrees - Subgraphs - Isomorphism.

UNIT II **(12 Hours)**

Matrices - Operations on Graphs - Walks - Trails and Paths - Connectedness and Components

UNIT III **(12 Hours)**

Introduction - Eulerian Graphs- Hamiltonian Graphs (Omit Chavatal Theorem)

UNIT IV **(12 Hours)**

Introduction - Characterization of Trees - Centre of a Tree- Directed graphs - Introduction - Definitions and basic properties.

UNIT V **(12 Hours)**

Introduction - Definition and Properties - Characterization of Planar Graphs

Teaching Methodology	Chart, PPT, chalk and talk
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Arumugam, S., & Ramachandran, S. (2019). Invitation to Graph Theory. SciTech Publications (India) Pvt. Ltd., Chennai.
   Unit I (Sec 1.0,1.1,2.0,2.1,2.2,2.3,2.4)
   Unit II (Sec 2.8,2.9,4.1,4.2)
   Unit III (Sec 5.0,5.1, 5.2.)
   Unit IV (Sec 6.0, 6.1,6.2,10.0,10.1)
   Unit V (Sec 8.0, 8.1,8.2)

Books for Reference:

1. Deo, N. (2004). Graph Theory with applications to Engineering and Computer Science, Prentice Hall of India.
2. Chartrand, G., & Zhang, P. (2004). Introduction to Graph Theory. Tata McGraw-Hill Edition.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Acquire knowledge on fundamental concepts in graph theory.	**K1**
CO2	Have in-depth understanding of various types of graphs and their properties.	**K2**
CO3	Apply the concepts to classify and construct graphs.	**K3**
CO4	Analyze inter-related concepts of graphs and infer their characterization.	**K4**
CO5	Evaluate the nature of graphs and estimate its various parameters.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UMA53ES02A**			**Discipline Specific Elective - 2:** Graph Theory						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	3	2	3	1	3	2	3	2.4
CO2	3	2	2	1	3	2	2	3	2	3	2.3
CO3	3	3	3	2	3	1	2	3	3	2	2.5
CO4	3	2	3	3	1	2	3	2	3	2	2.4
CO5	3	2	1	2	3	2	2	3	2	3	2.3
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA53ES02B	**Discipline Specific Elective - 2:** Mathematical Modelling	4	3

Course Objectives
To develop a strong foundation in mathematical modelling by understanding the basics and classifying different types of models.
To apply mathematical techniques such as geometry, algebra, and calculus in constructing and analyzing mathematical models, while recognizing their limitations.
To master partial differential equations (PDEs) by learning methods for deriving PDE models, including mass balance, momentum balance, and variational principles.
To explore advanced modelling methods like probability generating functions, linear and non-linear programming, and optimization techniques.
To enhance problem-solving and critical thinking skills by translating real-world problems into mathematical models for analysis and decision-making.

UNIT I **(12 Hours)**

Simple Situations Requiring Mathematical Modelling - The Technique of Mathematical Modelling - Classification of Mathematical Models - Some Characteristics of Mathematical Models.

UNIT II **(12 Hours)**

Mathematical Modelling through Geometry - Mathematical Modelling through Algebra - Mathematical Modelling through Calculus - Limitations of Mathematical Modelling.

UNIT III **(12 Hours)**

Situations Giving Rise to Partial Differential Equations Models - Mass Balance equations: First method of Getting PDE Models - Momentum-Balance Equations: The Second Method of Obtaining Partial Differential Equation Models - Variational Principles: The Third Method of Obtaining Partial Differential Equation Models.

UNIT IV **(12 Hours)**

Probability Generating Function, Fourth Method of Obtaining Partial Differential Equation Models - Model for Traffic Flow on a Highway - Nature of Partial Differential Equations.

UNIT V **(12 Hours)**

Mathematical Modelling Through Linear Programming - Mathematical Modelling Through Non- Linear Programming - Mathematical Modelling Through Maximum Principle.

Teaching Methodology	PPT, chalk and talk, Group Discussion
Assessment Methods	Seminar, Snap Test, MCQ, Library Record

Books for Study:

1. Kapur, J.N. (2015). *Mathematical Modelling*, (2nd Edition). New Age International Publishers.
   Unit I *Chapter 1 (Sec 1.1 - 1.4)*
   Unit II *Chapter 1 (Sec1.5-1.6, 1.8-1.9)*
   Unit III *Chapter 6(Sec 6.1 -6.4,)*
   Unit IV *Chapter 6(Sec 6.5 -6.7)*
   Unit V *Chapter 10(Sec 10.1 - 10.3)*

Books for Reference:

1. Bender, C.A. (1978). *An Introduction to Mathematical Modelling*. Wiley Inter science.
2. Kapur, J.N. (1985). *Mathematical Models in Biology and Medicine*. Affiliated East- West Press

Websites and eLearning Sources:

1. https://ocw.mit.edu/courses/mathematics/18-085-computational-science-and-engineering-i-fall-2008/
2. https://www.researchgate.net/publication/357313926_Lecture_Notes_on_Mathematical_Modeling

3. https://people.maths.bris.ac.uk/~madjl/course_text.pdf
4. https://www.coursera.org/courses?query=mathematical%20modeling
5. https://www.edx.org/learn/mathematical-modeling

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	Recall the basic concepts, classification, and characteristics of mathematical models.	**K1**
CO2	Explain the techniques of mathematical modeling through geometry, algebra, and calculus.	**K2**
CO3	Apply mathematical modeling techniques to construct and analyze models for real-world problems.	**K3**
CO4	Examine and differentiate between various modeling approaches, including PDEs and optimization techniques.	**K4**
CO5	Assess the effectiveness of different mathematical models in solving complex real-world problems and optimizing solutions.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
5	**25UMA53ES02B**		**Discipline Specific Elective - 2:** Mathematical Modelling							**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	2	3	3	2	3	3	**2.3**
CO2	2	3	2	1	2	3	3	2	3	3	**2.4**
CO3	1	2	3	2	3	2	3	2	3	3	**2.4**
CO4	1	2	2	3	1	2	3	2	3	3	**2.2**
CO5	1	2	2	2	3	1	3	2	3	3	**2.2**
										Mean Overall Score	**2.3(High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA54OE01	**Open Elective - 1 (WS):** Quantitative Aptitude	4	2

Course Objectives
To solve aptitude problems.
To prepare for various competitive examinations.
To acquaint shortcut methods and Applications of simple formulae.
To acquaint various elementary concepts.
To improve and learn basic mathematical skills.

UNIT I **(12 Hours)**

Simplification - Pipes and Cisterns - Boats and Streams

UNIT II **(12 Hours)**

Problems on ages - Simple Interest and Compound Interest

UNIT III **(12 Hours)**

Partnership - Permutations and Combinations

UNIT IV **(12 Hours)**

Alligation or mixture - Probability and Banker's Discount

UNIT V **(12 Hours)**

Heights and Distances - Odd man out and series

Teaching Methodology	Chalk and Talk, PPT, Group Discussion, Problem solving
Assessment Methods	Seminar, Quiz, Test

Books for Study:

1. Agarwal, R.S. (2010). *Quantitative Aptitude for competitive examinations (Fully solved)* Revised and Enlarged Edition**.** S. Chand & Company Limited.
   Unit I: *Chapter 4,16,19*.
   Unit II: *Chapter 8,21,22*.
   Unit III: *Chapter 13, 30*.
   Unit IV: *Chapter 20,31,33*.
   Unit V: *Chapter 34,35*

Books for Reference:

1. Khattar, D. *Quantitative Aptitude for competitive examinations*. Pearson.
2. Guha, A. *Quantitative Aptitude for Competitive Examinatio*n, (5th Ed.). McGraw Hill Education Series.
3. Yaav, R. (2016). *Advanced Maths for General Competitions*. KD Publication.

Website and e Learning Source:

1. www.bankexamstoday.com

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire the knowledge on the various techniques of quantitative aptitude	**K1**
CO2	Understand different methods or techniques in problem solving of Ratio & Proportion, Time & work, Time & Distance, Problems on Trains, calculation of Area, Volume and Surface area, Calendar and Clocks	**K2**
CO3	Apply different methods or techniques on Ratio & Proportion, Time & work, Time & Distance, Problems on Trains, calculation of Area, Volume and Surface area, Calendar and Clocks in real life problems and various competitive examinations.	**K3**
CO4	Analyze real life problems related to Ratio & Proportion, Time & work, Time & Distance, Problems on Trains, calculation of Area, Volume and Surface area, Calendar, clocks and find solutions	**K4**
CO5	Evaluate relations between Ratio & Proportion, Time & work, Time & Distance, Problems on Trains, calculation of Area, Volume and Surface area, Calendar and Clocks.	**K5**

Relationship Matrix												
Semester	**Course Code**			**Title of the Course**							**Hours**	**Credits**
5	**25UMA54OE01**			**Open Elective - 1 (WS):** Quantitative Aptitude							**4**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**		
CO1	3	1	3	2	2	3	2	2	1	2	**2.1**	
CO2	2	3	3	2	1	2	3	2	2	3	**2.3**	
CO3	3	3	3	2	2	3	2	3	2	2	**2.5**	
CO4	3	3	2	2	1	2	3	3	2	3	**2.4**	
CO5	2	3	3	1	2	3	3	2	2	3	**2.4**	
										Mean Overall Score	**2.36 (High)**	

Evaluation Pattern for Open Elective - 1 (WS):

Continuous Internal Assessment (CIA) – 100 Marks

Components (40 Marks)

1. MCQ - 15 Marks (to be conducted by the Department)
2. Assignment - 20 Marks
3. Library Reference - 5 Marks

MID and END Semester Pattern (60 Marks)

Part A (MCQ)

15 × 1 Mark = 15 Marks

Part B

9 × 5 Marks = 45 Marks (9 out of 15 Questions)

Semester Pattern (100 Marks)

Part A (MCQ)

30 × 1 Mark = 30 Marks

Part B

14 × 5 Marks = 70 Marks (14 out of 20 Questions)

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UMA54SL04	**Certificate Course:** LaTeX for Technical Writing	-	2

Course Objectives
To give basic knowledge about LaTeX software to the students to prepare documents technically
To train the students to work with computers the in-built commands in LaTeX to type mathematical symbols
To motivate the students to format texts with neat alignment in a customized way using LaTeX.
To train the students to learn the techniques to insert images and to create tables.
To motivate the students to apply the techniques to prepare projects and PPT presentations.

UNIT I

Introduction to LaTeX - Installation of LaTeX - Basic structure of LaTeX document - Text typing and formatting

UNIT II

Math Equation Typing - Listing Items

UNIT III

Table Creation - Inserting Figures

UNIT IV

Article preparation - Thesis preparation

UNIT V

Presentation Creation - Beamer Class

Teaching Methodology	Black board, Demonstration, PPT, ICT tools, Online classes
Assessment Method	Online Tests, MCQ, Assignments

Books of Study:

1. Leslie Lamport, LaTeX: A Document Preparation System, Addison-Wesley Publishing, Second edition, 1994.

Books for Reference:

1. H. Kopka and P.W. Daly, A Guide to LaTeX, Addison-Wesley, 2003.
2. Frank Mittelbach, MichelGoossens, Johannes Braams, David Carlisle, Chris Rowley, The LaTeX Companion Addi son-Wesley Professional 2004.

Websites and e Learning Source:

1. https://www.overleaf.com/learn/latex/Creating_a_document_in_LaTeX
2. https://www.overleaf.com/learn/latex/How_to_Write_a_Thesis_in_LaTeX_(Part_1)%3A_Basic_Structure
3. https://www.youtube.com/watch?v=mZcV1wIPCBo
4. https://www.overleaf.com/learn/latex/Beamer

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	To acquire the knowledge of the basics of LaTeX for document preparation.	**K1**
CO2	To understand the simple commands in LaTeX to type mathematical symbols.	**K2**
CO3	To apply LaTeX in built commands for formatting texts and inserting figures.	**K3**
CO4	To analyse the concepts learned to design manually to make an effective documentation.	**K4**
CO5	To evaluate and handle the techniques to type neat thesis files and PPT presentations.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
5	**25UMA54SL04**	**Certificate Course:** LaTeX for Technical Writing								**-**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	3	3	2	2	3	2.2
CO2	2	3	2	1	2	3	3	2	2	3	2.3
CO3	1	2	3	2	3	2	3	2	3	2	2.3
CO4	1	2	2	3	1	2	3	2	2	3	2.1
CO5	1	2	2	2	3	1	3	2	2	3	2.1
										Mean Overall Score	**2.2(High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63CC13	**Core Course - 13:** Complex Analysis	6	4

Course Objectives
To enable students, understand differentiation and integration of complex functions
To enable students to learn about Bilinear transformation to make students understand complex power series, classifications of singularities and calculus of residues
To enable students, analyze functions of complex variable using series expansion
To enable students, evaluate integrals
To make students understand complex power series, classifications of singularities and calculus of residues

UNIT I: Analytic Functions **(18 Hours)**

Continuous Functions -Differentiability - Cauchy-Riemann Equations - Analytic Functions - Harmonic Functions

UNIT II: Bilinear Transformations **(18 Hours)**

Bilinear Transformations - Cross ratio - Fixed Points of Bilinear Transformations.

UNIT III: Complex Integration **(18 Hours)**

Definite Integral - Cauchy's Theorem - Cauchy's Integral Formula - Higher Derivatives.

UNIT IV: Series Expansions **(18 Hours)**

Taylor's Series - Laurent's Series - Zeros of Analytic Functions - Singularities.

UNIT V: Calculus of Residues **(18 Hours)**

Residues - Cauchy's Residue Theorem - Evaluation of Definite Integrals (poles not lying on the real axis)

Teaching Methodology	PPT, Chalk and Talk
Assessment Methods	MCQ, Snap Test

Books for Study:

1. Arumugam, S., Isaac, T.A., & Somasundaram, A. (2002). *Complex* Analysis. SciTech Publications (India) Pvt. Ltd.
   Unit I: *Chapter II, Sections 2.4-2.8, pp. 30-41, 46-56, 61-67.*
   Unit II: *Chapter III, Section 3.2 - 3.4, pp. 67-73, 82-94*
   Unit III: *Chapter VI, Section 6.0 -6.4, pp.132-138, 146-172.*
   Unit IV: *Chapter VII, Section 7.0-7.4, pp.173-178, 181-187, 197-208.*
   Unit-V: *Chapter VIII, Section 8.0-8.3, pp. 209-213, 217-222, 228-231, 235-240,246-251.*

Books for Reference:

1. Narayanan, S. & Pillai, T.K.M. (2007). *Complex Analysis*. S. Viswanatha printers and publishers Pvt. Ltd.
2. Duraipandian, P., Laxmi, D., & Muhilan, D. (2001). *Complex Analysis*. Emerald Publishers.
3. Spiegel, M.R. (1964). *Theory and Problems of Complex Variables.* Schaum's Outline Series, McGraw Hill book Company.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=flUk8zwqGV0&list=PLbMVogVj5nJS_i8vfVWJG16mPcoEKMuWT&index=7
2. https://www.youtube.com/watch?v=yV_v6zxADgY&list=PLbMVogVj5nJS_i8vfVWJG16mPcoEKMuWT&index=10
3. https://www.youtube.com/watch?v=Mpmlk1H1aQo
4. https://www.youtube.com/watch?v=M80uqJZqMfs

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire knowledge of complex-valued functions, Analytic function, Harmonic functions and Bilinear Transformations.	**K1**
CO2	Understand Series Expansions, singularities, Cauchy's theorem and its consequences	**K2**
CO3	Identify types of singularities, poles and residues.	**K3**
CO4	Analyze the results associated to Definite Integrals and Cauchy's Integral formulae.	**K4**
CO5	Evaluate the region of convergence by applying Taylor's Series - Laurent's Series.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
6	**25UMA63CC13**	**Core Course - 13:** Complex Analysis								**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	2	2	1	3	2	3	3	3	**2.2**
CO2	2	2	2	2	2	3	3	3	2	2	**2.3**
CO3	1	2	2	2	2	3	3	3	2	3	**2.3**
CO4	2	2	2	2	1	3	3	3	2	3	**2.3**
CO5	1	3	2	1	1	2	3	3	1	2	**1.9**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63CC14	**Core Course - 14:** Computer Oriented Numerical Methods with 'C'	5	3

Course Objectives
To acquire the knowledge of basic structure of C-program and Numerical methods.
To understand the language C and to apply the techniques of C programs in Numerical methods.
To understand the C tokens and using the control statements to write a program in C
To apply the appropriate numerical methods and C program and solve the problems and find its Solutions.
To develop the programming in C and solve the numerical problems.

UNIT I **(15 Hours)**

Structure of C programs - Constants, Variables and Data types - Operators and Expressions Mathematical functions - Input and output operators -Temperature conversion.

UNIT II **(15 Hours)**

Decision making and Branching - IF statements GOTO statement - Solving Quadratic equations - Decision making and looping- WHILE, DO, FOR statements - *Prime number Checking* - Arrays- *series expansions of cos x and sin x- Fibonacci series - numbers in ascending order - L.C.M, G.C.D. - Mean and S.D. - Matrix addition, subtraction and multiplication*

UNIT III **(15 Hours)**

Handling of character strings - Arithmetic operations on characters- *Palindrome verification* -String handling functions - *Names in alphabetical order* - User defined functions -Recursion
- *nCr, and nPr.*

UNIT IV **(15 Hours)**

Curve fitting - Linear and parabolic curves by the method of least squares principle - Solving algebraic and transcendental equations - Bisection method, false position method and Newton Raphson method - Solving simultaneous algebraic equations - Gauss Elimination method- Gauss Seidel method.

UNIT V **(15 Hours)**

Interpolation - Newton's forward and backward difference formulae - Lagrange's interpolation formula - Numerical integration using Trapezoidal and Simpson's one-third rules - Solution of ODE s - Simple Euler's method and Runge-Kutta fourth order method.

Teaching Methodology	Chalk and Talk, PPT
Assessment Methods	Seminar, Online Test, MCQ

Note:

l) For Numerical methods: Problems and Programs only.

2) For topics in italics- programs only.

Books for Study:

1. E. Balagurusamy, *Programming in ANSI C*, Sixth edition, Tata Mc- Graw Hill Publishing Co. Ltd., New Delhi, 2012.
   - **Unit I:** *Chapters 1-4*
   - **Unit II:** *Chapters 5-7*
   - **Unit III:** *Chapters 8-9*
2. M.K. Venkatraman, *Numerical methods in Science and Engineering*, National Publisher Company, Fifth Edition, 2001.

Unit IV: *Chapter 1 (Sec 1.7, 1.8) Chapter 3 (Sec 2, 4, 5) Chapter 4 (Sec 2, 6) Chapters 4 (omit Gauss Jordan method in section 2 and omit Gauss Jacobi method in section 6).*

Unit V: *Chapter 6 (Sec 3, 4) Chapter 8 (Sec 4) Chapter 9 (Sec 8, 10) Chapter 11 (Sec 10, 16)*

Books for Reference:

1. Yashavant. P Kanetkar, *Let us 'C'*, BPB Publications, 2002.
2. Rajaraman, *Computer oriented numerical methods*, Prentice-Hall of India, 1971

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Acquire the knowledge of basic structure of C-program and Numerical methods.	**K1**
CO2	Understand the different types of C-tokens, 'if statements', loops, arrays and handling of character strings; Numerical methods such as curve fitting, bijection, Newton-Raphson, Gauss elimination, Gauss seidel methods, interpolation methods, Trapezoidal, Simpson one third rule, Euler and Runge-Kutta method for solving problems.	**K2**
CO3	Apply appropriate numerical methods and C-program to solvethe given problems and evaluate their solutions.	**K3**
CO4	Analyze the best approximated value of the root of the givenfunction using various numerical methods.	**K4**
CO5	Develop programming skills using the fundamental and basics of C-program to solve numerical problems.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
6	**25UMA63CC14**	**Core Course - 14:** Computer Oriented Numerical Methods with 'C'								**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	2	3	2	2	2.4
CO2	3	3	2	2	2	3	2	2	2	2	2.3
CO3	3	2	2	3	2	3	3	2	2	2	2.4
CO4	2	3	2	3	2	3	2	2	3	2	2.3
CO5	2	2	3	3	2	2	2	3	3	2	2.4
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63CP01	**Core Practical - 1:** C Programming	2	1

Course Objectives
To acquire the knowledge to write a C program.
To understand functions of various keywords involved in a C program.
To apply user defined functions and loops while writing a C program.
To analyze and evaluate the exact solution of a problem with output of a C program.
To evaluate and create a C program and write solution for real lifeproblems.

LIST OF PRACTICALS:

1. Finding the mean and S.D. of *n* values.
2. Finding Correlation coefficients.
3. Arranging *n* numbers in ascending order and finding the median value.
4. L.C.M. and G.C.D. of two numbers.
5. Prime number checking.
6. *nCr* and *nPr* using function subprogram.
7. Fibonacci series.
8. Finding cos*x* and sin *x* from series expansions.
9. Arranging the names in alphabetical order.
10. Matrix addition, subtraction and multiplication.
11. Palindrome verification.
12. Solving quadratic equations.
13. Newton - Raphson method - Bisection method - False position method of solvingequations.
14. Gauss elimination method - Gauss-Seidel method of solving simultaneous equations.
15. Trapezoidal rule and Simpson's rule of integration.
16. Runge- Kutta Fourth order method of solving differential equations.
17. Lagrange's method of interpolation.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	Acquire the knowledge to write a C program.	**K1**
CO2	Understand functions of various keywords involved in a Cprogram.	**K2**
CO3	Apply user defined functions and loops while writing a Cprogram.	**K3**
CO4	Analyze and evaluate the exact solution of a problem with outputof a C program.	**K4**
CO5	Evaluate and create a C program and write solution for real lifeproblems.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UMA63CP01**			**Core Practical - 1:** C Programming						**2**	**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	1	2	1	3	3	1	2	2	2.1
CO2	3	2	2	1	2	3	3	1	2	2	2.1
CO3	3	2	3	2	1	3	3	2	2	2	2.3
CO4	3	2	3	2	1	3	3	1	2	2	2.2
CO5	3	3	2	2	1	3	3	1	2	3	2.3
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63CC15	**Core Course - 15:** Discrete Mathematics	5	3

Course Objectives
To study the fundamental concepts of coding theory and to explore group codes and their generation process.
To develop analytical skills through the study of truth table and tautology
To understand and apply the theory of inference
To analyse statements involving multiple quantifiers.
To learn about algebraic operations in lattices and explore the concepts in New lattices.

UNIT I **(15 Hours)**

Binary operation - Special Types of Binary Operations - Coding Theory: Introduction - Hamming Distance - encoding a Message - Group Codes - Procedure for Generating Group Codes - Decoding and Error Correction - An example of Simple Error Correcting Code.

UNIT II **(15 Hours)**

Introduction - tf statements - Connectives - Atomic and Compound Statements - Well-Formed Formulae - The truth table of a formula - Tautology

UNIT III **(15 Hours)**

Normal forms - Principal normal forms - Theory of Inference - Indirect Method of proof.

UNIT IV **(15 Hours)**

Open Statements - Quantifiers - Bound and free variables - Valid formulae and Equivalence - Theory of Inference for predicate Calculus - Statements involving more than one Quantifiers.

UNIT V **(15 Hours)**

Lattices - Some properties of Lattices - Duality Principle - Lattice through Algebraic Operations - New Lattice-Lattice Homomorphisms - Product Lattice of Two Lattices

Teaching Methodology	chalk and talk, Group Learning, Individual Learning
Assessment Methods	Seminar, Snap Test, MCQ, Library Record, Written Assignment

Books for Study:

1. Venkataraman. M.K., Sridharan. N, and Chandrasekaran. N (2012) *Discrete Mathematics*, The National Publishing Company, Chennai.
   - **Unit I** Chapter VII: Sec 1, Chap VIII: Sec 1-7
   - **Unit II** Chap IX: Sec 1-7
   - **Unit III** Chap - IX: Sec 9 - 13
   - **Unit IV** Chap - IX: Sec 14 - 18
   - **Unit V** Chap - X: Sec 1 ,2, 3

Books for Reference:

1. Rosen, K.H. (2006). *Discrete Mathematics and its Applications,* (6th Ed.). Tata McGraw-Hill.
2. Susanna, S. E. (2011). *Discrete Mathematics with Applications,* (4th Ed.). Brooks/Cole.

Websites and eLearning Sources:

1. https://brilliant.org/wiki/discrete-mathematics/.
2. https://www.tutorialspoint.com/discrete_mathematics/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the rules of inference and proof techniques to construct valid arguments.	**K1**
CO2	Acquire knowledge of relations, functions, mathematical logic, lattices	**K2**
CO3	Construct and evaluate valid formulae and their equivalences.	**K3**
CO4	Justify relations and functions, to construct mathematical arguments using logical connectives and quantifiers, lattices.	**K4**
CO5	Utilize inference techniques to derive conclusions from premises.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UMA63CC15**			**Core Course - 15:** Discrete Mathematics						**5**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	1	2	1	3	3	1	2	2	**2.1**
CO2	3	2	2	1	2	3	3	1	2	2	**2.1**
CO3	3	2	3	2	1	3	3	2	2	2	**2.3**
CO4	3	2	3	2	1	3	3	1	2	2	**2.2**
CO5	3	3	2	2	1	3	3	1	2	3	**2.3**
Mean Overall Score											**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63ES03A	**Discipline Specific Elective - 3:** Astronomy	4	3

Course Objectives
To introduce the exciting world of astronomy to the students.
To help students to study about the celestial objects.
To understand the effects of refractions geocentric parallax.
To understand Kepler's laws of planetary motion.
To understand the variation in duration of day and night in various zones of earth.

UNIT I **(12 Hours)**

Celestial sphere and diurnal motion - Celestial coordinates - Sidereal time.

UNIT II **(12 Hours)**

Morning and evening stars - circumpolar stars - zones of earth - perpetual day - twilight.

UNIT III **(12 Hours)**

Refraction - laws of refraction - tangent formula - horizontal refraction - geocentric parallax - horizontal parallax

UNIT IV **(12 Hours)**

Kepler's laws - Anomalies - Kepler's equation.

UNIT V **(12 Hours)**

Moon - sidereal and synodic months - elongation - phase of moon - eclipses - umbra and penumbra - lunar and solar eclipses - maximum and minimum number of eclipses in ayear.

Teaching Methodology	Chalk and Talk, PPT, Group Discussion, Flipped classrooms, Kinesthetic Learning.
Assessment Methods	MCQ, Quiz Snap Test

Books for Study:

1. Kumaravelu, S., & Susheela, K. (2004). *Astronomy*. SKV Publications.
   UNIT I: ***Art. 39 - 76.***
   UNIT II: ***Art. 80 - 83, 87 - 89, 111 - 116.***
   UNIT III: ***Art. 117 - 128, 135 - 144.***
   UNIT IV: ***Art. 146 - 149, 156 - 159, 175 - 179.***
   UNIT V: ***Art. 229 - 241, 256 - 263, 267, 268, 271 - 275***.

Books for Reference:

1. Ramachandran, G.V. (1965). *Text Book of Astronomy*. Mission Press.
2. Seeds, M. (1992). *Foundations of* Astronomy, (3rd Ed.). Wadsworth Publishing Company.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=S_lzLurKgx4&t=2411s
2. https://www.youtube.com/watch?v=ggZsMEO2q0g&list=PLbMVogVj5nJROKq6v6sZq74sjty86dAQ2&index=2
3. https://www.youtube.com/watch?v=8X1x9RLaaxc&list=PL5E4E56893588CBA8&index=2

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire the knowledge of Celestial co-ordinates and Celestial Objects, Stars, Calender and Moon.	**K1**
CO2	Understand the main properties of Sidereal time, Perpetual day, Law of refraction, Kepler's equation, Eclipses.	**K2**
CO3	Identify the properties Zones of earth, Geocentric, Horizontal parallaxes and the different Phases of moon.	**K3**
CO4	Analyze the basic aspects associated with Celestial Objects.	**K4**
CO5	Evaluate the extension of the Celestial Sphere and Diurnal motion, Twilight, Maximum and Minimum number of Eclipses in a year.	**K5**

Relationship Matrix												
Semester	**Course Code**			**Title of the Course**							**Hours**	**Credits**
6	**25UMA63ES03A**			**Discipline Specific Elective - 3:** Astronomy							**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**		
CO1	3	1	3	2	2	3	2	2	1	2	**2.1**	
CO2	2	3	3	2	1	2	3	2	2	3	**2.3**	
CO3	3	3	3	2	2	3	2	3	2	2	**2.5**	
CO4	3	3	2	2	1	2	3	3	2	3	**2.4**	
CO5	2	3	3	1	2	3	3	2	2	3	**2.4**	
										Mean Overall Score	**2.36 (High)**	

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63ES03B	**Discipline Specific Elective - 3:** Optimization Techniques	4	3

Course Objectives
To understand sequencing problems and its applications.
To study the dynamic programming with different approaches.
To Use optimization techniques in decision making.
To solve replacement problems of different types.
To understand nonlinear programming problems and its applications.

UNIT I **(12 Hours)**

Introduction-Problem of Sequencing - Basic Terms Using Sequencing - Processing n jobs through Two Machines - Processing n jobs through k Machines - Processing 2 jobs through k Machines.

UNIT II **(12 Hours)**

Introduction the Recursive Equation Approach - Characteristics of Dynamic Programming - Dynamic Programming Algorithm.

UNIT III **(12 Hours)**

Introduction -- Decision making Problem - Decision making Process - Decision making Environment - Decision under Uncertainty

UNIT IV **(12 Hours)**

Introduction - Replacement of Equipment/Asset That Deteriorates Gradually-Replacement of Equipment that fails suddenly.

UNIT V **(12 Hours)**

Introduction Graphical solution - Kuhn-Tucker conditions with non- negative constraints - Quadratic programming.

Teaching Methodology	Chart, PPT, chalk and talk
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Swarup, K., Gupta, P.K., & Mohan, M. *Operations Research*, (16th Ed.). Sultan Chand & Sons, Educational Publishers.
   Unit I: *Chapter 12, Sections 12.1 to12.6.*
   Unit II: *Chapter 13, Sections 13.1 to 13.4.*
   Unit III: *Chapter16, Sections 16.1 to16.5.*
   Unit IV: *Chapter18, Sections18.1 to18.3.*
   Unit V: *Chapter28, Sections28.1to 28.4.*

Books for Reference:

1. Taha, H.A. (2011). *Operations Research: An introduction*, (9th Ed.). Prentice Hall.
2. Sundaresan, V., Subramaniyan, K.S., & Ganesan, K. (2002). *Resource Management Techniques.* A.R. Publications.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=_Lt3zNdnE0k
2. https://www.youtube.com/watch?v=xZs7WsNPJXY
3. https://www.youtube.com/watch?v=ug7O1lSZyg0

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Acquire the knowledge optimization techniques such as sequencing problems, Dynamic programming, decision analysis, replacement problems and nonlinear programming problems.	**K1**
CO2	Understand basic terms used in sequencing problems, processing n jobs through two machines and processing n jobs through k machines; characteristics of dynamic programming and dynamic programming algorithm; decision making process and decision under uncertainty; replacement of asset that deteriorates gradually; Kuhn-Tucker conditions with non-negative constraints.	**K2**
CO3	Apply suitable optimization technique to solve problems.	**K3**
CO4	Analyse the optimal solution for a given problem	**K4**
CO5	Evaluate design mathematical model for some industrial problems	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
6	**25UMA63ES03B**			**Discipline Specific Elective - 3:** Optimization Techniques					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	2	3	2	2	**2.4**
CO2	3	2	3	2	2	3	3	2	2	2	**2.4**
CO3	3	2	2	3	2	3	3	2	2	2	**2.4**
CO4	3	3	2	2	2	2	2	3	3	2	**2.3**
CO5	2	2	3	3	2	2	2	3	3	2	**2.4**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63ES04A	**Discipline Specific Elective - 4:** Automata Theory	4	3

Course Objectives
Understand the definition of Automaton and its classifications.
Introduce different types of Grammar.
Constructing Regular Expressions.
Train to know the normal forms.
Study Pumping lemma for regular sets.

UNIT I **(12 Hours)**

The Theory of Automata: Definition of an Automaton - Description of Finite Automaton - Transition systems - Properties of transition functions - Acceptability of a string by a finite Automaton - Nondeterministic finite Machines -The equivalence of DFA and NDFA.

UNIT II **(12 Hours)**

Formal Languages: Basic Definitions and examples - Grammars - Derivations and Languages generated - Chomsky classification of Languages (Theorems 4.1 and 4.2 are excluded) - Languages and their relation - Recursive and Recursively Enumerable sets - Operations on Languages.

UNIT III **(12 Hours)**

Regular Sets and Regular Grammars: Regular expressions - Identities - Finite Automata and Regular expressions - Transition systems containing Λ – moves - NDFA with Λ – moves - Conversion of NDFA to DFA - Algebraic method - Construction of FA to Regular expressions - Equivalence of two FA - Equivalence of two Regular expressions

UNIT IV **(12 Hours)**

Regular Sets and Regular Grammars (Further Topics): Pumping Lemma for Regular sets -Applications of Pumping Lemma - Closure Property of Regular sets - Regular sets and Regular grammars - Construction of a Regular grammar from a DFA - Construction of a Transition system from a Regular grammar.

UNIT V **(12 Hours)**

Context free Languages: Context free Languages (CFG) and Derivation trees - Ambiguity in CFG - Simplification of CFG - Construction of Reduced grammars - Elimination of Null productions - Elimination of Unit productions - Normal forms of CFG - Chomsky Normal Form (Proof of theorems 6.3, 6.4, 6.5, 6.6, 6.7, 6.8 are excluded).

Teaching Methodology	Chalk and Talk, PPT
Assessment Methods	McQ, Quiz, Snap Test

Books for Study:

1. Mishra, K.L.P., & Chandrasekaran, N. (2007), *Theory of Computer Science Automata Languages and Computation*, (Third Ed., 32nd Printing). PHI Learning Private Limited, New Delhi.
   UNIT I: *Chapter 2: Sections 3.1 - 3.7 and 3.10*
   UNIT II: *Chapter 3: Sections 4. l - 4.7.*
   UNIT III: *Chapter 4: Sections: 5. 1 -5.2.*
   UNIT IV: *Chapter 4 Sections: 5.3 -5.7.*
   UNIT V: *Chapter 5 Sections: 6.1 - 6.3 and 6.4.1 only.*

Books for Reference:

1. Hopcroft, J.E., & Ullman, J.D. (2006*). Introduction to Automata Theory Languages and Computation*, (3rd Ed.). Prentice Hall.
2. Ahoand, A.V., & Ullman, J.D. (2012). *Principles of Compiler Design*. Pearson Education.

Websites and eLearning Sources:

1. https://www.youtube.com/watch?v=539Bk9fFOyo

2. https://www.youtube.com/watch?v=-aIRqNnUvEg&list=PL85CF9F4A047C7BF7
3. https://www.youtube.com/watch?v=fkwhsVZLsao

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Level (K - Level)**
CO1	Acquire knowledge in mathematical notions of computation such as computability, decidability and reducibility of the theory of formal languages and automata.	**K1**
CO2	Perceive the techniques of computations including finite state automata, grammars and regular expressions and their relations.	**K2**
CO3	Design and explain finite state automata, context free grammars, derivation trees.	**K3**
CO4	Apply mathematical foundations, algorithmic principles and computer science theory to the modelling and design of computer based systems in a way that demonstrates.	**K4**
CO5	Evaluate different computational models using combinatorial methods.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
6	**25UMA63ES04A**		**Discipline Specific Elective - 4:** Automata Theory						**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	1	3	3	1	3	3	**2.4**
CO2	3	3	2	1	2	3	3	2	2	2	**2.3**
CO3	3	2	3	2	2	2	3	1	3	2	**2.3**
CO4	3	2	3	1	2	3	2	1	3	3	**2.3**
CO5	2	3	3	2	2	2	3	1	2	3	**2.3**
										Mean Overall Score	**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA63ES04B	**Discipline Specific Elective - 4:** Fuzzy Theory	4	3

Course Objectives
To enable the students to understand the concept of fuzzy logic, different types of fuzzy sets, α-cuts and extension principles.
To enable the students to understand the concepts of fuzzy complements and various other operations on fuzzy sets.
To provide the idea of fuzzy numbers, operations on fuzzy numbers and fuzzy equations.
To understand the decision making process and apply them to real life problems.

UNIT I: Fuzzy Set Theory (12 Hours)

Introduction - Concept of a fuzzy set - Relation between fuzzy sets - Numbers and Crisp set associated with a fuzzy set - Fuzzy sets associated with a given fuzzy set- Extension Principle - Diverse applications of fuzzy logic.

UNIT II: Operations On Fuzzy Set (12 Hours)

Introduction - Fuzzy Complements - Fuzzy Intersections - Fuzzy Unions - Application of fuzzy in production management

UNIT III: Fuzzy Relations (12 Hours)

Introduction - Operations on Fuzzy Relations- α-cuts of Fuzzy Relations - Compositions of Fuzzy Relations - Projections of Relations - Cylindrical Extensions - Application of fuzzy equivalence relations.

UNIT IV: Fuzzy Logic (12 Hours)

Introduction - Three valued logics - N valued logics for N>4 - Infinite valued logics - Fuzzy logic - Fuzzy Propositions and Rules – Reasoning – Fuzzy inference.

UNIT V: Applications (12 Hours)

Introduction- Introduction to Decision Making- Introduction to fuzzy methods in Decision Making.

Teaching Methodology	Chart, PPT, chalk and talk
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. M. Ganesh, Reprint (2012), "Introduction to Fuzzy Sets and Fuzzy Logic", Prentice Hall of India Pvt. Limited, New Delhi.
   UNIT I: CHAPTER 6 – Sec 6.1 to 6.9
   UNIT III: CHAPTER 7 – Sec 7.1 to 7.7
   UNIT IV: CHAPTER 8 – Sec 8.1 to 8.8
   UNIT V: CHAPTER 10 – Sec 10.1to 10.3
2. George J. Klir /Bo Yuan, Reprint (2013), "Fuzzy Sets and Fuzzy Logic –Theory and Applications", Prentice Hall of India, New Delhi.
   UNIT II: Chapter 3 - Sec 3.1 to 3.4

Books for Reference:

1. A. Kaufmann, (2005), "Introduction to Fuzzy Theory", Academic press, New York.
2. George J. Kler/ Boyuan, (2005), "Fuzzy Sets and Fuzzy Logic–Theory and Applications", Prentice Hall of India, New Delhi.
3. T. M. Ross (2006), "Fuzzy Engineering Application", Wiley Western Company.

Websites and eLearning Sources:

1. https://sc.uobaghdad.edu.iq/wp-content/uploads/sites/64/mainfiles/lectures/math/class%202/fuzzy%20sets.pdf?utm_source=chatgpt.com
2. https://www.maths.tcd.ie/~ormondca/notes/Fuzzy%20Logic%20Notes.pdf?utm_source=chatgpt.com

3. https://onlinecourses.nptel.ac.in/noc25_ee40/preview?utm_source=chatgpt.com
4. https://www.udemy.com/course/fuzzy-logic-course/?srsltid=AfmBOoo-wPj7s7f_xE_6c7xPHUV4cqHXIym8nliOX-YtLd7WVipc0lyV&utm_source=chatgpt.com
5. https://engineering.futureuniversity.com/BOOKS%20FOR%20IT/CHEN-PHAM-Introduction-to-Fuzzy-sets-Fuzzy-logic-and-Fuzzy-control-systems-Page-160.pdf?utm_source=chatgpt.com

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Acquire the knowledge in basic concepts of fuzzy theory	**K1**
CO2	Understand various concepts of fuzzy theory	**K2**
CO3	Evaluate fuzzy operations, fuzzy relations like projections, composition, etc	**K3**
CO4	Illustrate fuzzy operations and fuzzy relations with examples	**K4**
CO5	Make decisions on real life problems through MCDM, Multi person Decision Making and fuzzy linear programming methods	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**	**Credits**	
6	**25UMA63ES04B**		**Discipline Specific Elective - 4:** Fuzzy Theory						**4**	**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	2	3	3	2	3	2	**2.6**
CO5	2	2	3	2	1	3	2	3	2	1	**2.1**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
6	25UMA63CE01	Comprehensive Examination	-	2

Course Objectives
To gain a deep understanding of important concepts of algebraic structures Groups and Rings.
To understand the concepts of linear transformations, Eigen values and their properties.
To provide precise foundation for calculus and theory of real and complex numbers. Also provide a deeper understanding in Analysis concepts and their applications.
To understand the important concepts of Differential equations.
To develop problem solving skills.

UNIT I: Calculus

Variables Separable - Homogeneous equations - Non- Homogeneous equations of the first degree in x and y- Linear equations - Bernoulli's equation - Exact differential equations - First order DE of higher degree- Linear DE with constant coefficients - particular integrals - General method of finding P.I -Special methods for finding P.I when X is of the form $e^{ax}, cosax, sinax, x^m, e^{ax}V(x)$.

UNIT II: Real Analysis

Sequences-Convergent-Divergent-Limit point- Cauchy sequences- Series-Infinite series-Tests-Limit of a function on the real line - Metric spaces - Functions continuous at a point on the real line - Discontinuous functions on R1 - Derivatives- Rolle's Theorem - Fundamental theorems of calculus - Taylor's theorem.

UNIT III: Algebra

Groups - Permutation Groups- Lagrange's Theorem - Normal Subgroups and Quotient Groups - Rings - Ideals - Quotient rings - Maximal and Prime Ideals.

UNIT IV: Linear Algebra

Linear Transformation - Basis and Dimension -Rank and Nullity- Matrix of a linear transformation - Inner product space - Algebra of Matrices - Rank of a matrix- Eigenvalues and Eigenvectors-Bilinear forms.

UNIT IV: Complex Analysis

Continuous Functions -Differentiability - Cauchy-Riemann Equations - Analytic Functions - Bilinear Transformations - Definite Integral - Cauchy's Theorem - Cauchy's Integral Formula - Higher Derivatives- Taylor's Series - Laurent's Series - Zeros of Analytic Functions - Singularities - Cauchy's Residue Theorem - Evaluation of Definite Integrals (poles not lying on the real axis).

Teaching Methodology	Teaching Methodology Chalk and Talk method, Problem solving
Assessment Methods	Seminar, Snap Test, MCQ

Books for Study:

1. Narayanan, S., & Pillay, T.K.M. (2013). *Differential equations and its applications.* Viswanathan Pvt Ltd. (Unit I)
2. Goldberg, R.R. (1970). *Methods of Real Analysis*. Oxford & IBH Publishing Co. Pvt. Ltd. (Unit II)
3. Arumugam, S., Isaac, T.A, & Somasundaram, A. (2019). *Sequences and Series*. Yes Dee Publishing Pvt Ltd. (Unit II)
4. Arumugam, S., & Isaac, T.A. (2016). *Modern Algebra*. SciTech Publications (India) Private Ltd. (Unit III, Unit IV)
5. Arumugam, S., Isaac, T.A., & Somasundaram, A. (2002). *Complex Analysis*. SciTech Publications (India) Pvt. Ltd. (Unit V)

Books for Reference:

1. Herstein, I.N. (1975). *Topics in Algebra,* (2nd Ed.). John Wiley & Sons.
2. Kumaresan, S. *Linear Algebra - A Geometric Approach.*
3. Malik, S.C., & Arora, S. (2009). *"Mathematical Analysis*. New Age International (P) Limited Publishers.
4. Narayanan, S., & Pillay, T.K.M (2007). *Complex Analysis*. S. Viswanatha printers and publishers Pvt. Ltd.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Acquire knowledge on basic concepts, definitions and ideas with examples in Algebra, Analysis and Differential equations.	**K1**
CO2	Understand basic mathematical concepts and computational skills.	**K2**
CO3	Articulate mathematical concepts and use it in solving problems in Algebra, Analysis, and Differential equations.	**K3**
CO4	Attend various competitive exams	**K4**
CO5	Develop creativity in communicating and solving mathematical Problems.	**K5**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UMA64OE02	**Open Elective - 2:** Mathematics for Competitive Examinations	4	2

Course Objectives
To solve aptitude problems.
To prepare for various competitive examinations.
To acquaint shortcut methods and Applications of simple formulae.
To acquaint various elementary concepts.
To improve and learn basic mathematical skills.

UNIT I

Simplication –Simple Interest & Component Interest **(12 Hours)**

UNIT II

Average- Problem on Ages **(12 Hours)**

UNIT III

Percentage – Profit & Loss **(12 Hours)**

UNIT IV

Time & Work - Pipes and Cistern **(12 Hours)**

UNIT V

Time and Distance – Problem on Train **(12 Hours)**

Teaching Methodology	Chalk and Talk, PPT, Group Discussion, Problem solving
Assessment Method	MCQ. Written Test

Books for Study:

1. Agarwal, R.S. (2010). *Quantitative Aptitude for competitive examinations (Fully solved)* Revised and Enlarged Edition**.** S. Chand & Company Limited.
   Unit I: *Chapter 4*,21,22
   Unit II: *Chapter 6,8*
   Unit III: *Chapter 10,11*
   Unit IV: *Chapter 15*,16
   Unit V: *Chapter 17,18*

Books for Reference:

1. Khattar, D. *Quantitative Aptitude for competitive examinations*. Pearson.
2. Guha, A. *Quantitative Aptitude for Competitive Examinatio*n, (5th Ed.). McGraw Hill Education Series.
3. Yaav, R. (2016). *Advanced Maths for General Competitions*. KD Publication.

Website and e Learning Source:

1. www.bankexamstoday.com

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire the knowledge on the various techniques of quantitative aptitude	**K1**
CO2	Understand different methods or techniques in problem solving of Simple Interest & Component Interest	**K2**
CO3	Apply different methods or techniques on Time & work, Time & Distance, Problems on Trains and various competitive examinations.	**K3**
CO4	Analyze real life problems related to Time & work, Time & Distance	**K4**
CO5	Evaluate relations between Ratio & Proportion, Time & work, Time & Distance, Problems on Trains.	**K5**

Relationship Matrix												
Semester	**Course Code**			**Title of the Course**							**Hours**	**Credits**
6	**25UMA64OE02**			**Open Elective - 2:** Mathematics for Competitive Examinations							**4**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**		
CO1	3	1	3	2	2	3	2	2	1	2	**2.1**	
CO2	2	3	3	2	1	2	3	2	2	3	**2.3**	
CO3	3	3	3	2	2	3	2	3	2	2	**2.5**	
CO4	3	3	2	2	1	2	3	3	2	3	**2.4**	
CO5	2	3	3	1	2	3	3	2	2	3	**2.4**	
									Mean Overall Score		**2.36 (High)**	

Evaluation Pattern for Open Elective - 2:

Continuous Internal Assessment (CIA) – 100 Marks

Components (40 Marks)

1. MCQ - 15 Marks (to be conducted by the Department)
2. Assignment - 20 Marks
3. Library Reference - 5 Marks

MID and END Semester Pattern (60 Marks)

Part A (MCQ)
15 × 1 Mark = 15 Marks

Part B
9 × 5 Marks = 45 Marks (9 out of 15 Questions)

Semester Pattern (100 Marks)

Part A (MCQ)
30 × 1 Mark = 30 Marks

Part B
14 × 5 Marks = 70 Marks (14 out of 20 Questions)