

B Sc MATHEMATICS

LOCF SYLLABUS 2023



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) POSTGRADUATE 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 TANSICHE 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 133 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.

Foundation Course (FC): Foundation Courses serve to bridge the gap in knowledge and skills between secondary education and college-level studies, facilitating a smoother transition for students entering higher education.

Skill Enhancement Course (SE): 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 (AE): 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 courses 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 (ES): 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 ES, a minimum of two courses of equal importance/weightage is a must. A department with two sections must offer two courses to the students.

Generic Elective (EG): A course chosen from a different discipline or subject area, typically to gain exposure. Students pursuing specific disciplines must select Generic Elective courses from the options available across departments as per the college's course offerings. The breadth of Generic Elective (GE)

Courses is directly linked to the diversity of disciplines offered by the college. Two GE Courses are available, one in each semester V and VI, and are open to students from other departments.

Self-paced Learning (SP): It is a two-credit course designed to foster students' ability for independent and self-directed learning. With a syllabus structured to be completed within 45 hours, this course encourages learners to take control of their own educational journey. Notably, Self-paced Learning is conducted outside of regular class hours, emphasizing autonomy and self-motivation in students.

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.

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:

23	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

FC - Foundation Course

SE - 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

SP - Self-paced Learning

EG - Generic Elective

ES - Discipline Specific Elective

PW - Project and Viva Voce

CE - Comprehensive Examination

OR - Outreach Programme

EVALUATION PATTERN

Continuous Internal Assessment

SI No	Component	Marks Alloted
1	Mid Semester Test	30
2	End Semester Test	30
3	*Three Components (15 + 10 + 10)	35
4	Library Referencing (30 hours)	5
Total		100

Passing minimum: 40 marks

* The first component is a compulsory online test (JosTEL platform) comprising 15 multiple choice questions (10 questions at K1 level and 5 questions at K2 level); The second and the third components are decided by the course in-charge.

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						$7 \times 1 = 7$
B (compulsory)		5					$5 \times 3 = 15$
C (either...or type)			3				$3 \times 6 = 18$
D (2 out of 3)	For courses with K5 as the highest cognitive level, one K4 and one K5 question is compulsory. (Note: two questions on K4 and one question on K5)						2 × 10 = 20
	For courses with K6 as the highest cognitive level: Mid Sem: two questions on K4 and one question on K5; End Sem: two questions on K5 and one question on K6)						
					1	1*	
				Mid Sem			
					End Sem		
				1	1	1*	
Total							60

* Compulsory

Question Paper Blueprint for Semester Examination

Duration: 3 Hours				Maximum Marks: 100	
UNIT	Section A (Compulsory)	Section B (Compulsory)	Section C (Either...or type)	Section D (3 out of 5)	
	K1	K2	K3	K4	K5
UNIT I	2	2	2	3*	2*
UNIT II	2	2	2		
UNIT III	2	2	2		
UNIT IV	2	2	2		
UNIT V	2	2	2		
Marks	10 × 1 = 10	10 × 3 = 30	5 × 6 = 30	3 × 10 = 30	

* For courses with K5 as the highest cognitive level wherein two K4 and one K5 questions are compulsory. (Note: three questions on K4 and two question on K5)

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

Title of the Course	CIA	Semester Examination	Total Marks
<ul style="list-style-type: none"> • Skill Enhancement Course (Non Major Elective) • Foundation Course • Skill Enhancement Course (WS) 	20 + 10 + 20 = 50	50 (A member from the Department other than the course instructors)	100
<ul style="list-style-type: none"> • Self-paced Learning • Comprehensive Examination 	25 + 25 = 50	50 (CoE)	100
<ul style="list-style-type: none"> • Value Education • Environmental Studies 	50	50 (CoE)	100
<ul style="list-style-type: none"> • Skill Enhancement Course: Soft Skills 	100	-	100
<ul style="list-style-type: none"> • Generic Elective 	100	100 (CoE)	100
<ul style="list-style-type: none"> • Project Work and Viva Voce 	100	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:

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

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

Where,

C_i - credit earned for the Course i

Gp_i - Grade Point obtained for the Course i

M_i - 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 imbued 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.

PROGRAMME STRUCTURE					
Part	Semester	Specification	No. of Courses	No. of Hours	Credits
1	1- 4	Languages (Tamil / Hindi/ French/ Sanskrit)	4	17	12
2	1 - 4	General English	4	20	12
3	1 - 6	Core Course: Theory	12	73	54
	1 - 6	Core Course: Practical	1	2	1
	1 - 6	Allied Course	2	12	7
		Allied Practical	-	-	-
	3, 4	Allied Optional	2	10	6
	3, 4	Allied Optional Practical	1	2	2
	5, 6	Discipline Specific Elective	4	20	12
	5	Internship	1	-	1
	5	Self-paced Learning	1	-	2
	5	Project Work and Viva Voce	1	-	2
	5	Comprehensive Examination	1	-	2
4	1	Foundation Course	1	2	1
	1	Skill Enhancement Course (Non-Major Elective)	1	2	1
	5	Skill Enhancement Course	1	2	1
	6	Skill Enhancement Course (WS)	1	2	1
	1 - 4	Value Education	4	8	4
	1, 2	Ability Enhancement Compulsory Course	2	2(6)	4
	5, 6	Generic Elective	2	8	4
5	2 - 6	Outreach Programme (SHEPHERD)	-	-	4
	2 - 6	Extra Credit Courses (MOOC)/Certificate Courses	5	-	(15)
		Total		180	133(15)

PROGRAMME PATTERN								
Course Details						Scheme of Exams		
Sem	Part	Course Code	Title of the Course	Hours	Credits	CIA	SE	Final
1	1	23UTA11GL01A	General Tamil - 1	5	3	100	100	100
		23UFR11GL01	French - 1					
		23UHI11GL01	Hindi - 1					
		23USA11GL01	Sanskrit - 1					
	2	23UEN12GE01	General English - 1	5	3	100	100	100
	3	23UMA13CC01	Core Course - 1: Algebra and Trigonometry	5	4	100	100	100
		23UMA13CC02	Core Course - 2: Differential Calculus	5	3	100	100	100
		23UMA13AC01	Allied Course - 1: Statistical Methods - 1	4	3	100	100	100
	4	23UMA14FC01	Foundation Course: Bridge Mathematics	2	1	100	-	100
		-	Skill Enhancement Course - 1: (Non-Major Elective): Refer ANNEXURE 1	2	1	100	-	100
		23UHE14VE01	Value Education - 1: Essentials of Humanity*	2	1	50	50	50
23UEN14AE01		Ability Enhancement Compulsory Course - 1: Communicative English	(6)	3	100	-	100	
Total				30(6)	22			
2	1	23UTA21GL02	General Tamil - 2	4	3	100	100	100
		23UFR21GL02	French - 2					
		23UHI21GL02	Hindi - 2					
		23USA21GL02	Sanskrit - 2					
	2	23UEN22GE02	General English - 2	5	3	100	100	100
	3	23UMA23CC03	Core Course - 3: Analytical Geometry and Vector Calculus	6	5	100	100	100
		23UMA23CC04	Core Course - 4: Integral Calculus	5	3	100	100	100
		23UMA23AC02	Allied Course - 2: Statistical Methods - 2	6	4	100	100	100
	4	23UHE24VE02	Value Education - 2: Fundamentals of Human Rights*	2	1	50	50	50
		23UHE24AE01	Ability Enhancement Compulsory Course - 2: Environmental Studies*	2	1	50	50	50
	-	Extra Credit Courses (MOOC/Certificate Courses) - 1		(3)				
Total				30	20(3)			
3	1	23UTA31GL03	General Tamil - 3	4	3	100	100	100
		23UFR31GL03	French - 3					
		23UHI31GL03	Hindi - 3					
		23USA31GL03	Sanskrit - 3					
	2	23UEN32GE03	General English - 3	5	3	100	100	100
	3	23UMA33CC05	Core Course - 5: Differential Equations	7	6	100	100	100
		23UMA33CC06	Core Course - 6: Sequences and Series	6	4	100	100	100
		23UMA33AO01A	Allied Optional - 1: Physics - 1	4	3	100	100	100
		@	Allied Optional Practical: Physics	2	-	-	-	-
		23UMA33AO01B	Allied Optional - 1: Accounts - 1	(6)	(4)	100	100	100
	4	23UHE34VE03A	Value Education - 3: Social Ethics - 1*	2	1	50	50	50
23UHE34VE03B		Value Education - 3: Religious Doctrine - 1*						
	-	Extra Credit Courses (MOOC/Certificate Courses) - 2		(3)				
Total				30	21/20(3)			

4	1	23UTA41GL04B	General Tamil - 4: அறிவியல் தமிழ் (Scientific Tamil)	4	3	100	100	100
		23UFR41GL04	French - 4					
		23UHI41GL04	Hindi - 4					
		23USA41GL04	Sanskrit - 4					
	2	23UEN42GE04	General English - 4	5	3	100	100	100
		3	23UMA43CC07	Core Course - 7: Modern Algebra	7	6	100	100
	23UMA43CC08		Core Course - 8: Operations Research	6	4	100	100	100
	23UMA43AO02A		Allied Optional - 2: Physics - 2	4	3	100	100	100
	23UMA43OP01		Allied Optional Practical: Physics	2	2	100	100	100
	23UMA43AO02B		Allied Optional - 2: Accounts - 2	(6)	(4)	100	100	100
4	23UHE44VE04A	Value Education - 4: Social Ethics - 2*	2	1	50	50	50	
	23UHE44VE04B	Value Education - 4: Religious Doctrine - 2*						
		-	Extra Credit Courses (MOOC/Certificate Courses) - 3	-	(3)			
Total				30	21/22(3)			
5	3	23UMA53CC09	Core Course - 9: Real Analysis	7	5	100	100	100
		23UMA53CC10	Core Course - 10: Mechanics	7	5	100	100	100
		23UMA53ES01A	Discipline Specific Elective - 1: Automata Theory	5	3	100	100	100
		23UMA53ES01B	Discipline Specific Elective - 1: Number Theory					
		23UMA53ES02A	Discipline Specific Elective - 2: Graph Theory	5	3	100	100	100
		23UMA53ES02B	Discipline Specific Elective - 2: Mathematical Modeling					
		23UMA53IS01	Internship	-	1	100	-	100
	23UMA53SP01	Self-paced Learning: History of Mathematics*	-	2	50	50	50	
	4	-	Generic Elective - 1: Refer ANNEXURE 2	4	2	100	100	100
		23USS54SE01	Skill Enhancement Course - 2: Soft Skills	2	1	100	-	100
		-	Extra Credit Courses (MOOC/Certificate Courses)- 4	-	(3)			
Total				30	22(3)			
6	3	23UMA63CC11	Core Course - 11: Linear Algebra	6	5	100	100	100
		23UMA63CC12	Core Course - 12: Complex Analysis	6	4	100	100	100
		23UMA63CP01	Core Practical: C Language	2	1	100	100	100
		23UMA63ES03A	Discipline Specific Elective - 3: Computer Oriented Numerical Methods	5	3	100	100	100
		23UMA63ES03B	Discipline Specific Elective - 3: Optimization Techniques					
		23UMA63ES04A	Discipline Specific Elective - 4: Astronomy	5	3	100	100	100
		23UMA63ES04B	Discipline Specific Elective - 4: Fuzzy Theory					
		23UMA63PW01	Project Work and Viva Voce	-	2	100	100	100
	23UMA63CE01	Comprehensive Examination*	-	2	50	50	50	
	4	-	Generic Elective - 2: Refer ANNEXURE 3	4	2	100	100	100
-		Skill Enhancement Course - 3 (WS): Refer ANNEXURE 4	2	1	100	-	100	
		-	Extra Credit Courses (MOOC/Certificate Courses) - 5					
Total				30	23(3)			
2 - 6	5	23UCW65OR01	Outreach Programme (SHEPHERD)	-	4			
1 - 6	Total (3 years)			180	133(15)			

@ - year end practical

*- for grade calculation 50 marks are converted into 100 in the mark statements

Passed by	Board of Studies held on 18.12.2023
Approved by	48th Academic Council Meeting held on 27.03.2024

ANNEXURE 1**Skill Enhancement Course - 1: (Non-Major Elective)***

Department	Course Code	Title of the Course
Botany	23UBO14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Organic Farming
Computer Science	23UCS14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Office Automation
BCA	23UBC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Fundamentals of Information Technology
Statistics	23UST14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Basics of Statistics
Vis Com	23UVC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Digital Storytelling and Scriptwriting
English	23UEN14SE01	Skill Enhancement Course - 1: (Non-Major Elective): English for Communication
History	23UHS14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Introduction to Tourism
Tamil	23UTA14SE01	Skill Enhancement Course - 1: (Non-Major Elective): பேச்சுக்கலைத் திறன் (Oratory Skills)
BBA	23UBU14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Practical Advertising
	23UBU14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Digital Marketing
B. Com	23UCO14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Introduction to Accounting
	23UCO14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Consumer Protection and Rights
B. Com CA	23UCC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Entrepreneurship Skills
Economics	23UEC14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Demography
Chemistry	23UCH14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Role of Chemistry in Daily Life
Electronics	23UEL14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Consumer Electronics
Physics	23UPH14SE01A	Skill Enhancement Course - 1: (Non-Major Elective): Physics for Everyday Life
	23UPH14SE01B	Skill Enhancement Course - 1: (Non-Major Elective): Home Electrical Installation

*Offered to students from other Departments

ANNEXURE 2
Generic Elective - 1*

Department	Course Code	Title of the Course
Botany	23UBO54EG01	Generic Elective - 1: Landscape designing
Computer Science	23UCS54EG01	Generic Elective - 1: Ethical Hacking
BCA	23UBC54EG01	Generic Elective - 1: Fundamentals of Data Science
Statistics	23UST54EG01	Generic Elective - 1: Actuarial Statistics
Vis Com	23UVC54EG01	Generic Elective - 1: Media Education
English	23UEN54EG01	Generic Elective - 1: Film Studies
History	23UHS54EG01	Generic Elective-1: Tamil Heritage and Culture
Tamil	23UTA54EG01	Generic Elective - 1: தமிழிலக்கியத்தில் மனித உரிமைகள் (Human rights in Tamil literature)
BBA	23UBU54EG01A	Generic Elective - 1: Global Supply Chain Management
	23UBU54EG01B	Generic Elective - 1: Starts-ups and small Business Management
B.Com.	23UCO54EG01A	Generic Elective - 1: Computerised Accounting
	23UCO54EG01B	Generic Elective - 1: Basics of Excel
	23UCO54EG01C	Generic Elective - 1: Personal Investment Planning
B. Com CA	23UCC54EG01	Generic Elective - 1: E-commerce and E Business Management
Economics	23UEC54EG01	Generic Elective - 1: Principles of Economics
Chemistry	23UCH54EG01	Generic Elective - 1: Health Science
Electronics	23UEL54EG01A	Generic Elective - 1: Everyday Electronics
	23UEL54EG01B	Generic Elective - 1: Wireless Communication
Physics	23UPH54EG01A	Generic Elective-1: Everyday Physics
	23UPH54EG01B	Generic Elective-1: Renewable Energy Physics

*Offered to students from other Departments

ANNEXURE 3
Generic Elective - 2*

Department	Course Code	Title of the Course
Botany	23UBO64EG02	Generic Elective - 2: Solid Waste Management
Computer Science	23UCS64EG02	Generic Elective - 2: 3D Printing and Design
BCA	23UBC64EG02	Generic Elective - 2: Industry 4.0
Statistics	23UST64EG02	Generic Elective - 2: Applied Statistics
Vis Com	23UVC64EG02	Generic Elective - 2: Digital Media Production
English	23UEN64EG02	Generic Elective - 2: English for the Media
History	23UHS64EG02	Generic Elective - 2: Intellectual Revivalism in Tamil Nadu
Tamil	23UTA64EG02	Generic Elective - 2: தமிழர் மருத்துவம். (Tamil Medicine)
BBA	23UBU64EG02A	Generic Elective - 2: Personality Development
	23UBU64EG02B	Generic Elective - 2: NGO Management
B. Com	23UCO64EG02A	Generic Elective - 2: Rural Marketing
	23UCO64EG02B	Generic Elective - 2: Entrepreneurship Development
	23UCO64EG02C	Generic Elective - 2: Digital Marketing
B. Com CA	23UCC64EG02	Generic Elective - 2: Total Quality Management
Economics	23UEC64EG02	Generic Elective - 2: Economics for Competitive Exams
Chemistry	23UCH64EG02	Generic Elective - 2: Solid Waste Management
Electronics	23UEL64EG02A	Generic Elective - 2: CCTV and Smart Security Systems
	23UEL64EG02B	Generic Elective - 2: Entrepreneurial Electronics
Physics	23UPH64EG02A	Generic Elective - 2: Laser Technology and its applications
	23UPH64EG02B	Generic Elective - 2: Physics of Earth

*Offered to students from other Departments

ANNEXURE 4

Skill Enhancement Course - 3 (WS)*

School	Course Code	Title of the Course
SCS	23UCS64SE02	Skill Enhancement Course - 3 (WS): E-Services and Applications
	23UBC64SE02A	Skill Enhancement Course - 3(WS): Web Design
	23UBC64SE02B	Skill Enhancement Course - 3(WS): 3DAnimation
	23UST64SE02	Skill Enhancement Course - 3 (WS): Official Statistics
	23UVC64SE02	Skill Enhancement Course - 3 (WS): Event Management

*Offered to students from other Departments within School

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UTA11GL01A	General Tamil - 1	5	3

கற்றலின் நோக்கங்கள்
தமிழ்ச் செவ்வியல் இலக்கியங்களையும் காப்பியங்களையும் மாணவர்கள் அறிந்துகொள்ளல்
தமிழர் பேணி வளர்த்த அறம்சார் விழுமியங்களை மாணவர்கள் தம் வாழ்வில் பின்பற்றுதல்
தமிழில் பக்திஇயக்கப் பங்களிப்பையும் பகுத்தறிவுச் சிந்தனை மரபையும் உணர்தல்
மாணவர்கள் தம் எழுத்தாற்றலையும் மொழிப்புலமையையும் வளர்த்தெடுத்தல்
போட்டித்தேர்வுகளை எதிர்கொள்ளும் வகையில் இலக்கணம், இலக்கியம் கற்றல்

அலகு - 1 தமிழ் இலக்கிய, இலக்கண வரலாறு அறிமுகம். (10 மணி நேரம்)

1. இலக்கணம் :

அ.தொல்காப்பியம், இறையனார் களவியல் உரை , நம்பியகப் பொருள், புறப்பொருள் வெண்பா மாலை, நன்னூல், தண்டியலங்காரம், யாப்பருங்கலக்காரிகை- நூல்கள்

ஆ.மொழிப் பயிற்சி- ஒற்றுப்பிழை தவிர்த்தல்

- வல்லினம் மிகும் இடங்கள்
- வல்லினம் மிகா இடங்கள்
- ஈரொற்று வரும் இடங்கள்
- ஒரு, ஓர் வரும் இடங்கள்
- அது, அஃது வரும் இடங்கள்
- தான், தாம் வரும் இடங்கள்

பயிற்சி : வல்லினம் மிகும் இடங்கள், மிகா இடங்கள் தவறாக வரும்வகையில் ஒரு பத்தி கொடுத்து ஒற்றுப் பிழை திருத்தி எழுதச் செய்தல்.

2. சங்க இலக்கியம் - எட்டுத்தொகை, பத்துப்பாட்டு

3. அற இலக்கியம்-பதினெண்கீழ்க்கணக்கு நூல்கள்

4. காப்பிய இலக்கியம் - ஐம்பெருங் காப்பியங்கள், ஐஞ்சிறு காப்பியங்கள், சமயக் காப்பியங்கள்

5. பக்தி இலக்கியமும் (பன்னிரு திருமுறைகள், நாலாயிர திவ்வியப் பிரபந்தம் -- பகுத்தறிவு இலக்கியமும் (சித்தர் இலக்கியங்கள், புலவர் குழந்தையின் இராவண காவியம்)

அலகு - 2 சங்க இலக்கியம்

(15 மணி நேரம்)

எட்டுத்தொகை :

6. நற்றிணை-முதல் பாடல் -நின்ற சொல்லர்

7. குறுந்தொகை 3 ஆம் பாடல் -நிலத்தினும் பெரிதே

8. ஐங்குறுநூறு -நெல் பல பொலிக! பொன் பெரிது சிறக்க!" (முதல் பாடல்)-வேட்கைப் பத்து

9. கலித்தொகை- 51 - சுடர்த்தொடிக் கேளாய் -குறிஞ்சிக் கலி

10. புறநானூறு -189 தெண்கடல் வளாகம் பொதுமையின்றி, நாடா கொன்றோ -187

பத்துப்பாட்டு:

முல்லைப்பாட்டு (முழுவதும்)

அலகு - 3 அற இலக்கியம்

(10 மணி நேரம்)

12. திருக்குறள் -அறன் வலியுறுத்தல் அதிகாரம்

13. நாலடியார்-பாடல்: 131 (குஞ்சியழகும்)

14. நான்மணிக்கடிகை-நிலத்துக்கு அணியென்ப

15. பழமொழி நானூறு- தம் நடை நோக்கார்

16. இனியவை நாற்பது- 37. இளமையை மூப்பு என்று

அலகு - 4 காப்பிய இலக்கியம்

(20 மணி நேரம்)

17. சிலப்பதிகாரம் - வழக்குரைகாதை

18. மணிமேகலை- பாத்திரம் பெற்ற காதை
19. பெரியபுராணம் - பூசலார் நாயனார்புராணம்
20. கம்பராமாயணம்- குகப் படலம்
21. சீறாப்புராணம் – மானுக்குப் பிணை நின்ற படலம்
22. இயேசு காவியம் -ஊதாரிப்பிள்ளை

அலகு - 5 பக்தி இலக்கியமும், பகுத்தறிவு இலக்கியமும்

(15 மணி நேரம்)

23. பக்தி இலக்கியம்:

- திருநாவுக்கரசர் தேவாரம் - நாமார்க்கும் குடியல்லேம் எனத் தொடங்கும் பாடல் மட்டும்
- மாணிக்கவாசகர் கிருவாசகர் - ஈழச்சிவாய வாழ்க நாதன்தான் வாழ்க முதல் சிரம்குவிவார் ஓங்குவிக்கும் சீரோன் கழல் வெல்க வரை
- பொய்கையாழ்வார்-வையந் தகளியா வர்கடலே
- பூதத்தாழ்வார்-அன்பே தகளியா
- பேயாழ்வார்-திருக்கண்டேன் பொன்மேனி கண்டேன்
- ஆண்டாள் – திருப்பாவை மார்கழித் திங்கள் (முதல் பாடல்)

24. பகுத்தறிவு இலக்கியம் :

- திருமூலர் – திருமந்திரம் (270,271, 274, 275 285)
- பட்டினத்தார் -திருவிடை மருதூர் (காடே திரிந்து – எனத் தொடங்கும் பாடல்
- பா.எண்.279, 280)
- கடுவெளி சித்தர் - பாபஞ்செய் யாதிரு மனமே (பாடல் முழுவதும்)
- இராவண காவியம் – தாய்மொழிப் படலம் - 18. (ஏடுகை யில்லா ரில்லை முதல் - 22. செந்தமிழ் வளர்த்தார் வரை)

கற்பித்தல் முறை	விரிவுரை (Lecture), காணொளிக் காட்சி (Videos), விளக்கக் காட்சி (PPT presentation)
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பாடநூல்

1. பொதுத்தமிழ்-1 (தமிழ் இலக்கிய வரலாறு-1), தமிழாழ்வுத்துறை, தூய வளனார் தன்னாட்சிக் கல்லூரி, திருச்சிராப்பள்ளி - 620 002, முதற்பதிப்பு - 2023
2. பார்வை நூல்கள்
3. வரதராசன்.மு., தமிழ் இலக்கிய வரலாறு, சாகித்ய அக்காதெமி, புதுடெல்லி. 2021
4. விமலானந்தன். மது. ச., தமிழ் இலக்கிய வரலாறு, முல்லை நிலையம், சென்னை, 2019
5. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, பாரி நிலையம், சென்னை, 2022
6. சிற்பி பாலசுப்பிரமணியன் & சேதுபதி.சொ., தமிழ் இலக்கிய வரலாறு, கவிதா வெளியீடு, சென்னை, 2015
7. சிற்பி பாலசுப்பிரமணியன், & பத்மநாபன். நீல., புதிய தமிழ் இலக்கிய வரலாறு (3 தொகுதிகள்), சாகித்ய அக்காதெமி, புதுடெல்லி,2013
8. பெருமாள். அ.கா., தமிழ் இலக்கிய வரலாறு, சுதர்சன் புகல், நாகர்கோவில், 2014
9. ஏசுதாசன். ப.ச., தமிழ் இலக்கிய வரலாறு, நியூ செஞ்சுரி புக ஹவுஸ், சென்னை, 2015
10. ஸ்ரீகுமார். எஸ்., தமிழ் இலக்கிய வரலாறு, ஸ்ரீசெண்பகா பதிப்பகம், சென்னை, 2014
11. பாக்கியமேரி எஃப்., வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, பூவேந்தன் பதிப்பகம், சென்னை,2022
12. சுப்புரெட்டியார்.ந., தமிழ் பயிற்றும் முறை, மணிவாசகர் நூலகம், சிதம்பரம், 1980

Websites and eLearning Sources

1. <https://www.chennaiibrary.com/>
2. <https://www.sirukathaigal.com>
3. <https://www.tamilvirtualuniversity.org>
4. <https://www.noolulagam.com>
5. <https://www.katuraitamilblogspot.com>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	இப்பாடத்தின் நிறைவில் மாணவர்கள்	
CO1	சங்க இலக்கியங்கள்வழி பண்டைத்தமிழரின் வாழ்வியலையும் பண்பாட்டையும் அறிந்து கொள்வர்	K1
CO2	அற இலக்கியங்கள், காப்பியங்கள் வெளிப்படுத்தும் அறம்சார் விழுமியங்களைத் தம் வாழ்வில் பின்பற்றுவர்	K2
CO3	இலக்கணக் கோட்பாடுகளை இக்கால வாழ்வியலோடு பொருத்திப் பார்ப்பர்	K3
CO4	மொழியறிவோடு பெறுவர் திறன் பகுத்தாராயும் இலக்கியங்களைப்	K4
CO5	பக்தி இயக்கங்களின் செல்வாக்கையும், தமிழரின் பகுத்தறிவு மரபையும் மதிப்பிடுவர்	K5

Relationship Matrix												
Semester	Course Code		Title of the Course								Hours	Credits
1	23UTA11GL01A		General Tamil - 1								5	3
Course Outcomes	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO2	PSO3	PSO4	PSO5		
CO1	1	2	3	2	2	3	3	2	2	2	2.2	
CO2	2	2	3	2	2	2	3	2	3	2	2.3	
CO3	1	2	2	3	2	2	2	3	3	3	2.3	
CO4	2	2	3	2	2	3	2	3	3	2	2.4	
CO5	3	1	2	2	2	2	3	2	3	3	2.3	
Mean Overall Score											2.3 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UFR11GL01	French - 1	5	3

Course Objectives
Identify the basic French sentence structure
Define and describe the various grammatical tenses and use them to communicate in French
Examine the various documents presented and discuss and reply to the questions asked on it
Analyze and interpret expressions used to convey the cause, the effect, the purpose, and the opposition in French
Evaluate the grammatical nature present in passages

UNIT I (15 Hours)

- Salut ! Enchanté

UNIT II (15 Hours)

- J'adore

UNIT III (15 Hours)

- Tu veux bien ?

UNIT IV (15 Hours)

- On se voit quand ?

UNIT V (15 Hours)

- Bonne idée

Teaching Methodology	Videos, Audios, PPT presentation, Role-play, Quiz
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Book for Study

1. Mérieux, R. & Loiseau, Y. (2017). *Latitudes -1- (A1 /A2)*, méthode de français, Didier. (Units 1 - 6 only)

Books for Reference

1. P.Dauda,L.Giachino and C.Baracco, *Generation AI*, Didier, Paris 2020.
2. J.Girardet and J.Pecheur, *Echo AI*, CLE International, 2^eedition ,2017
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

Websites and eLearning Sources

1. <https://www.wikihow.com/Pronounce-the-Letters-of-the-French-Alphabet>
2. <https://français.lingolia.com/en/grammar/tenses/le-present>
3. <https://www.lawlessfrench.com/grammar/articles/>
4. <https://www.frenchpod101.com/french-vocabulary-lists/10-lines-you-need-for-introducing-yourself>
5. <https://www.tolearnfrench.com/exercices/exercice-french-2/exercice-french-3295.php>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	recall and remember the usage of grammatical tenses in constructing sentences in a dialogue.	K1
CO2	apply the learnt grammar rules in practice exercises to improve their understanding	K2
CO3	explain the nuances in the usage of various grammatical tenses and their aspects	K3
CO4	demonstrate knowledge of various expressions used to express opinions, emotions, cause, effect, purpose, and hypothesis in French	K4
CO5	communicate in French and summarize a given text	K5

Relationship Matrix												
Semester	Course Code	Title of the Course					Hours	Credits				
1	23UFR11GL01	French - 1					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	3	1	3	1	3	3	2	3	2	2.4	
CO2	2	3	3	2	1	3	3	3	3	2	2.5	
CO3	1	3	2	1	2	2	2	2	3	2	2.0	
CO4	3	3	3	3	3	3	3	2	3	2	2.8	
CO5	3	3	3	3	2	3	3	3	3	2	2.8	
Mean Overall Score											2.5 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UHI11GL01	Hindi - 1	5	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 Hindu Literature
To empower the students with globally employable soft skills

UNIT I: Buniyadi Hindi (15 Hours)

- Swar
- Vyanjan
- Barah Khadi
- Shabd aur
- Vakya Rachna

UNIT II: Hindi Shabdavali (15 Hours)

- Rishto ke Naam
- Gharelu padartho ke Naam

UNIT III: Vyakaran (15 Hours)

- Sadharan Vakya aur Sangya
- Sarvanam
- Visheshan
- Kriya aadi shabdo ka prayog

UNIT IV: Chote Gadyansh ka pattan (15 Hours)

- Bacho ki Kahaniya
- Patra-Patrikao mein prakashit Gadyansho ka Pathan

UNIT V: Nibandh (15 Hours)

- Sant Tiruvalluvar
- E.V.R Thandai Periyar
- Naari Sashaktikaran
- Paryavaran Sanrakshan
- Vibhinna pratiyogi parikshao ke bare mein jaankari dena
- Pratiyogi priksa par adharit nibandho dwara bhasha ki kshamta badhane vale prashikshan kary.

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Project Work.
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Books for Study

1. Gupth, M.K. (2020). *Hindi Vyakaran*, Anand Prakashan, Kolkatta.
2. Tripaty, V. (2018). *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd, New Delhi.
3. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*, Kailash Pustak Sadan, Madhya Pradesh.

Books for Reference

1. Abdul Kalam, A. P.J. (2020). *Mere sapnom ka Bharath*, Prabath Prakashan, Noida.
2. Singh, L.P. (2017). *Kavya ke sopan*, Bharathy Bhavan Prakashan.
3. Kumar, A. (2019). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.

4. (2018). *Adhunik Hindi Vyakaran our Rachana*, Bharati Bhavan Publishers & distributors.
5. Shukla, A.R. (2022). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.

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 - Level)
	On successful completion of the course, the student will be able to	
CO1	Introduction to Hindi sounds	K1
CO2	Acquisition of Hindi Vocabulary	K2
CO3	Sentence formation in Hindi	K3
CO4	Reading of stories and other passages	K4
CO5	Modules to increase language ability through general essays based on competitive exams	K5

Relationship Matrix											
Semester	Course Code		Title of the Course					Hours	Credits		
1	23UHI11GL01		Hindi - 1					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	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	23USA11GL01	Sanskrit - 1	5	3

Course Objectives
To help the students learn the alphabets of Sanskrit.
To understand the Sanskrit grammar and sabdas.
To have an idea of the epics.
To closely understand the literary works in Sanskrit with special reference to Pancamahakavyas.
To understand the Raghuvasa Mahakava and Kalidasa.

UNIT I (15 Hours)

Introduction to Sanskrit (Alphabets, Two letter words and three letter words)

Grammar:

akārāntahpumlīṅgaḥśabda-s - 1. बाल (Bāla) and 2. देवे (Deva) *ākārāntahstrīlīṅgaḥśabda-s* - 1. बाला (Bālā) and 2. लता (Latā) *akārāntahnapuṃsakalīṅgaḥśabda-s* -

1. फल (Phala) and 2. वन (Vana)

UNIT II (15 Hours)

Introduction to *Rāmāyana, Kālidāsa* and his poetic works

Text: *Raghuvamśa* (Canto I) Verses 1-15

UNIT III (15 Hours)

Introduction to the works of *Bhāravi* -

Text: *Raghuvamśa* (canto I) Verses 16-30

UNIT IV (15 Hours)

Introduction to the works of *ŚrīHarṣa* -

Text: *Raghuvamśa* (Canto I) Verses 31-45

UNIT V (15 Hours)

Grammar:

Conjugations -*Laṭlakāra-s* – (Present tense)

(i) गच्छत (Gacchati) (ii) ततष्ठत (Tiṣṭhati) (iii) पठत (Paṭhati)

(iv) नृत्यत (Nrtyati) (v) कुप्यत (Kupyati) (vi) कथयत (Kathayati)

(vii) गणयत (Gaṇayati) (viii) अतत (Asti)

(ix) करोत (Karoti) (x) शृणोत (Śṛṇoti)

Indeclinables (Avyayaani) - अतप (api), कदा (kadā), च (ca), अद्य (adya), तवना (vinā), सह (saha), तत्र (tatra), क्वम् (kim), यद् (yadi) - तर्ह (tarhi), यथा (yathā) - तथा (tathā) Prefixes (Upasargas) - आङ् (āñ), तव (vi), परर (pari), अनु (anu),

अति (adhi), उत् (ut), प्रत (prati), उप (upa), प्र (pra) तनर् (nir)

Teaching Methodology	Videos, PPT, demonstration.
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Book for Study

1. Murugan, C., et al. (eds.). (2022). *Kalasala Samskṛta Sukha Bodhini I* (for under graduate foundation course) Published by University of Madras.

Book for Reference

1. Vadhyar, R.S. (2017). *Shabdha manjari*, R.S. Vadyar & Sons, Palakkad.

Websites and e-Learning Sources

1. <https://www.arlingtoncenter.org/Sanskrit%20Alphabet.pdf>

2. <https://courses.lumenlearning.com/suny-hccc-worldcivilization/chapter/sanskrit/>
3. https://www.newworldencyclopedia.org/entry/Sanskrit_literature
4. <https://archive.org/details/AShortHistoryOfsanskritLiterature>
5. https://archive.org/details/raghuvamsha_with_sanjivini_edited_by_mr_kale

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
CO1	remember the usage of grammatical tenses in constructing sentences in dialogue.	K1
CO2	apply the rules of usage in practice exercises and identify errors	K2
CO3	explain the nuances in the usage of various grammatical tenses and aspects	K3
CO4	demonstrate knowledge of various expressions of opinion, emotions, cause, effect, purpose, and hypothesis in French	K4
CO5	communicate in French and summarize the given text	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
1	23USA11GL01	Sanskrit - 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	1	3	2	3	1	3	2	3	2	2	2.1	
CO2	2	3	2	3	1	2	2	3	2	3	2.5	
CO3	3	2	2	2	2	2	3	2	3	2	2.1	
CO4	3	2	3	2	2	3	3	2	3	2	2.4	
CO5	3	2	3	3	2	2	3	2	3	3	2.3	
Mean Overall Score											2.34 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN12GE01	General English - 1	5	3

Course Objectives

To enable learners to acquire self awareness and positive thinking required in various life situations

To help them acquire the attribute of empathy

To assist them in acquiring creative and critical thinking abilities

To enable them to learn the basic grammar

To assist them in developing LSRW skills

UNIT I: Self-awareness ELF-A (WHO) & Positive Thinking (UNICEF) (15 Hours)

Life Story

- Chapter 1 from Malala Yousafzai, I am Malala
- An Autobiography or The Story of My Experiments with Truth (Chapters 1, 2 & 3) M.K. Gandhi

Poem

- Where the Mind is Without Fear – Gitanjali 35 – Rabindranath Tagore
- Love Cycle – Chinua Achebe

UNIT II: Empathy (15 Hours)

Poem

- Nine Gold Medals – David Roth
- Alice Fell or poverty – William Wordsworth

Short Story

- The School for Sympathy – E.V. Lucas
- Barn Burning – William Faulkner

UNIT III: Parts of Speech (15 Hours)

- Articles
- Noun
- Pronoun
- Verb
- Adverb
- Adjective
- Preposition

UNIT IV: Critical & Creative Thinking. (15 Hours)

Poem

- The Things That Haven't Been Done Before – Edgar Guest
- Stopping by the Woods on a Snowy Evening – Robert Frost

Readers Theatre

- The Magic Brocade – A Tale of China
- Stories on Stage – Aaron Shepard (Three Sideway Stories from Wayside School" by Louis Sachar)

Unit V: Paragraph and Essay Writing (15 Hours)

- Descriptive
- Expository
- Persuasive
- Narrative
- Reading Comprehension

Teaching Methodology	Interactive methods, and multimedia presentations
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Books for Study

1. Yousafzai, M. (2013). *I am Malala*, Little. Brown and Company.
2. Gandhi, M. K. (2011). *An Autobiography or The Story of My Experiments with Truth (Chapter - I)*. Rupa Publications.
3. Tagore, R. (1913). "*Gitanjali 35*" from *Gitanjali (Song Offerings): A Collection of Prose Translations Made by the Author from the Original Bengali*. MacMillan.
4. Shepard, A. (2017). *Stories on Stage*. Shepard Publications.

Books for Reference

1. Krishnasamy. N. (1975). *Modern English: A Book of Grammar, Usage and Composition*. Macmillan.
2. Nesfield, J. C. (2019). *English Grammar Composition and Usage*. Macmillan.

Websites and eLearning Sources

1. <https://archive.org/details/i-am-malala>
2. <https://www.indiastudychannel.com/resources/146521-Book-Review-An-Autobiography-or-The-story-of-my-experiments-with-Truth.aspx>
3. <https://www.poetryfoundation.org/poems/45668/gitanjali-35>
4. <https://amzn.eu/d/9rVzINv>
5. <https://archive.org/details/in.ernet.dli.2015.44179>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	discover self awareness and positive thinking required in various life situations	K1
CO2	classify the attributes of empathy	K2
CO3	apply creative and critical thinking skills	K3
CO4	focus on grammar for functional purposes	K4
CO5	integrate the LSRW skills for effective communication	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
1	23UEN12GE01	General English - 1									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	3	3	3	3	3	3	3	3	3	3	
CO2	2	3	3	3	2	3	3	3	3	3	2.5	
CO3	3	3	3	2	3	3	3	3	3	2	2.8	
CO4	3	3	3	3	3	3	3	3	3	3	3	
CO5	3	2	3	3	3	3	3	3	3	3	2.8	
Mean Overall Score											2.82 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UMA13CC01	Core Course - 1: Algebra and Trigonometry	5	4

Course Objectives
Basic knowledge to solve polynomial equations of higher degree
Skill to determine the summation for the Binomial, Exponential and Logarithms series
Understanding the concepts of eigen values and eigen vectors, Cayley Hamilton theorem and its applications
Knowledge about the expansions of trigonometry functions, solve theoretical and applied problems
Basic ideas on the theory of equations, matrices, number theory and regular hyperbolic functions

UNIT I (15 Hours)
 Reciprocal Equations - Standard form - Increasing or decreasing the roots of a given equation -
 Removal of terms - Approximate solutions of roots of polynomials by Horner's method - Related
 Problems.

UNIT II (15 Hours)
 Summation of Series: Binomial - Exponential - Logarithmic series (Theorems without proof) - Related
 Problems

UNIT III (15 Hours)
 Characteristic equation - Eigen values and Eigen Vectors-Similar matrices - Cayley - Hamilton Theorem
 (Statement only) - Finding powers of square matrix - Inverse of a square matrix up to order 3 -
 Diagonalization of square matrices - Related Problems.

UNIT IV (15 Hours)
 Expansions of $\sin n\theta$, $\cos n\theta$ in powers of $\sin\theta$, $\cos\theta$ - Expansion of $\tan n\theta$ in terms of $\tan\theta$ -
 Expansions of $\cos^n\theta$, $\sin^n\theta$, $\cos^m\theta$, $\sin^m\theta$ - Expansions of $\tan(\theta_1 + \theta_2 + \dots + \theta_n)$ - Expansions
 of $\sin\theta$, $\cos\theta$ and $\tan\theta$ in terms of θ - Related Problems.

UNIT V (15 Hours)
 Hyperbolic functions - Relation between circular and hyperbolic functions - Formulas in hyperbolic
 functions, Inverse hyperbolic functions - Logarithm of complex quantities, Summation of trigonometric
 series - Related Problems.

Teaching Methodology	Demonstration, Problem solving, group discussion
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Books for Study

- Pillay, T.K.M., Natarajan, T., & Ganapathy, K.S. (2007). *Algebra, Volume I*. Viswanathan Publication.
Unit - I Chapter 6 (Sec 16, 16.1, 17, 19, 30)
Unit - II Chapter 3 (Sec 10) and Chapter 4 (3 to 7)
- Pillay, T.K.M., Natarajan, T., & Ganapathy, K.S. (2008). *Algebra, Volume II*. Viswanathan Publication.
Unit - III Chapter 2 (Sec 16, 16.1 to 16.4)
- Duraipandian, P., & Pachaiyappa, P. *Trigonometry*. Muhil Publishers.
Unit - IV Chapter 2 (Sec 2.1, 2.1.1, 2.1.2) and Chapter 3 (Sec 3.1, 3.1.1, 3.2.1, 3.4, 3.4.1, 3.4.3)
Unit - V Chapter 4 (Sec 4.1 to 4.7), Chapter 5 (Sec 5.1 to 5.3) and Chapter 6 (Sec 6.1 to 6.6)

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, Indian Reprint,
3. Thomas, G.B., & Finney, R.L. (2005). *Calculus*, (9th Ed.). Pearson Education, Delhi.
4. Durell, C.V., & Robson, A. (2003). *Advanced Trigonometry*, Courier Corporation.
5. Stewart, J., Redlin, L., & Watson, S. (2012). *Algebra and Trigonometry*, Cengage Learning,

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	Classify and solve reciprocal equations	K1
CO2	Find the sum of binomial, exponential and logarithmic series	K2
CO3	Find Eigen values, eigen vectors, verify Cayley - Hamilton theorem and diagonalize a given matrix	K3
CO4	Expand the powers and multiples of trigonometric functions in terms of sine and cosine	K4
CO5	Determine relationship between circular and hyperbolic functions and the summation of trigonometric series	K5

Relationship Matrix												
Semester	Course Code		Title of the Course								Hours	Credits
1	23UMA13CC01		Core Course - 1: Algebra and Trigonometry								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	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	23UMA13CC02	Core Course -2: Differential Calculus	5	3

Course Objectives
Using basic skills of differentiation for successive differentiation, and their applications
Successive partial differentiation and total differentiation
Applying partial derivatives to find maxima and minima
Finding the envelope of family of curves
Basic knowledge on the notions of curvature, evolutes, involutes and polar co-ordinates and in solving related problems.

UNIT I: Successive Differentiation: (15 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).

(Chapter III Sections 1.1 - 1.6 and Section 2.1)

UNIT II: Partial Differentiation: (15 Hours)

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

(Chapter 8 Sections 1.1 - 1.5)

UNIT III: Partial Differentiation (Continued): (15 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.

(Chapter 8: Sections 1.6, 1.7, Sections: 4 and 5)

UNIT IV: Envelope: (15 Hours)

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

(Chapter: 10 Sections: 1.1 - 1.4)

UNIT V: Curvature: (15 Hours)

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

(Chapter: 10 Sections: 2.1-2.7)

Teaching Methodology	Demonstration, Problem solving, group discussion
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Book for Study

1. Narayanan, S., & Pillay, T.K.M. (2015). *Calculus Volume I*. Viswanathan Publishers Pvt. Ltd.

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*.

Course Outcomes		
CO No.	CO-Statements	Cognitive Level (K - Level)
CO1	Acquire basic knowledge successive differentiation, partial and total differentiation, envelope and curvature.	K1
CO2	Understand the concepts successive differentiation, involutes evolutes and curvatures.	K2
CO3	Apply Leibnitz formula for nth derivative partial differentiation for maxima and minima, involutes ,evolutes and curvature.	K3
CO4	Analyze various method studied	K4
CO5	Evaluate nth derivatives, maxima minima, envelopes and curvature.	K5

Relationship Matrix											
Semester	Course Code	Title of the Course								Hours	Credits
1	23UMA13CC02	Core Course - 2: Differential Calculus								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	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
1	23UMA13AC01	Allied Course - 1: Statistical Methods - 1	4	3

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 (12 Hours)

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

UNIT II (12 Hours)

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

UNIT III (12 Hours)

Moment generating function - Properties of cumulants - Chebychev's inequality - Binomial distribution.

UNIT IV (12 Hours)

Poisson distribution: Properties, Moments of Poisson distribution - Geometric distribution: Moment generating function of Geometric distribution.

UNIT V (12 Hours)

Normal distribution: Moment generating function of Normal distribution, Mean deviation about mean - Gamma distribution - Exponential distribution.

Teaching Methodology	Demonstration, Problem solving, group discussion
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Books for Study

- Gupta, S.C., & Kapoor, V.K. (2003). *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, Chapter 8: Sec 8.4(Omit 8.4.3, 8.4.10-8.4.12)

Unit IV: 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

- Vittal, P.R. (2004). *Mathematical Statistics*. Margham Publications.
- Kapur, J.N & Saxena, H.C. (2010). *Mathematical Statistics*, (10th Ed.). 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	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	23UMA13AC01		Allied Course - 1: Statistical Methods - 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	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	23UMA14FC01	Foundation Course: Bridge Mathematics	2	1

Course Objectives

Explain various trigonometric ratios and find them for different angles, including sum of the angles, multiple and submultiple angles, etc. Also, they can solve the problems using the transformations.
Find the limit and derivative of a function at a point, the definite and indefinite integral of a function. Find the points of min/max of a function.
Prove the binomial theorem and apply it to find the expansions of any $(x + y)^n$ and also, solve the related problems
Find the various sequences and series and solve the problems related to them. Explain the principle of counting.
Find the number of permutations and combinations in different cases. Apply the principle of counting to solve the problems on permutations and combinations

UNIT I (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.

UNIT II (6 Hours)

Calculus: Limits, standard formulae and problems, differentiation, first principle, uv rule, u/v rule, methods of differentiation, application of derivatives, integration - product rule and substitution method.

UNIT III (6 Hours)

Algebra: Binomial theorem, General term, middle term, problems based on these concepts

UNIT IV (6 Hours)

Sequences and series (Progressions). Fundamental principle of counting. Factorial n .

UNIT V (6 Hours)

Permutations and combinations, Derivation of formulae and their connections, simple applications, combinations with repetitions, arrangements within groups, formation of groups.

Teaching Methodology	Chalk and Talk, PPT,
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Books for Study

- Unit - I** : 11th NCERT Mathematics book Chapter 3,
12th NCERT Mathematics book Chapter 2
- Unit - II** : 11th NCERT Mathematics book Chapter 12,
12th NCERT Mathematics book Chapter 7.
- Unit - III** : 11th NCERT Mathematics book Chapter 7
- Unit - IV** : 11th NCERT Mathematics book Chapter 8 .
- Unit - V** : 11th NCERT Mathematics book Chapter 6.

Books for Reference

1. Pillay, T.K.M., Natarajan, T., & Ganapathy, K.S. (2013) *Algebra Vol.- I*.
2. Narayanan, S., & Pillay, T.K.M. (2013). *Calculus Vol.- I*.
3. Narayanan, S., & Pillay, T.K.M. (2013). *Trigonometry*.

Website and eLearning Source

1. <https://ncert.nic.in/textbook.php>

2. <https://textbookcorp.tn.gov.in/textbook1.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 basics of mathematics like trigonometry, differential calculus, series, binomial theorem, permutations and combinations	K1
CO2	understand the process of finding the sum of the series, derivatives of functions and trigonometric expansions	K2
CO3	apply the binomial theorem, trigonometric expressions, derivatives of functions, permutations and combinations in working out problems.	K3

Relationship Matrix											
Semester	Course Code		Title of the Course							Hours	Credits
1	23UMA14FC01		Foundation Course: Bridge Mathematics							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	2	2	2	2	2	2	3	1	2	2.1
CO2	2	2	2	2	2	3	2	2	3	3	2.3
CO3	1	2	3	2	2	2	2	3	3	2	2.2
Mean Overall Score											2.3 (High)

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UHE14VE01	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 a holistic development
To assimilate human values comprehensively

UNIT I: Principles of 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: Development of Human Personality (6 Hours)

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

UNIT III: The Dimensions of Human Development (6 Hours)

Areas of Development: Physical, Intellectual, Emotional, Social Development, Moral & Spiritual development

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	Chalk and Talk, Power point
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Book for Study

1. Department of Human Excellence. (2021). *Essentials of Humanity*. St. Joseph's College.

Books for Reference

1. Xavier, A. (2012). *You Shall Overcome*, (6th Ed.). ICRDE Publication.
2. Alex, K. (2009). *Soft Skills*. S. Chand.
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. <http://www.apa.org/topics/personality#>. Accessed 05 March 2021.
3. <http://www.peacecorps.gov/educators/resources/global-issues-gender-equaligy-and-womens-empowerment/>. Accessed 05 March 2021.

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 their 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	23UHE14VE01	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
1	23UEN14AE01	Ability Enhancement Compulsory Course - 1: Communicative English	6	3

Course Objectives

To recognize and identify the components of a formal letter.

To summarize the main points of a given letter and identify the intended meaning.

To use appropriate grammatical structures in context within their own writing.

To compare and contrast the elements of successful and unsuccessful letters.

To create well-structured letters with clear purpose and effectively evaluate and revise their own writing.

Basic Level

UNIT I

(18 Hours)

- 1) A letter to avail college hostel
- 2) A requisition letter to provide fee concession
- 3) A requisition letter to provide Bonafide certificate
- 4) A letter to avail resources in college library
- 5) An On Duty Permission Letter
- 6) Nouns
- 7) Pronouns
- 8) Adjectives
- 9) Verbs
- 10) Adverbs

UNIT II

(18 Hours)

- 11) A letter to provide conduct certificate
- 12) A letter to provide new ID card
- 13) A Permission letter for Name Correction in Mark sheet
- 14) A permission letter for Sports Events
- 15) A letter to avail permission for the Shepherd programme
- 16) Prepositions
- 17) Conjunctions
- 18) Articles
- 19) Conjugation of present form 'Be' verbs
- 20) Conjugation of past form 'Be' verbs

UNIT III

(18 Hours)

- 21) A letter to avail the College Hostel
- 22) A permission letter to join the sport team
- 23) A request letter to access college Wi-Fi
- 24) A letter to vice principal requesting to change Elective course
- 25) A permission letter for project extension
- 26) Conjugation of future form 'Be' verbs
- 27) Conjugation of present continuous 'Be' verbs
- 28) Conjugation of Past continuous 'Be' verbs
- 29) Conjugation of Future continuous 'Be' verbs
- 30) Conjugation of Present Perfect 'Be' verbs

UNIT IV

(18 Hours)

- 31) An apology letter to Dean for using mobile phone
- 32) A request letter to repair fan and tube light
- 33) A letter to invite Chief guest for Bibliophile Club meeting
- 34) A requisition Letter to issue the Transfer certificate
- 35) A permission letter for group exam coaching class
- 36) Conjugation of Past Perfect 'Be' verbs
- 37) Conjugation of Future Perfect 'Be' verbs
- 38) Conjugation of Present Perfect Continuous 'Be' verbs
- 39) Conjugation of Past Perfect Continuous 'Be' verbs
- 40) Conjugation of Future Perfect Continuous 'Be' verbs

UNIT V

(18 Hours)

- 41) A letter seeking help to find the missing laptop
- 42) A letter to the editor regarding frequent power cut
- 43) A medical leave letter
- 44) A requesting OD Letter to issue invitation to other colleges
- 45) A requisition letter to change Shift
- 46) Conjugation of present form 'Action' verbs
- 47) Conjugation of past form 'Action' verbs
- 48) Conjugation of Present form 'do' verbs
- 49) Conjugation of Past form 'do' verbs
- 50) Conjugation of Future form 'have' verbs

Teaching Methodology	Chalk and Talk, discussion, Training
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Book for Study

1. Jayapaul, V.L. (2023). *Begin to Learn English*. St. Joseph's College (Autonomous), Tiruchirappalli.

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	compose various types of letters (request, permission, and apology) demonstrating clarity, coherence, and correctness.	K1
CO2	exhibit a sound understanding of nouns, pronouns, adjectives, verbs, and adverbs, utilizing them accurately in written and spoken English.	K2
CO3	apply language skills in real-life college scenarios, gaining confidence in communicating effectively with peers, faculty, and administrative staff.	K3

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
1	23UEN14AE01	Ability Enhancement Compulsory Course - 1: Communicative English									6	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	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	
Mean Overall Score											2.37 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	Ability Enhancement Compulsory Course - 1: Communicative English	6	3

Course Objectives

To recognize and identify common punctuation marks and their usage in paragraphs.
To summarize the main topics introduced in a paragraph and demonstrate understanding.
To apply the learned concepts to construct paragraphs that convey ideas effectively.
To analyze paragraphs to identify the role of prefixes, suffixes, and noun types in enhancing meaning.
To synthesize information to create paragraphs, evaluate their own writing, and engage in role-playing scenarios to demonstrate understanding.

Intermediate Level

UNIT I (18 Hours)

- 1) Paragraph Punctuation
- 2) Introducing a Topic
- 3) Rhyming Words
- 4) Word Association
- 5) Going To
- 6) What Will Happen

UNIT II (18 Hours)

- 7) Every Drop Counts
- 8) Prefix
- 9) Suffix
- 10) Comprehending Characters
- 11) Complimenting & Thanking
- 12) Proper & Common Nouns

UNIT III (18 Hours)

- 13) Noun Substitution Table
- 14) A, Some
- 15) Visual Comprehension
- 16) Singular to Plural
- 17) Making & Responding
- 18) Pronoun Classification

UNIT IV (18 Hours)

- 19) Pronoun I, Me, He, Him, She, Her, We.
- 20) Singular to Plural
- 21) Responding
- 22) Pronoun Classification
- 23) Using Preposition of Movement
- 24) Preposition: Visual Talk

UNIT V (18 Hours)

- 25) Prepositional Phrases
- 26) Storytelling
- 27) Asking For Opinion
- 28) Using Things Creatively
- 29) Transition Sequencing
- 30) Role Play

Book for Study

- Joy, J. L. (2020). *Learning to Communicate*. St. Joseph's College (Autonomous), Tiruchirappalli.

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	demonstrate proficiency in paragraph construction, rhyming words, and the use of prefixes and suffixes.	K1
CO2	apply advanced grammar rules, including proper/common nouns and pronoun usage, in both written and spoken communication.	K2
CO3	express opinions, compliments, and gratitude effectively, showcasing an enhanced ability to articulate thoughts and emotions.	K3

Relationship Matrix												
Semester	Course Code	Title of the Course					Hours	Credits				
1	23UEN14AE01	Ability Enhancement Compulsory Course - 1: Communicative English					6	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	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	
Mean Overall Score											2.37 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	23UEN14AE01	Ability Enhancement Compulsory Course - 1: Communicative English	6	3

Course Objectives

- To recognize and demonstrate basic self-introduction strategies.
- To summarize information from listening and reading exercises, demonstrating understanding.
- To apply learned concepts to construct essays, actively contribute to group discussions, and create coherent narratives.
- To analyze reviews to understand how different elements contribute to a comprehensive evaluation.
- To synthesize information to create compelling presentations, actively participate in debates, interviews, and assess their own communication proficiency.

Advance Level

- UNIT I (18 Hours)**
- 1) Self Introduction
 - 2) Listening
 - 3) Reading
- UNIT II (18 Hours)**
- 4) Essay Writing
 - 5) Group Discussion
 - 6) Story Building, Story Writing & Story Narration
- UNIT III (18 Hours)**
- 7) Book Review
 - 8) Film Review
- UNIT IV (18 Hours)**
- 9) News Paper Reading and Analysis
 - 10) Public speaking: Drafting and Speaking
- UNIT V (18 Hours)**
- 11) Debate
 - 12) Interview Skills

Websites and eLearning Resources

1. <https://ielts-up.com/listening/ielts-listening-practice.html>
2. <https://www.bestmytest.com/ielts/speaking>
3. <https://ielts-up.com/speaking/ielts-speaking-practice.html>
4. <https://learnenglishteens.britishcouncil.org/skills/writing/a2-writing/film-review>

Course Outcomes

CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	exhibit high-level language skills in self-introduction, listening, reading, and diverse writing tasks such as essay writing and storytelling.	K1
CO2	critically evaluate and analyze literature through book reviews, film reviews, and newspaper reading, demonstrating an ability to articulate informed opinions.	K2
CO3	showcase proficiency in public speaking, group discussions, debates, and interviews, reflecting a comprehensive mastery of advanced communication skills.	K3

Relationship Matrix											
Semester	Course Code	Title of the Course								Hours	Credits
1	23UEN14AE01	Ability Enhancement Compulsory Course - 1: Communicative English								6	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	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
Mean Overall Score										2.37 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UTA21GL02	General Tamil - 2	4	3

கற்றலின் நோக்கங்கள்				
தமிழ் இலக்கிய வரலாற்றை அறிதல்.				
எழுத்து, சொல் இலக்கணங்களின் அடிப்படைகளைக் கண்டறிதல்.				
அயலகக் கவிதை வடிவங்களை விளங்கிக் கொள்ளுதல்.				
மொழிபெயர்ப்புக் கவிதைகளின் வாயிலாக மொழிபெயர்ப்புத் திறனை வளர்த்தெடுத்தல்.				
போட்டித் தேர்வுகளை எதிர்கொள்வதற்கான இலக்கண அறிவு பெறுதல்.				

அலகு - 1 (12 மணிநேரம்)

பாரதியார் கவிதைகள் - குயில்பாட்டு (குயில் தன் பூர்வ ஜென்மக் கதை உரைத்தல்)

பாரதிதாசன் கவிதைகள் - சஞ்சீவி பர்வதத்தின் சாரல்

நற்றமிழ்க்கோவை - முதல் மூன்று கட்டுரைகள்

அலகு - 2 (12 மணிநேரம்)

வெ.இராமலிங்கனார் - சொல், தமிழன் இதயம்
முடியரசனார் - உயிர் வெல்லமோ, மனத்தூய்மை
பெருஞ்சித்திரனார் - அஞ்சாதீர், மொழி, இனம், நாடு
பட்டுக்கோட்டை கலியாண சுந்தரனார் - வருங்காலம் உண்டு, உழைக்காமல் சேர்க்கும் பணம்
இலக்கணம் - எழுத்து
இலக்கிய வரலாறு - புதுக்கவிதை, தமிழில் புதிய கவிதை வடிவங்கள்

அலகு-3 (12 மணி நேரம்)

சுரதா - நல்ல தீர்ப்பு

கண்ணதாசன் - ஒரு பாணையின் கதை

அப்துல் ரகுமான்- வீடு

மேத்தா - ஒரேகுரல்

இலக்கிய வரலாறு - தமிழ்ச்சிறுகதைகள், இருபதாம் நூற்றாண்டு உரைநடை வளர்ச்சி

சிறுகதை - முதல் மூன்று சிறுகதைகள்

அலகு - 4 (12 மணிநேரம்)

அரசியல் கவிதைகள்

ஈரோடு தமிழன்பன்- அகல் விளக்காக இரு

ஆதவன் தீட்சண்யா- இன்னும் இருக்கும் சுவர்களின் பொருட்டு

சுகிர்தராணி- என் கண்மணியே இசைப்பிரியா

சக்தி ஜோதி - யுகாந்திர உறக்கம்

பழநி பாரதி- வெள்ளைக்காகிதம்

லிவிங்ஸ்மைல் வித்யா - நினைவில் பால்யம் அழுத்தம்

இலக்கணம் - சொல்

அலகு - 5 (12 மணிநேரம்)

அயலகக் கவிதைகள்

ஓசேரிசால் (தமிழில் நெய்தல்) - விடைகொடு என் தாய் மண்ணே

ஹைபுன் கவிதைகள்

சிறுகதை - நான்கு முதல் ஆறு சிறுகதைகள்

நற்றமிழ்க் கோவை - நான்கு முதல் ஆறு கட்டுரைகள்

கற்பித்தல் முறை (Teaching Methodology)	விரிவுரை (Lecture), காணொளிக் காட்சி (Videos), விளக்கக் காட்சி (PPT presentation)
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பாடநூல்கள்

1. தமிழாய்வுத்துறை (2023). பொதுத்தமிழ் -2, தூய வளனார் தன்னாட்சிக் கல்லூரி.

2. தமிழாய்வுத்துறை (2021). நற்றமிழ்க் கோவை, தூய வளனார் தன்னாட்சிக் கல்லூரி.

Websites and eLearning Sources

1. <https://www.chennaiLibrary.com/bharathiyar/kuyilpattu.html>
2. www.tamildigitallibrary.in
3. <https://eluthu.com/kavithai>
4. https://podhutamizh.blogspot.com/2017/09/blog-post_42.html
5. <https://thamizhsudar.com>
6. <https://ta.wikipedia.org/wiki>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	இப்பாடத்தின் நிறைவில் மாணவர்கள்	
CO1	தமிழ் இலக்கிய நூல்கள் பற்றிய அறிவைப் பெறுவர்.	K1
CO2	தமிழ் இலக்கண வளர்ச்சியைப் புரிந்து கொள்வர்.	K2
CO3	பிழையின்றி எழுதும் திறன் பெறுவதோடு கற்றல் திறனையும் வளர்த்துக்கொள்வர்.	K3
CO4	பிற கவிதை வடிவங்களைக் கையாளும் திறன் பெறுவர்.	K4
CO5	போட்டித் தேர்வுகளை எதிர்கொள்ளும் திறனைப் பெறுவர்.	K5

Relationship Matrix											
Semester	Course Code		Title of the Course					Hours	Credits		
2	23UTA21GL02		General Tamil - 2					4	3		
Course Outcomes	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO2	PSO3	PSO4	PSO5	
CO1	2	1	2	2	3	3	3	2	3	2	2.3
CO2	2	1	2	2	2	3	2	2	2	2	2.0
CO3	2	1	2	2	3	3	3	2	3	2	2.3
CO4	1	2	1	2	2	3	2	2	3	2	2.0
CO5	1	1	2	2	3	3	3	2	3	2	2.2
Mean Overall Score										2.16 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UFR21GL02	French - 2	4	3

Course Objectives

To construct simple phrases with pronominal verbs
To apply the different types of articles
To understand the usage of pronouns
To analyse the French culture through French culinary art
To evaluate and compare the French fashion in current scenario

UNIT I (12 Hours)

- TITRE: Les Loisirs
- GRAMMAIRE : les adjectifs interrogatifs, les nombres ordinaux, les verbes pronominaux
- LEXIQUE : les différentes activités quotidiennes, les loisirs, les activités quotidiennes, les matières
- PRODUCTION ORALE : parler sur votre passe-temps
- PRODUCTION ECRITE : décrire sa journée

UNIT II (12 Hours)

- TITRE: La routine
- GRAMMAIRE : les pronoms personnels COD, les verbes du premier groupe en e/er/eler/eter, le verbe prendre
- LEXIQUE : exprimer ses goûts et ses préférences, le temps, l'heure, la fréquence
- PRODUCTION ORALE : savoir comment dire l'heure
- PRODUCTION ECRITE : écrire vos préférences en quelques lignes

UNIT III (12 Hours)

- TITRE: Où Faire Ses Courses?
- GRAMMAIRE : les articles partitifs, le pronom en (la quantité), très ou beaucoup
- LEXIQUE : inviter et répondre à une invitation, les commerces et les commerçants, demander et dire le prix, les quantités
- PRODUCTION ORALE : faire des courses pour une soirée
- PRODUCTION ECRITE : écrire un message en acceptant l'invitation

UNIT IV (12 Hours)

- TITRE: Découvrez et Dégustez
- GRAMMAIRE : l'impératif, il faut, les verbes devoir, pouvoir, savoir, vouloir
- LEXIQUE : Commander et commenter sur un plat de la carte, les aliments, les services, les moyens de paiement
- PRODUCTION ORALE : Jeu de rôle – au restaurant (entre vous et le garçon)
- PRODUCTION ECRITE : faire une comparaison avec la carte française et indienne

UNIT V (12 Hours)

- TITRE: Tout le monde s'amuse/ les ados au quotidien
- GRAMMAIRE : les adjectifs démonstratifs, le pronom indéfini on, le futur proche, le passé composé, les verbes en –yer, voir et sortir
- LEXIQUE : connaître les marques connues sur les vêtements, les sorties, situer dans le temps, les vêtements et les accessoires

- PRODUCTION ORALE : décrire une tenue
- PRODUCTION ECRITE : écrire une lettre amicale, une carte postale

Teaching Methodology	Chalk and talk, visual cues like flashcards, one to one conversation
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Book for Study

1. Dauda, P., Giachino, L. & Baracco, C. (2016). *Generation A1*. Didier.

Books for Reference

1. Girardet, J. & Pecheur, J. (2017). *Echo A1*. CLE International, (2nd Ed.).
2. Mérieux, R. & Loiseau, Y. (2012). *Latitudes A1*. Didier.
3. Fournier, I. (2011). *Talk French*. Goyal Publishers.

Websites and eLearning Sources

1. <https://www.frenchtoday.com/blog/french-verb-conjugation/french-reflexive-verbs-list-exercises/>
2. <https://www.fluentu.com/blog/french/french-subject-pronouns/>
3. <https://grammarist.com/french/french-partitive-article/>
4. <https://www.talkinfrench.com/guide-french-food-habits/>
5. <https://www.fluentu.com/blog/french/talking-about-clothes-in-french/>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	relate pronominal verbs in expressing one's day today activity	K1
CO2	compare the different types of articles – article partitif and contracte	K2
CO3	construct texts using pronouns – passages and dialogues	K3
CO4	discover the food habits of the French culture	K4
CO5	appraise the French fashion	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
2	23UFR21GL02	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	3	3	3	3	1	3	1	2	2	2	2.2	
CO2	2	1	2	3	2	3	1	2	2	2	2.0	
CO3	3	2	3	2	2	3	3	1	3	2	2.4	
CO4	3	2	2	1	3	3	3	1	1	3	2.2	
CO5	2	1	2	2	3	3	3	2	2	2	2.2	
Mean Overall Score											2.2 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UHI21GL02	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)

- Kafan
- Letter Writing - Chutti Patra
- Bakthikal - Namakarn
- Sarkari Kariyalayom Ka Naam

UNIT II (12 Hours)

- Baathcheeth - Dookan Mein
- Kriya
- Letter Writing - Rishthedarom Ko Patra
- Bakthikal - Samajik Paristhithiyam

UNIT III (12 Hours)

- Vah Thodthi Patthar
- Adverb
- Letter Writing - Naukari Keliye Avedan Patra
- Bakthikal - Sahithyik Paristhithiyam

UNIT IV (12 Hours)

- Mukthi
- Samas
- Letter Writing - Kitab Maangne Keliye Patra
- Bakthikal - Salient Features, Main Divisions

UNIT V (12 Hours)

- Anuvad
- Sandhi
- Letter Writing - Nagarpalika Ko Patra
- Bakthikal - Visheshathayem

Teaching Methodology	Peer Instruction Exercise, Videos, PPT, Quiz, Group Discussion
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Books for Study

1. Viswanath Tripaty. (2018). *Kuchh Kahaniyan*, Rajkamal Prakashan Pvt. Ltd.
2. Kamathaprasad Gupth, M. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Sadananth Bosalae. (2020). *kavya sarang*, Rajkamal Prakashan.

Books for Reference

1. Acharya Ramchandra Shukla. (2021). *Hindi Sahitya Ka Itihas*. Prabhat Prakashan.
2. Krishnakumar, G. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.
3. Aravind Kumar. (2019). *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher.
4. Lakshman Prasad Singh. (2017). *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	Cognitive Levels (K - Level)
	On successful completion of the course, the student will be able to	
CO1	Find out the Terms & Expressions related to letter writing.	K1
CO2	Explain the works of Hindi writers.	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 the following authors "Premchand, Nirala, etc."	K5

Relationship Matrix											
Semester	Course Code		Title of the Course					Hours	Credits		
2	23UHI21GL02		HINDI - 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	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	23USA21GL02	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) sarvanaam asabdaha

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
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Books for Study

1. Saralasangraham Skisha. (2021).
2. Dhaatu Manjari. (2021).

Books for Reference

1. Paindrapuram Ashram, Srirangam. (2019).
2. Vadhyar, R. S., & Sons, Book - Seller and Publishers. (2021).
3. Kulapthy, K. M. (2018). *Saral Sanskrit Balabodh*. Bharathiya Vidya Bhavan.

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 - Level)
	On successful completion of this course, students will be able to	
CO1	Remembering names of different objects, remembering different verbal forms and sandhi	K1
CO2	Contrast different verbal forms Explain good sayings, Relate good saying to life.	K2
CO3	Apply and build small sentences	K3
CO4	Analyze different forms of Verbs and nouns	K4
CO5	Appreciate subhashitas and Sanskrit poetry	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
2	23USA21GL02	Sanskrit - 2									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	2	1	3	2	2	2	3	3	2	1	2.1	
CO2	3	2	3	2	2	3	2	3	3	2	2.5	
CO3	2	2	3	2	2	2	2	3	3	1	2.1	
CO4	3	2	3	3	1	2	3	3	3	1	2.4	
CO5	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	23UEN22GE02	General English - 2	5	3

Course Objectives

To develop an expanded and specialised vocabulary related to diverse themes such as education, entertainment, career, and society through activities like word grids, reading, and discussions.
To enhance problem-solving abilities through activities like debates, role-playing, and scenario analysis.
To enable students to express ideas with precision and clarity by practising different forms of expressing quality, comparison, and actions in various contexts.
To equip students with language skills relevant to professional settings.
To encourage students to explore language as a tool for creative expression and communication.

UNIT I

(15 Hours)

01. Education Word Grid
02. Reading Problems and Solutions
03. Syllabification
04. Forms for Expressing Quality
05. Expressing Comparison
06. Monosyllabic Comparison
07. Di/polysyllabic Comparison
08. The Best Monosyllabic Comparison
09. The Best Di/Polysyllabic Comparison
10. Practising Quality Words

UNIT II

(15 Hours)

11. Wh Words
12. Yes/No Recollection
13. Unscramble Wh Questions
14. Wh Practice
15. Education and the Poor
16. Controlled Role Play
17. Debate on Education
18. Education in the Future
19. Entertainment Word Grid
20. Classify Entertainment Wordlist
21. Guess the Missing Letter
22. Proverb-Visual Description
23. Supply Wh Words
24. Rearrange Questions
25. Information Gap Questions

UNIT III

(15 Hours)

26. Asking Questions
27. More about Actions
28. More about Actions and Uses
29. Crime Puzzle
30. Possessive Quiz
31. Humorous News Report
32. Debate on Media and Politics
33. Best Entertainment Source

UNIT IV**(15 Hours)**

34. Career Word Grid
35. Job-Related Wordlist
36. Who's Who?
37. People at Work
38. Humour at Workplace
39. Profession in Context
40. Functions and Expressions
41. Transition Fill-in
42. Transition Word Selection
43. Professional Qualities
44. Job Procedures
45. Preparing a Resume
46. Interview Questions
47. Job Cover Letter Format
49. Emailing an Application
50. Mock Interview

UNIT V**(15 Hours)**

51. Society Word Grid
52. Classify Society Wordlist
53. Rearrange the Story
54. Storytelling
55. Story Cluster
56. Words Denoting Time
57. Expressing Time
58. What Can You Buy?
59. Noise Pollution
60. Positive News Headlines
61. Negative News Headlines
62. Matching Conditions
63. What Would You Do?
64. If I were the Prime Minister
65. My Dream Country

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method
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Book for Study

1. Joy, J.L. & Peter, F.M. (2014). *Let's Communicate 2*, Trinity Press.

Books for Reference

1. Ahrens, Sönke. (2017). *How to Take Smart Notes: One Simple Technique to Boost Writing, Learning and Thinking*. Create Space.
2. Aspinall, Tricia. (2002). *Test Your Listening*. Pearson.
3. Bailey, Stephen. (2004). *Academic Writing: A Practical Guide for Students*. Routledge.
4. Fitikides, T.J. (2002). *Common Mistakes in English*, (6th Ed.). Longman
5. Wainwright., Gordon. (2007). *How to Read Faster and Recall More: Learn the Art of Speed Reading with Maximum Recall*, (3rd Ed.). How to Books.

Websites and eLearning Sources

1. <https://learnenglish.britishcouncil.org/>
2. <https://oneminuteenglish.org/en/best-websites-learn-english/>
3. <https://www.dailywritingtips.com/best-websites-to-learn-english/>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	write paragraphs with apt punctuation marks	K1
CO2	discuss basic issues with friends, relatives and members of the family	K2
CO3	use polite expressions in appropriate ways	K3
CO4	evaluate the language and communication aspects of the topics	K4
CO5	create and produce various forms of communication, including professional documents like resumes and cover letters, debates	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
2	23UEN22GE02	General English - 2									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	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
2	23UMA23CC03	Core Course - 3: Analytical Geometry and Vector Calculus	6	5

Course Objectives
To acquire knowledge in the concept of coordinate system in a space
To utilize the techniques of direction cosines and direction ratios in straight lines and planes
To visualize spheres and to create tangent plane of a sphere
To evaluate vector and scalar quantities such as divergence, gradient and curl
To analyse the relationship between the line, surface and volume integrals

UNIT I: Coordinates and the Plane (18 Hours)

Coordinates of a point in space - Direction cosines of a line -Relation between Direction Cosines - Projection of a Straight line - Angle between two lines - General equation of First Degree - 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 II: Straight Lines (18 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 III: The Sphere (18 Hours)

Equation of a Sphere -The Sphere through four given points - Plane section of a Sphere - Equations of a Circle - Equation of a Tangent Plane.

Unit IV: Vector Differentiation (18 Hours)

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

UNIT V: Vector Integration (18 Hours)

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 method, Problem solving
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Books for Study

- Narayanan, S. & Mittal, P. K. (2017). *Analytical Solid Geometry*. (17th Ed.). S. Chand & Co, (For Units I to III)
 - Unit I:** Chapter 1 (Sec: 1.1, 1.5-1.9 Pages 01 - 03, 09 - 23)
Chapter 2 (Sec: 2.1-2.8, Pages 28 - 45)
 - Unit II:** Chapter 3 (Sec: 3.1-3.7, Pages 56-88)
 - Unit III:** Chapter 6 (Sec: 6.1-6.6, Pages 127-149)
- Narayanan., & Manickavasagam, P. (1994). *Vector Algebra and Analysis*. S. Viswanathan Printers & Publishers Pvt. Ltd. (For Unit IV & V)
 - Unit IV:** Chapter 4 (Sec: 6-12, Pages 98-122)
 - Unit V:** Chapter 6 (Sec: 2-6, Pages 136-158; Sec: 9-10, Pages 163-177)

Books for Reference

1. Duraipandian, P. (1970). *Analytical Geometry 3 Dimensional*. Emerald Student Edition.
2. Arumugam, S. & Thangapandi, I. A. (2008). *Analytical Geometry (3D) and Vector Calculus*. New Gamma Publishing House.

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	acquire knowledge about the basic concepts in Analytical geometry (3D) and Vector calculus.	K1
CO2	understand the properties of planes, spheres, divergent and curl of a vector.	K2
CO3	apply the concepts of analytical geometry and vector calculus to real life problems.	K3
CO4	evaluate the equations of lines, planes, spheres, volume and surface Integrals.	K4
CO5	illustrate the importance of angle between planes, shortest distance between skew lines, divergence and curl of vector field, surface integral and volume integral.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
2	23UMA23CC03	Core Course - 3: Analytical Geometry and Vector Calculus									6	5
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	23UMA23CC04	Core Course - 4: Integral Calculus	5	3

Course Objectives

To acquire knowledge of Integrals and its geometrical applications

To have in-depth understanding on the concepts of definite integrals

To 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

UNIT I (15 Hours)

Revision of Integral formulae - All Integral models including Integration of Rational and Irrational Functions.

UNIT II (15 Hours)

Integration Models (continued) - Properties of Definite integrals - Integration by Parts.

UNIT III (15 Hours)

Reduction Formulae for $x^n e^{ax}$, $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$, $\tan^n x$, $\cot^n x$, $\sec^n x$, $\operatorname{cosec}^n x$, $x^m (\log x)^n$, $e^{ax} \cos bx$ - Bernoulli's Formula - Integration as summation.

UNIT IV (15 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 V (15 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.

Teaching Methodology	Black board, chalk and talk, PPT
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Book for Study

- Narayanan, S. & Manicavachagam, T. K.P. (2013). *Calculus (Major), Volume - II*, S. Viswanathan Printers & Publishers.

Unit I: Chapter 1 (Sec 1-8)

Unit II: Chapter 1 (Sec 9-12)

Unit III: Chapter 1 (Sec 13,14,15)

Unit IV: Chapter 2 (Sec 1,4,5) Chapter 5 (Sec 1-4)

Unit V: Chapter 7 (Sec 2-5)

Books for Reference

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

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
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	K5

Relationship Matrix											
Semester	Course Code		Title of the Course					Hours	Credits		
2	23UMA23CC04		Core Course - 4: Integral Calculus					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	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	23UMA23AC02	Allied Course - 2: Statistical Methods - 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 meaningful 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.

UNIT V: 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
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Book for Study

- Gupta, S. C. & Kapoor, V. K. (2002). *Fundamentals of Mathematical Statistics*, (11th Ed.). Sultan Chand and Sons.

Unit I Chapter 14: Full

Unit II Chapter 15: Sec 15.1- 15.3, 15.6 (Omit 15.6.4-15.6.7)

Unit III Chapter 16: Sec 16.1-16.3, 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: Sec 10.1-10.4, 10.7.

Books for Reference

- Vittal, P. R. (2004). *Mathematical Statistics*. Margham Publications.
- Kapur, J. N. & Saxena, H. C. (2010). *Mathematical Statistics*, (20th Ed.). 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	23UMA23AC02	Allied Course - 2: Statistical Methods - 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	23UHE24VE02	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, January 2012- Human Rights Organizations - NHRC - SHRC.

Teaching Methodology	Chalk and Talk, Power point, Handouts and Group discussion
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Book 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	23UHE24VE02	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
2	23UHE24AE01	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 - Scope and Importance - Subsystems of Earth - Various recycling Methods - Environmental Movements in India - Eco- Feminism - Public awareness - Suggestions to conserve environment

UNIT II: Natural Resources (6 Hours)

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

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

General structure of ecosystem - Functions of Ecosystem - Energy flow and Ecological pyramids - Levels of Biodiversity - 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 - Issues deals with Population growth.

Teaching Methodology	Chalk and Talk, Power point and Field visit
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Book for Study

1. Department of Human Excellence, (2021). *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	23UHE24AE01	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	PSO 4	PSO 5	
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	23UTA31GL03	General Tamil - 3	4	3

கற்றலின் நோக்கங்கள்				
தனிப்பாடல்களின் பாடற்பொருளை அறிதல்				
சிற்றிலக்கியங்களின் வகைகளையும் வகைமைகளையும் அறிதல்				
இடைக்காலப் புலவர்களின் பங்களிப்பை உணர்தல்				
சிற்றிலக்கியங்களின் பாடுபொருள், தனித்தன்மை, மரபு ஆகியவற்றை அறிதல்				
சிற்றிலக்கியங்கள்வழி தமிழின் வளர்ச்சி நிலையை அறிதல்				

அலகு - 1

(12 மணி நேரம்)

ஒளவையார்

காவிரியே தார்வேந்தன் (16) கற்றது கைமண்ணளவு (39) மதியாதார் முற்றம் (42)

இனியது கேட்கின் (55) தாயொடு அறுசுவை (64)

காளமேகப் புலவர் -

நஞ்சிருக்குத் தோலுரிக்கு நாதர்முடி(4) ஒடுஞ் சுழிசுத்த முண்டமாகும் (16)

அடிநந்தி சேர்தலால் ஆகம் (22) செருப்புக்கு வீரரைச் சென்றுழக்கும் (52)

துதிவாணி வீரம் (80)

இராமச்சந்திர கவிராயர் - வஞ்சகர்பா னடந்தலைந்த - 19

பொற்களந்தைப் படிக்காகத் தம்பிரான் - குட்டுதற்கோபிள்ளைப் பாண்டிய - 21

தமிழ்விடுதாது,- கண்ணிகள் 19 முதல் 62 வரை

கலிங்கத்துப்பரணி - தேவியைப் பரவியது, பாடல் 121 முதல் 134 வரை

அலகு - 2

(12 மணி நேரம்)

முக்கூடற்பள்ளு - நாட்டுப்படலம் பாடல்கள் 19 - முதல் 27 வரை

முத்துகுமாரசாமி பிள்ளைத்தமிழ் - அம்புலிப்பருவம் முதல் 5 பாடல்கள்

அறிஞர் அண்ணா - வேலைக்காரி நாடகம்

அலகு - 3

(12 மணி நேரம்)

திருக்குற்றாலக்குறவஞ்சி - மலைவளம் (6 பாடல்கள்)

இலக்கியவரலாறு - சிற்றிலக்கியங்கள்

நற்றமிழ்க்கோவை கட்டுரைகள் 7, 8, 9

அலகு - 4

(12 மணி நேரம்)

தாயுமானவர் திருப்பாடல்கள் - பராபரக்கண்ணி 7 முதல் 30 வரை உள்ள கண்ணிகள்

இலக்கணம் - அணிகள்

குணங்குடி மஸ்தான் சாகிபு - குறை இரங்கி உரைத்தல் - 7 பாடல்கள்

அலகு - 5

(12 மணி நேரம்)

திருவருட்பா - திருக்கதவம் திறத்தல்

இலக்கிய வரலாறு - இடைக்காலப் புலவர்கள், நாடகத்தமிழ்

நற்றமிழ்க்கோவை - கட்டுரைகள் - 10, 11, 12

கற்பித்தல் முறை	விரிவுரை (Lecture), காணொளிக் காட்சி (Videos), விளக்கக் காட்சி (PPT presentation)
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பாட நூல்கள்

1. தமிழாய்வுத்துறை (2023), பொதுத்தமிழ்-3, தூய வளனார் கல்லூரி
2. தமிழாய்வுத்துறை (2021), நற்றமிழ்க்கோவை, தூய வளனார் கல்லூரி

பார்வை நூல்கள்

1. செயராமன் ந. வீ. (1967), சிற்றிலக்கியச் செல்வம், மணிவாசகர் பதிப்பகம்
2. பொன்னுசாமி (2023), சிற்றிலக்கிய வரலாறு, இரண்டு தொகுதிகள், பாரிநிலையம்
3. சண்முகம் பிள்ளை மு. (2022), சிற்றிலக்கிய வகைகள், மணிவாசகர் பதிப்பகம்

Websites and eLearning Sources

1. <https://ta.wikipedia.org/wiki/>
2. <https://www.britannica.com/science/Siddha-medicine>

3. <https://nischennai.org/main/siddha-medicine/>
4. <https://tamil.hindustantimes.com/>
5. <https://www.tamiluniversity.ac.in/english/library2-/digital-library/>
6. <https://www.tamilelibrary.org/>
7. www.projectmadurai.or
8. <http://www.tamilvu.org/ta/library-libcontnt-273141>
9. <https://www.tamildigitallibrary.in/>
10. <https://noolaham.org/>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	இப்பாடத்தின் நிறைவில் மாணவர்கள்	
CO1	இடைக்காலப் புலவர்களின் பாட்டுத்திறனை அறிந்து கொள்வர்	K1
CO2	சிறுநிலக்கிய வகைகளையும் வகைமைகளையும் அறிந்து கொள்வர்	K2
CO3	பள்ளு, பரணி, பிள்ளைத்தமிழ், குறவஞ்சி போன்ற இலக்கியங்கள் வழி வீரம், பக்தி, காதல் உணர்வை அறிந்து கொள்வர்	K3
CO4	சிறுநிலக்கியங்களின் அமைப்பு பாட்டு வடிவங்களை அறிந்து கொள்வர்	K4
CO5	இடைக்காலத் தமிழ் வளர்ச்சி நிலையை அறிந்து கொள்வர்	K5

Relationship Matrix											
Semester	Course Code		Title of the Course							Hours	Credits
3	23UTA31GL03		General Tamil - 3							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	2	2	3	2	3	2	3	3	2	2.5
CO2	2	2	2	3	3	2	2	3	3	2	2.4
CO3	3	3	2	3	3	2	2	3	3	3	2.7
CO4	3	2	2	3	2	3	2	3	2	3	2.5
CO5	2	3	2	3	2	3	2	3	2	3	2.5
Mean Overall Score										2.52 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UFR31GL03	French - 3	4	3

Course Objectives
To analyse the French clothing with respect to its culture
To apply prepositions and understand its usages
To analyse a contemporary text in present tense
To evaluate the French festivals and compare with their own cultural context
To apply the past tense using simple conversation

UNIT I (12 Hours)

- TITRE: Vivre la ville
- GRAMMAIRE : la comparaison, les prépositions avec les noms géographiques, les pronoms personnels COI, le pronom y (le lieu)
- LEXIQUE : se repérer sur un plan de ville, la ville, les lieux de la ville
- PRODUCTION ORALE : demander et indiquer une direction dans un dialogue
- PRODUCTION ECRITE : décrire votre ville natale, créez les affiches en appréciant votre ville

UNIT II (12 Hours)

- TITRE: Visiter une ville
- GRAMMAIRE : la position des pronoms compléments, les verbes du premier groupe en – ger et – cer, les verbes ouvrir et accueillir
- LEXIQUE : dire les informations sur une ville de votre choix, les transports, les points cardinaux, les prépositions de lieu
- PRODUCTION ORALE : Indiquer le chemin
- PRODUCTION ECRITE : Demander des renseignements touristiques

UNIT III (12 Hours)

- TITRE: On vend ou on garde
- GRAMMAIRE : la formation du pluriel, les adjectifs de couleurs, l'adjectif beau, nouveau, vieux
- LEXIQUE : savoir comment s'habiller des grandes occasions, les couleurs, les formes, les matériaux
- PRODUCTION ORALE : comprendre une présentation de catalogues vestimentaires en France
- PRODUCTION ECRITE : adresser des souhaits à quelqu'un

UNIT IV (12 Hours)

- TITRE: Ventes d'autrefois, ventes d'aujourd'hui
- GRAMMAIRE : les pronoms relatifs qui et que, l'imparfait, les verbes connaître, écrire, mettre et vendre, la question avec inversion
- LEXIQUE : comprendre la description de personnes dans un extrait de roman, les mesures, l'informatique
- PRODUCTION ORALE : imaginez un dialogue avec un personnage célèbre. Utilisez l'inversion.
- PRODUCTION ECRITE : écrire une biographie en utilisant les pronoms relatifs

UNIT V
(12 Hours)

- **TITRE:** Félicitations! / On voyage!
- **GRAMMAIRE :** les pronoms démonstratifs, les articles : particularités, les pronoms interrogatifs variables : lequel, les adverbes de manières, les verbes recevoir et conduire
- **LEXIQUE :** les moyens de transports, les voyages, les fêtes, l'aéroport et l'avion, la gare et le train, l'hôtel
- **PRODUCTION ORALE :** Présenter ses vœux–
- **PRODUCTION ECRITE :** Faire une réservation

Teaching Methodology	PPT Presentation, Seminar, Video Assignments
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Book for Study

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Generation AI*. Didier.

Books for Reference

1. Girardet, J., & Pecheur, J. (2017). *Echo AI*. (2nd Ed.). CLE International.
2. Mérieux, R., & Loiseau, Y. (2012). *Latitudes AI*. Didier.
3. Fournier, I. (2011). *Talk French*. Goyal Publishers.

Websites and eLearning Sources

1. <https://français.lingolia.com/en/grammar/prepositions>
2. <https://www.lawlessfrench.com/grammar/present-tense/>
3. <https://www.thoughtco.com/textures-french-adjectives-and-expressions-1368980>
4. <https://study.com/academy/lesson/past-tense-in-french.html>
5. <https://absolutely-french.eu/french-celebrations/?lang=en>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	Relate colours, materials and shapes to the french clothing.	K1
CO2	Select appropriate prepositions in giving directions.	K2
CO3	construct a text in present tense using different verbs.	K3
CO4	examine the travel manners and celebrations of the French.	K4
CO5	justify the usage of past tense in a biography.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
3	23UFR31GL03	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	1	2	2	3	2	3	1	2	3	2.1	
CO2	3	2	3	3	1	2	1	2	2	3	2.2	
CO3	2	1	3	2	2	3	1	3	2	2	2.1	
CO4	3	1	3	2	3	3	3	1	2	3	2.4	
CO5	3	2	3	2	2	3	3	2	2	1	2.3	
Mean Overall Score											2.22 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHI31GL03	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)

- Tera Sneh Na Khoon
- Samband Bodak
- Reethikal - Namakarn
- Tense

UNIT II (12 Hours)

- Himadri Thung Sring Se
- Paribakshik Shabdavali
- Smuchaya Bodak
- Reethikal - Samajik Paristhithiyam

UNIT III (12 Hours)

- Insan Our Kuthae
- Vismayadi Bodak
- Reethikal - Sahithiyik Paristhithiyam
- Reethikal - Salient Features

UNIT IV (12 Hours)

- Shokgeeth
- Avikary Shabdh
- Reethikal - Main Divisions
- Social Media and Modern World

UNIT V (12 Hours)

- Reethikal - Visheshathayem
- Anuvad
- Bahoo Ki Vidha (One Act Play)

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Case Based Problem Solving
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Books for Study

1. Jain, S.K. (2019). *Anuwad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.
2. Gupth, K. M. (2020). *Hindi Vyakaran*, Anand Prakashan.
3. Bosalae, S. (2020). *kavya sarang*. Rajkamal Prakashan.

Books for Reference

1. Ramdev. (2016). *Vyakaran Pradeep*. Hindi Bhavan.

2. Singh, L.P. (2017). *Kavya Ke Sopan*. Bharathy Bhavan Prakashan.
3. Shukla, A.R. (2021). *Hindi Sahitya Ka Itihas*, Prabhat Prakashan.
4. Gosamy, K. (2016). *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 able to	
CO1	find out the dialects of Hindi language.	K1
CO2	compare the poems of Sumithra Nandanpanth, Prasad & Bachan in Context with their experience of life.	K2
CO3	illustrate the importance given to family ethics by the youth in the modern period according to “Bahoo Ki vidha” One Act play.	K3
CO4	categorize the poetics in some selective poems.	K4
CO5	justify the social & political conditions of Devotional period in Hindi Literature.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course					Hours	Credits				
3	23UHI31GL03	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	23USA31GL03	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
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Books for Study

1. Vedic literature
2. Ramodantam

Books for Reference

1. Parameshwara. (2018). *Ramodantam*. LIFCO Chennai.
2. Vadhyar, R. S., & Sons. (2019). *History of Sanskrit Literature*, Book - sellers and publishers , Kalpathu ,Palghat, Kerala , south India.
3. Kulapathy, K.M Saral *Sanskrit Balabodh, Bharathita vidya bhavan*, Munshimarg.

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.learn Sanskrit.org/guide/uninflected-words/the-upasarga/>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	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	K3
CO4	Appreciate the Vedic Philosophy	K4
CO5	Evaluate and create new words with upasargas	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
3	23USA31GL03	Sanskrit - 3									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	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/Week	Credits
3	23UEN32GE03	General English - 3	5	3

Course Objectives
To develop strategies to enhance reading skills through teacher-led practices, promoting comprehension, critical analysis, and creative engagement with various genres.
To strengthen informal and formal letter writing skills.
To analyze and appreciate different literary forms, including anecdotes, biographies, poems, and prose, fostering critical thinking and creative expression.
To practice applying grammatical structures, including the simple future and future continuous tenses, in writing tasks.
To engage in critical discussions through reading and writing about societal issues.

UNIT I: Suggestions to Develop Your Reading Habit (13 Hours)

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Listening and Reading Skills through Teacher-led Reading Practice
- 1.3 Glossary
 - 1.3.1 Words
 - 1.3.2 Phrases
- 1.4 Reading Comprehension
- 1.5 Critical Analysis
- 1.6 Creative Task
- 1.7 General Writing Skill: Letter Writing: Informal
- 1.8 Grammar: Simple Present Tense

UNIT II: The Secret of Success: An Anecdote (13 Hours)

- 1.9 Introduction
- 2.0 Objectives
- 2.1 Listening and Reading Skills through Teacher-led Reading Practice
- 2.2 Glossary
 - 2.3.1 Words
 - 2.3.2 Phrases
- 2.4 Reading Comprehension
- 2.5 Critical Analysis
- 2.6 Creative Task
- 2.7 General Writing Skills: Letter Writing: Formal
- 2.8 Grammar: Present Continuous Tense

UNIT III: The Impact of Liquor Consumption on the Society (13 Hours)

- 2.9 Introduction
- 3.0 Objectives
- 3.1 Listening and Reading Skills through Teacher-led Reading Practice
- 3.2 Glossary
 - 3.3.1 Words
 - 3.3.2 Phrases
- 3.4 Reading Comprehension
- 3.5 Critical Analysis
- 3.6 Creative Task
- 3.7 General Writing Skills: Letter to Newspaper
- 3.8 Grammar: Simple Past Tense

UNIT IV: Dr. A.P.J. Abdul Kalam: A Short Biography**(12 Hours)**

- 3.9 Introduction
- 4.0 Objectives
- 4.1 Listening and Reading Skills through Teacher-led Reading Practice
- 4.2 Glossary
- 4.3.1 Words
- 4.3.2 Phrases
- 4.4 Reading Comprehension
- 4.5 Critical Analysis
- 4.6 Creative Task
- 4.7 General Writing Skill: Write a letter applying for a job
- 4.8 Grammar: Past Continuous Tense

UNIT V: Golden Rule: A Poem**(12 Hours)**

- 4.9 Introduction
- 5.0 Objectives
- 5.1 Listening and Reading Skills through Teacher-led Reading Practice
- 5.2 Glossary
- 5.3.1 Words
- 5.3.2 Phrases
- 5.4 Reading Comprehension
- 5.5 Critical Analysis
- 5.6 Creative Task
- 5.7 Grammar: Simple Future Tense
- 5.8 General Writing Skill: Circular-Writing

UNIT VI: Hygiene**(12 Hours)**

- 5.9 Introduction
- 6.0 Objectives
- 6.1 Listening and Reading Skills through Teacher-led Reading Practice
- 6.2 Glossary
- 6.3.1 Words
- 6.3.2 Phrases
- 6.4 Reading Comprehension
- 6.5 Critical Analysis
- 6.6 Creative Task
- 6.7 General Writing Skill: Writing an Agenda for a Meeting
- 6.8 Grammar: Future Continuous Tense

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method
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Book for Study

1. Jayraj., & Arul, S.J. et al. (2016). *Trend-Setter: An Interactive General English Textbook for Undergraduate Students*. Trinity.

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On completion of this course, students will be able to	
CO1	recall and explain the fundamental components of English language and grammar.	K1
CO2	demonstrate their understanding of various texts by summarizing, paraphrasing, and interpreting the contents.	K2
CO3	apply their language and comprehension skills to create written communication.	K3
CO4	critically analyze the texts presented in the course.	K4
CO5	synthesize the language and grammar knowledge to compose creative tasks	K5

Relationship Matrix											
Semester	Course Code	Title of the Course								Hours	Credits
3	23UEN32GE03	General English - 3								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	23UMA33CC05	Core Course -5: Differential Equations	7	6

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 (21 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 - Rules for finding integrating factors - Equations of first order but of higher degree - Clairaut's form.

UNIT II: Linear Differential equations (21 Hours)

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

UNIT III: Partial Differential Equations (21 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 (21 Hours)

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

UNIT V: Fourier series (21 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	Chalk and Talk, Hand out, Problem Solving
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Book for Study

- 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 - 3.4, 4, 5.1 - 5.4, 6.1 - 6.2.
(Page No: 1-38)

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, 4, 5, 6, 7, 8. (Page No: 154 - 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	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
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	23UMA33CC05	Core Course -5: Differential Equations									7	6
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	23UMA33CC06	Core Course - 6: Sequences and Series	6	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 (18 Hours)
Sequences - Bounded sequences - Monotonic Sequences - Convergent sequences - Divergent and Oscillating sequences.

UNIT II (18 Hours)
Algebra of limits - Behavior of Monotonic functions.

UNIT III (18 Hours)
Some theorems on limits - Subsequences - Limit points - Cauchy sequences - The upper and lower limits of a sequence.

UNIT IV (18 Hours)
Series - Infinite series - Comparison test - D'Alembert's ratio test - Rabbe's test [*Omit Proof for D'Alembert's Ratio Test & Rabbe's test*]

UNIT V (18 Hours)
Cauchy's root test - Integral test - Alternating Series - Absolute Convergence. [*Omit Proof for Cauchy's root test & Integral test*]

Teaching Methodology	Chalk and Talk, PPT, Handout and Problem-solving sessions
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Books for Study

- Arumugam, S., Isaac, T.A., & Somasundaram, A. (2019). *Sequences and Series*. Yes Dee Publishing Pvt Ltd.
Unit I: Chapter 3 (Sec: 3.1 - 3.6; Pages: 41 - 61)
Unit II: Chapter 3 (Sec: 3.7 - 3.8; Pages: 62 - 94)
Unit III: Chapter 3 (Sec: 3.9 - 3.13; Pages: 94 - 125)
Unit IV: Chapter 4 (Sec: 4.1 - 4.2; Pages: 129 - 146 Sec: 4.3 Pages: 149, 152 - 158)
Unit V: Chapter 4 (Sec: 4.4 - 4.5 Pages: 162, 164 - 166, 168 - 174),
Chapter 5 (Sec: 5.1 - 5.2; Pages: 175 - 186)

Books for Reference

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

Website and e-Learning Source

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

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
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	23UMA33CC06	Core Course - 6: Sequences and Series									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	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	23UMA33AO01A	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 of entropy 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 field - 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 deviation without dispersion - direct vision spectroscopy - 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	Demo Videos, PPT, Handouts, Study materials
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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/Week	Credits		
3	23UMA33AO01A		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	3	3	2	1	3	2	2	1	1	2.1
CO2	3	2	3	3	2	2	3	2	2	1	2.3
CO3	3	2	3	2	2	3	2	2	2	2	2.3
CO4	3	3	2	3	2	3	3	3	2	2	2.6
CO5	3	2	2	3	2	3	2	3	2	2	2.4
Mean Overall Score											2.34 (High)

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UMA33AO01B	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 organisations
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
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Book for Study

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

Books for Reference

1. Jain, S. P., & Narang, K.L. (2015). *Advanced Accountancy*, Volume I. Kalyani Publishers.
2. Reddy, T.S., & Murthy. (2020). *Financial Accounting*. Margham Publications.

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	Credits				
3	23UMA33AO01B	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	
Mean Overall Score											2.2 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UHE34VE03A	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

Book 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	Credits
3	23UHE34VE03A	Value Education - 3: Social Ethics - 1									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	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	23UHE34VE03B	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:	God of salvation	(6 Hours)
UNIT II:	Life & Mission of Jesus Christ	(6 Hours)
UNIT III:	The Holy Spirit	(6 Hours)
UNIT IV:	Gospel Values	(6 Hours)
UNIT V:	Mary, the Mother of God	(6 Hours)

Teaching Methodology	Chalk and Talk, Power point, Assignment and Group discussion
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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	Credits
3	23UHE34VE03B	Value Education - 3: Religious Doctrine - 1									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	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
4	23UTA41GL04B	General Tamil - 4: அறிவியல் தமிழ் (Scientific Tamil)	4	3

கற்றலின் நோக்கங்கள்	
அன்றாட வாழ்வில் அறிவியலின் செல்வாக்கை அறிந்துகொள்ளுதல்	
பண்டைத்தமிழர் வாழ்வில் இடம்பெற்ற அறிவியல்கூறுகளைக் கண்டறிதல்	
அறிவியலின் வளர்நிலைகளையும் வகைப்பாடுகளையும் கண்டுணர்தல்	
பண்டைத்தமிழரின் பல்துறைச் சிந்தனைகள்வழி தமிழர் தம் பண்பாட்டு மேன்மையை உணர்தல்	
படைப்பாற்றல் திறனைக் கண்டறிந்து வளர்த்தெடுத்தல்	

அலகு 1 (12 மணி நேரம்)

தொல்காப்பியம்: நிலம் தீ நீர் வளி விசும்போடு (தொல். பொருள் 635)

ஒன்றறிவதுவே (தொல். பொருள் 571)

புறநானூறு

மண் திணித்த நிலனும் (புறம் 2 1- 6) செஞ்ஞா யிற்றுச் செலவும் (புறம் 30 1- 7)

அகநானூறு

அம்ம வாழி, தோழி (அகம் 141: 1-11) செஞ்ஞா யிற்றுச் செலவும் (புறம் 30 1-7)

பதிற்றுப்பத்து

நிலம் நீர் வளி விசும்பு என்ற நான்கின் (பதிற்று 14:1-4)

நெடுவயின் ஒளிறு மின்னுப் பரந்தாங்கு (பதிற்று 24:1-26)

உரைநடைக்கட்டுரை: வியக்க வைக்கும் தமிழரின் அறிவியல்

அலகு 2 (12 மணி நேரம்)

சித்தர் பாடல்கள்

பதார்த்த சிந்தாமணி

குளத்து சலந்தானே கொடிதான (27) ஏரிசலம் வாதமிகு மதுவே (31)

அருவிநீர் மேக மகற்றுங் (39) மேவிய சீவன் வடிவது சொல்லிடில் (திருமூலர்)

அணுவில் அணுவினை ஆதிபிரானை (திருமூலர்)

நட்டகல்லைத் தெய்வமென்று (சிவவாக்கியர்)

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

அலகு 3 (12 மணி நேரம்)

திருக்குறள் (2 அதிகாரங்கள்)

வான் சிறப்பு, மருந்து வலைப்பூக்கள் உருவாக்கல், பராமரித்தல் புதிய அறிவியல் கலைச்சொல்லாக்கங்களை உருவாக்குதல்

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் வெளிப்படும் நீர் மேலாண்மையியல்

அலகு 4 (12 மணி நேரம்)

புதினம்: சொர்க்கத்தீவு - சுஜாதா நூல் - திறனாய்வு அறிவியல் புனைவு

ஆவணப்படம், திரைப்படம் - திறனாய்வு

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

அலகு 5 (12 மணி நேரம்)

அறிவியல்; கலைச்சொற்கள் அன்றாட வாழ்வில் அறிவியல் பழமொழிகளைத் தொகுத்தல் மூலிகைகள், கீரைகள் ஆகியவற்றின் முக்கியத்துவத்தைக் காட்சிப்படுத்துதல். தமிழர் அறிவியல் கண்காட்சி நடத்துதல்
உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்;

கற்பித்தல் முறை	விரிவுரை (Lecture), காணொளிக் காட்சி (Videos), விளக்கக் காட்சி (PPT presentation)
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பாட நூல்கள்

1. தமிழாய்வுத்துறை (2021), அறிவியல் தமிழ் , தூய வளனார் தன்னாட்சிக் கல்லூரி
2. சுஜாதா (2009), சொர்க்கத்தீவு, லிசா பப்ளிகேஷன்ஸ்,

3. மூர்த்தி அ.கி.(2001) , அறிவியல் கலைச்சொல் அகராதி, மணிவாசகர் பதிப்பகம்.

பார்வை நூல்கள்

1. நெடுஞ்செழியன்(2017), இன்னும் மீதமிருக்கிறது நம்பிக்கை, பூவுலகின் நண்பர்கள் வெளியீடு
2. குழந்தைசாமி.வா.செ., (2001), அறிவியல்தமிழ், பாரதி பதிப்பகம்

Websites and eLearning Sources

1. www.tamilvu.org
2. www.tamildigitallibrary.in
3. https://www.tamiluniversity.ac.in/english/library2-/digital-library/
4. https://www.tamilelibrary.org/

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	இப்பாடத்தின் நிறைவில் மாணவர்கள்	
CO1	பண்டைய தமிழர்களின், அறிவியல் அறிவை அறிந்து கொள்வர்.	K1
CO2	பண்டைய தமிழ் இலக்கியங்களுள் காணாலும் அறிவியல் சிந்தனைகளைப் புரிந்துகொள்வர்.	K2
CO3	தமிழரின் அறிவியல் மருத்துவத்தையும், நீர் மேலாண்மை அறிவையும் அறிந்து கொள்வர்.	K3
CO4	இக்கால இலக்கியங்களுள் அறிவியல்துறை பெற்றுள்ள இடத்தை அறிந்து கொள்வர்.	K4
CO5	அறிவியல் கலைச்சொற்களைத் தமிழில் கற்றுக் கொண்டு அறிவியல்தமிழ் வளரத் துணைபுரிவர்.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
4	23UTA41GL04B	General Tamil - 4 அறிவியல் தமிழ் (Scientific Tamil)									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	1	2	3	2	2	3	3	2	2	2	2.2	
CO2	2	2	3	2	2	2	3	2	3	2	2.3	
CO3	1	2	2	3	2	2	2	3	3	3	2.3	
CO4	2	2	3	2	2	3	2	3	3	2	2.4	
CO5	3	1	2	2	2	2	3	2	3	3	2.3	
Mean Overall Score											2.3 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UFR41GL04	French - 4	4	3

Course Objectives
To analyse the French clothing with respect to its culture
To apply prepositions and understand its usages
To analyse a contemporary text in present tense
To evaluate the French festivals and compare with their own cultural context
To apply the past tense using simple conversation

UNIT I (12 Hours)

- TITRE: On fait le mélange!
- GRAMMAIRE : le présent progressif, les pronoms possessifs, la phrase négative
- LEXIQUE : décrire les étapes d'une action, la maison, les tâches ménagères
- PRODUCTION ORALE : comprendre le récit d'un voyage
- PRODUCTION ECRITE : raconter ses actions quotidiennes

UNIT II (12 Hours)

- TITRE: à propos de logement
- GRAMMAIRE : quelques adjectifs et pronoms indéfinis, les verbes lire, rompre et se plaindre
- LEXIQUE : la localisation et le logement, les pièces, meubles et équipement
- PRODUCTION ORALE : jeu de rôle –votre ami et vous s'installe dans un nouveau meuble
- PRODUCTION ECRITE : décrire votre maison/appartement

UNIT III (12 Hours)

- TITRE: Tous en forme!
- GRAMMAIRE : le passé composé et l'imparfait, le passé récent, l'expression de la durée
- LEXIQUE : un souvenir et les événements du passés, le corps humain : extérieur, le corps humain : intérieur
- PRODUCTION ORALE : échanger sur ses projets de vacances
- PRODUCTION ECRITE : raconter un souvenir

UNIT IV (12 Hours)

- TITRE: Accidents et catastrophes
- GRAMMAIRE : les adjectifs et les pronoms indéfinis : rien/ personne/aucun, les verbes dire, courir et mourir
- LEXIQUE : savoir les mots et les expressions des catastrophes naturelles, les maladies et les remédies, les accidents, les catastrophes naturelles
- PRODUCTION ORALE : comprendre des personnes qui expriment leur accord ou leur désaccord selon un thème donné
- PRODUCTION ECRITE : écrivez sur une catastrophe naturelle en articulant la cause et la conséquence

UNIT V (12 Hours)

- TITRE: Faire ses études a l'étranger/ bon voyage/ la météo
- GRAMMAIRE : les pronoms démonstratifs neutres, le futur simple, situer dans le temps, moi

- aussi/non-plus – moi non/si, les verbes impersonnels, les verbes croire, suivre et pleuvoir
- LEXIQUE : savoir vivre en France, le système scolaire, les formalités pour partir à l'étranger, la météo
 - PRODUCTION ORALE : exprimer son opinion sur la météo/parler de l'avenir
 - PRODUCTION ECRITE: comparer le système scolaire français et indien

Teaching Methodology	Workshop, group activity, Sharing contemporary french cultural videos
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Book for Study

1. Dauda, P., Giachino, L., & Baracco, C. (2016). *Generation AI*. Didier.

Books for Reference

1. Girardet, J., & Pecheur, J. (2017). *Echo AI*. (2nd Ed.). CLE International.
2. Mérieux, R., & Loiseau, Y. (2012). *Latitudes AI*. Didier.
3. Fournier, I. (2011). *Talk French*. Goyal Publishers.

Websites and eLearning Sources

1. <https://www.frenchcourses-paris.com/french-travel-journal/>
2. <http://www.saberfrances.com.ar/vocabulary/house.html>
3. <https://www.thoughtco.com/different-past-tenses-in-french-1368902>
4. <https://www.youtube.com/watch?v=JZdwJM7sEY8>
5. <https://www.scholaro.com/pro/Countries/France/Education-System>

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	recall the vocabulary pertaining to dwelling place.	K1
CO2	outline crisis management in France.	K2
CO3	develop a travel diary of your own.	K3
CO4	simplify the French education system.	K4
CO5	interpret past tenses in a text.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
4	23UFR41GL04	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	3	1	3	2	2	3	2	1	2	2	2.1	
CO2	3	1	2	3	3	3	2	1	3	1	2.2	
CO3	3	2	3	2	2	3	2	1	3	2	2.3	
CO4	3	1	2	2	3	3	3	1	3	3	2.4	
CO5	2	2	3	3	1	3	1	2	3	2	2.2	
Mean Overall Score											2.24 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHI41GL04	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)

- Computer Ka Yug
- Prathyay
- Adhunik Kal – Namakarn
- Namakaran

UNIT II (12 Hours)

- Vigyan Hani/Labh
- Paryayvachy Shabdh
- Adhunik Kal - Samajik Paristhithiyam
- Samanarthy Shabdh

UNIT III (12 Hours)

- Nari Shiksha
- Upasarg
- Adhunik Kal – Sahithyik Paristhithiyam
- Adhunik Kal – Salient Features

UNIT IV (12 Hours)

- Review- Book/Film
- Paryavaran Pradookshan
- Adhunik Kal - Main Divisions
- Adhunik Kal - Visheshathayem

UNIT V (12 Hours)

- Sapnom Kee Home Delivery (Novel)
- Anuvad

Teaching Methodology	Debate Participation, Videos, PPT, Quiz, Project Work
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Books for Study

1. Bosalae, S. (2020). *kavya sarang*. Rajkamal Prakashan.
2. Gupth, M. K. (2020). *Hindi Vyakaran*. Anand Prakashan.
3. Jain, S.K. (2019). *Anuvad: Siddhant Evam Vyavhar*. Kailash Pustak Sadan.

Books for Reference

1. Chaturvedi, R.P. (2015). *Hindi vyakarana*. Upakar Prakashan.
2. Ramdev. (2016). *Vyakaran Pradeep*. Hindi Bhavan.
3. Gosamy, K. (2016). *Anuvad vigyan ki Bhumika*. Rajkamal Prakashan.

4. Shukla, A. R (2021). *Hindi Sahitya Ka Itihas*, Prabhat 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	Cognitive Levels (K - Level)
	On successful completion of the course, the student will able to	
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	analyze the human values expressed in life and literature of Hindi Novelist “Mamatha Kaliyah”.	K4
CO5	evaluate the film & Literary works in Hindi.	K5

Relationship Matrix											
Semester	Course Code		Title of the Course					Hours	Credits		
4	23UHI41GL04		Hindi - 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	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	23USA41GL04	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
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Books for Study

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

Books for Reference

1. Vadhyar, R.S. & Sons. (2019). *History of Sanskrit Literature*. Book - sellers and publishers , Kalpathu ,Palghat, Kerala, south India,
2. Kulapathy, Saral, K.M. (2018). *Sanskrit Balabodh , Bharathita vidya bhavan* , Munshimarg.
3. Bharathi. (2019). *Vadatu sanskritam - Samaskara Binduhu*. S. Aksharam 8th cross, 2nd phase Giri nagar Bangalore.

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 - Level)
	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	23USA41GL04	Sanskrit - 4									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	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/week	Credits
4	23UEN42GE04	General English - 4	5	3

Course Objectives

To develop and enhance language proficiency in listening, reading, and writing skills through teacher-led reading practice, and comprehension exercises.
To encourage creative thinking through creative tasks and essay writing.
To foster effective communication skills by engaging in tasks that require note-taking, note-making, précis writing, paragraph writing, and the synthesis of information from different sources.
To strengthen grammatical skills by focusing on the application of different tenses and to emphasise grammatical accuracy in various writing tasks.
To encourage students to critically engage with media content and evaluate information.

UNIT I: Women Through the Eyes of Media

(13 Hours)

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Listening and Reading Skills through Teacher-led Reading Practice
- 1.3 Glossary
 - 1.3.1 Words
 - 1.3.2 Phrases
- 1.4 Reading Comprehension
- 1.5 Critical Analysis
- 1.6 Creative Task
- 1.7 General Writing Skill: Writing Minutes of a Meeting
- 1.8 Grammar: Present Perfect Tense

UNIT II: Effects of Tobacco Smoking

(13 Hours)

- 1.9 Introduction
- 2.0 Objectives
- 2.1 Listening and Reading Skills through Teacher-led Reading Practice
- 2.2 Glossary
 - 2.3.1 Words
 - 2.3.2 Phrases
- 2.4 Reading Comprehension
- 2.5 Critical Analysis
- 2.6 Creative Task
- 2.7 General Writing Skill: Note-Taking
- 2.8 Grammar: Present Perfect Continuous Tense

UNIT III: Short Message Service (SMS)

(13 Hours)

- 2.9 Introduction
- 3.0 Objectives
- 3.1 Listening and Reading Skills through Teacher-led Reading Practice
- 3.2 Glossary
 - 3.3.1 Words
 - 3.3.2 Phrases
- 3.4 Reading Comprehension
- 3.5 Critical Analysis
- 3.6 Creative Task
- 3.7 General Writing Skill: Note-Making
- 3.8 Grammar: Past Perfect Tense

UNIT IV: An Engineer Kills Self as Crow Sat on his Head: A Newspaper Report (12 Hours)

- 3.9 Introduction
- 4.0 Objectives
- 4.1 Listening and Reading Skills through Teacher-led Reading Practice
- 4.2 Glossary
- 4.3.1 Words
- 4.3.2 Phrases
- 4.4 Reading Comprehension
- 4.5. Critical Analysis
- 4.6. Creative Task
- 4.7 General Writing Skill: Précis Writing
- 4.8 Grammar: Past Perfect Continuous Tense

UNIT V: Traffic Rules (12 Hours)

- 4.9 Introduction
- 5.0 Objectives
- 5.1 Listening and Reading Skills through Teacher-led Reading Practice
- 5.2 Glossary
- 5.3.1 Words
- 5.3.2 Phrases
- 5.4 Reading Comprehension
- 5.5 Critical Analysis
- 5.6 Creative Task
- 5.7 General Writing Skill: Paragraph Writing
- 5.8 Grammar: Future Perfect Tense

UNIT VI: A Handful of Answers: A Zen Tale (12 Hours)

- 5.9 Introduction
- 6.0 Objectives
- 6.1 Listening and Reading Skills through Teacher-led Reading Practice
- 6.2 Glossary
- 6.3.1 Words
- 6.3.2 Phrases
- 6.4 Reading Comprehension
- 6.5 Critical Analysis
- 6.6 Creative Task
- 6.7 General Writing Skill: Writing Short Essays on Current Issues/General Topics
- 6.8 Grammar: Future Perfect Continuous Tense

Teaching Methodology	Lecture Method, Use of ICT Tools and Interactive method
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Book for Study

1. Jayraj., & Arul, S.J. et al. (2016). *Trend-Setter: An Interactive General English Textbook for Under Graduate Students*. Trinity.

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	identify and explain key concepts and topics discussed in the course.	K1
CO2	understand the content by summarising, paraphrasing, and interpreting the materials presented.	K2
CO3	apply their knowledge to create various forms of written communication, such as meeting minutes, notes, précis, paragraphs, and essays.	K3
CO4	analyse the application of different tenses in various texts.	K4
CO5	synthesise their knowledge by creating creative tasks, including short essays on current issues and general topics	K5

Relationship Matrix											
Semester	Course Code		Title of the Course							Hours	Credits
4	23UEN42GE04		General English - 4							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
4	23UMA43CC07	Core Course - 7: Modern Algebra	7	6

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 (21 Hours)
 Groups -Introduction - Definition and Examples - Elementary Properties of a Group - Equivalent Definitions of a Group - Permutation Groups.

UNIT II (21 Hours)
 Subgroups - Cyclic Groups - Order of an Element - Cosets and Lagrange's Theorem.

UNIT III (21 Hours)
 Normal Subgroups and Quotient Groups - Isomorphism - Homomorphism.

UNIT IV (21 Hours)
 Rings - Definition and Examples - Elementary Properties of Rings - Isomorphism - Types of Rings - Subrings.

UNIT V (21 Hours)
 Ideals - Quotient rings - Maximal and Prime Ideals - Homomorphism of Rings - Polynomial Rings.

Teaching Methodology	Chalk and Talk.
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Books for Study

- Arumugam, S., & Isaac, T.A. (2016). *Modern Algebra*, SciTech Publications (India) Private Ltd.
UNIT I: Chapter 3 (Sec 3.0 -3.4)
UNIT II: Chapter 3 (Sec 3.5 -3.8)
UNIT III: Chapter 3 (Sec 3.9 -3.11)
UNIT IV: Chapter 4 (Sec 4.1 -4.4, 4.6)
UNIT V: Chapter 4 (Sec 4.7-4.10, 4.16)

Books for Reference

- Herstein, I.N. (1975). *Topics in Algebra*, (2nd Ed.).John Wiley & Sons.
- Santiago, M.L. (2001). *Modern Algebra*. Tata McGraw-Hill Publishing Co. Ltd.

Course Outcomes		
CO No.	CO-Statements	Cognitive Level (K - Level)
	On successful completion of this course, students will be able to	
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	23UMA43CC07	Core Course - 7: Modern Algebra									7	6
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	1	3	3	3	3	3	2.8	
CO2	3	3	2	2	2	3	2	3	2	3	2.5	
CO3	2	2	3	3	2	3	3	3	2	3	2.6	
CO4	2	2	2	3	2	2	2	2	2	3	2.2	
CO5	2	2	2	2	2	1	3	2	2	2	2.0	
Mean Overall Score											2.42 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UMA43CC08	Core Course - 8: Operations Research	6	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 (18 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 (18 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 (18 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 (18 Hours)

Queuing theory - Queuing system - Classification of Queuing models - Poisson Queuing systems Model I (M/M/1)(∞ /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 mx2 games.

UNIT V (18 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
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Book 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 3.1 - 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.

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 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	23UMA43CC08	Core Course - 8: Operations Research						6	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	23UMA43AO02A	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's explanation 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 released in 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 a box (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	Demo Videos, PPT, Handouts, Study materials
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Book 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

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

Websites and eLearning Sources*

- <https://archive.nptel.ac.in/courses/115/107/115107131/>
- <https://archive.nptel.ac.in/courses/115/105/115105100/>
- <https://archive.nptel.ac.in/courses/115/103/115103101/>
- <https://archive.nptel.ac.in/courses/115/101/115101011/>
- <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	23UMA43AO02A	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	23UMA43OP01	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 ρ
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	23UMA43AO02B	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
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Books for Study

1. Reddy, T.S., & Murthy, A. (2012). *Cost Accounting*. Margham Publications. (Unit-I).
2. Reddy, T.S., & Murthy, A. (2012). *Management Accounting*. Margham Publications. (Unit-II, III, IV & V)

Books for References

1. Maheswari, S. N. (2017). *Cost Accounting*. S. Chand & Co.
2. Jain, S.P., & Narang, K.L. (2018). *Cost Accounting Principles and Practice*. Kalyani Publishers.

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	K1
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		Credits	
4	23UMA43AO02B		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
Mean Overall Score											2.2 (High)

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UHE44VE04A	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: Counselling for Adolescents (6 Hours)

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

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 Adolescence*, page no: 211-224 (2011).
2. Larry, R. C. (2000). *Disaster Management and Preparedness*, Lewis Publications.
3. Hurlock, E.B. (2001). *Developmental Psychology: A Life-Span Approach*. (5th Ed.). Tata McGraw-Hill.
4. Sangha., & Kamaljit. (2015). *Ways to Live in Harmony with Nature: Living Sustainably and*

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

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
4	23UHE44VE04A	Value Education - 4: Social Ethics - 2									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
4	23UHE44VE04B	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	Chalk and Talk, Power point, assignment and Group discussion
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Book for Study

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

Book 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 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

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
4	23UHE44VE04B	Value Education - 4: Religious Doctrine - 2									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	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
5	23UMA53CC09	Core Course - 9: Real Analysis	7	5

Course Outcomes
To study the real number system and its properties
To study the properties of functions defined on the Real line
To understand metric spaces with suitable examples
To apply the Rolle's Theorem to problems in the context of real analysis
To know how abstract ideas and rigorous methods in Mathematical Analysis can be applied to practical problems.

UNIT I: Sets, Functions and Sequences of Real Numbers (21 Hours)

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

UNIT II: Limits and Metric Spaces (21 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 (21 Hours)

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

UNIT IV: Calculus (21 Hours)

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

UNIT V: Taylor's Series (21 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.
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Book for Study

- Goldberg, R.R. (1970). *Methods of Real Analysis*. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

Unit I: Chapter 1: Sections: 1.3 - 1.7; Chapter 2: 2.9 & 2.10)

Unit II: Chapter 4: Sections: 4.1 - 4.3 [Omit examples 4 & 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

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

Course Outcomes		
CO No.	CO-Statements	Cognitive Level (K - Level)
	On successful completion of this course, students will be able to	
CO1	acquire knowledge of set theory, functions and limits.	K1
CO2	have in-depth understanding on the concepts of continuity, derivability and Riemann integrability.	K2
CO3	apply the concepts to test continuity, derivability and Riemann integrability of functions.	K3
CO4	analyze, infer and conceptualize the theory and properties of metric spaces.	K4
CO5	evaluate limits of functions, integrals and derivatives.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
5	23UMA53CC09	Core Course - 9: Real Analysis									7	5
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	23UMA53CC10	Core Course - 10: Mechanics	7	5

Course Objectives
Introduce the laws of Forces and their properties
Understand friction laws and its properties
Solve problems in Catenary using its properties
Analyze the behavior of motion of objects
Apply the concepts of behavior of elastic bodies to real life problems

UNIT I (21 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 (21 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 (21 Hours)
Equation to common catenary - Tension at any point - Geometrical properties of common Catenary.

UNIT IV (21 Hours)
Motion in a plane without air resistance - path of a projectile - Time off light-Horizontal range - Motion of a projectile up an inclined plane.

UNIT V (21 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
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Books for Study

- Venkataraman, M.K. (2007). *Statics*, (12th Ed.). Agasthiar Publishers.
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
- Venkataraman, M.K. (2006). *Dynamics*, (12th Ed.). 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

Book for Reference

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

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 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	23UMA53CC10	Core Course - 10: Mechanics									7	5
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	23UMA53ES01A	Discipline Specific Elective - 1: Automata Theory	5	3

Course Objectives
Understand the definition of Automation.
Introduce different types of Grammar.
Constructing Regular Expressions.
Train to know the normal forms.
Study Pumping lemma for regular sets.

UNIT I (15 Hours)

Definition of an Automaton - Description of Finite Automaton -Transition systems - Properties of transition functions - acceptability of a string by a finite Automaton-Nondeterministic finite automaton -The equivalence of DFA and NFA.

UNIT II (15 Hours)

Formal Languages - Basic Definitions and examples- Chomsky classification of Languages - Languages and their relation - Recursive and Recursively Enumerable sets- Operations on Languages.

UNIT III (15 Hours)

Regular expressions - Finite Automata and Regular expressions

UNIT IV (15 Hours)

Pumping Lemma for Regular sets-Applications of Pumping Lemma-Closure Property of Regular sets - Regular sets and Regular grammars.

UNIT V (15 Hours)

Context free Languages and Derivation trees - Ambiguity in Context free grammars - Simplification of Context Free grammars (Examples only).

Teaching Methodology	Chalk and talk, Lectures, PPT.
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Book for Study

- Mishra, K.L.P., & Chandrasekaran, N. (2006). *Theory of Computer Science Automata Languages and Computation*, (3rd Ed.). Prentice Hall India.
UNIT I: Chapter 2: Sections 2.1 - 2.7.
UNIT II: Chapter 3: Sections 3.1 - 3.5.
UNIT III: Chapter 4: Sections: 4.1 - 4.2.
UNIT IV: Chapter 4 Sections: 4.3 - 4.6.
UNIT V: Chapter 5 Sections: 5.1- 5.3.

Books for Reference

- Hopcroft, J.E., & Ullman, J.D. (2006). *Introduction to Automata Theory Languages and Computation*, (3rd Ed.). Prentice Hall.
- Ahoand, A.V., & Ullman, J.D. (2012). *Principles of Compiler Design*. Pearson Education.

Course Outcomes		
CO No.	CO-Statements	Cognitive Level (K - Level)
	On successful completion of this course, students will be able to	
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
5	23UMA53ES01A	Discipline Specific Elective - 1: Automata Theory									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	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
5	23UMA53ES01B	Discipline Specific Elective - 1: Number Theory	5	3

Course Objectives
Aims to give elementary ideas from number theory which will have applications in cryptology
Identify and apply various properties of primes, unique factorization, the division algorithm and relating it to integers
Understand the concept of a congruence and find the greatest common divisor (gcd) of two integers using the Euclidean algorithm
Establishing properties of Euler's phi function, sigma function and $\phi(\phi)$
Applying Fermat's little theorem and Wilson's theorem to establish congruences with a prime modulus.

UNIT I (15 Hours)
Euclid's Division Lemma-Divisibility - The Linear Diophantine Equation - The Fundamental Theorem of Arithmetic.

UNIT II (15 Hours)
Permutation, Combinations - Basic Properties of congruence's - Residue Systems - Linear Congruence-The Theorems of Fermat and Wilson Revisited.

UNIT III (15 Hours)
The Chinese Remainder Theorem - Polynomial congruence's-Combinatorial Study of $\phi(\phi)$ - Formulae for $\phi(\phi)$ and $\phi(\phi)$.

UNIT IV (15 Hours)
Multiplicative Arithmetic Function-The Mobius Inversion Formula- Properties of Reduced Residue Systems- Primitive roots Modulo ϕ .

UNIT V (15 Hours)
Euler's criterion - The Legendre Symbol - The Quadratic Reciprocity Law.

Teaching Methodology	Chalk and talk, Lectures, PPT.
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Book for Study

- 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)
Unit V: Chapter 9 (Sec 9.1-9.3 Pages 115-124)

Books for Reference

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

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 of the basic concepts of number theory.	K1
CO2	understand the concepts of permutation, combinations, polynomial congruence, primitive roots, Legendre symbol and signum function.	K2
CO3	find measures and parameter in number theory.	K3
CO4	illustrate the concepts of number theory with example	K4
CO5	solve system of congruences, Diophantine equation and some problems in combinatorics.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
5	23UMA53ES01B	Discipline Specific Elective - 1: Number Theory									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	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											2.24 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UMA53ES02A	Discipline Specific Elective - 2: Graph Theory	5	3

Course Objectives
To introduce the notion of graph theory and its applications.
To understand the concept of Eulerian graphs.
To learn the techniques of combinatorics in Graph Theory.
To learn the concept of Hamiltonian graphs.
To know the relation between Matrices and Graph Theory.

UNIT I (15 Hours)
Introduction - The Konigsberg Bridge Problem - Definition and Examples - Degrees - Subgraphs - Isomorphism.

UNIT II (15 Hours)
Matrices - Operations on Graphs - Walks - Trails and Paths - Connectedness and Components - Eulerian Graphs.

UNIT III (15 Hours)
Hamiltonian Graphs (Omit Chavatal Theorem) - Characterization of Trees - Centre of Tree

UNIT IV (15 Hours)
Introduction - Definition and Properties - Characterization of Planar Graphs

UNIT V (15 Hours)
Definitions and Basic Properties - Some Applications: Connector Problem - Kruskal's algorithm - Shortest Path Problem - Dijkstra's algorithm.

Teaching Methodology	Chalk and Talk, PPT
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Book for Study

- Arumugam, S., & Ramachandran, S. (2006). *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, 5.0,5.1)
Unit III (Sec 5.2,6.1,6.2)
Unit IV (Sec 8.0, 8.1,8.2)
Unit V (Sec 10.0, 10.1, 11.1, 11.2)

Books for Reference

- Deo, N. (2004). *Graph Theory with applications to Engineering and Computer Science*, Prentice Hall of India.
- 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, 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	23UMA53ES02A	Discipline Specific Elective - 2: Graph Theory									5	3
Course Outcomes	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO 5		
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	23UMA53ES02B	Discipline Specific Elective - 2: Mathematical Modeling	5	3

Course Objectives
To gather and convert information of a physical phenomenon into a mathematical framework
To analyze a model and to apply an appropriate method to calculate a solution in order to predict the behaviour of the system
To interpret results of modelling on numbers and variables and equations and diagrams and graphs and charts
To communicate the entire process such as abstraction, hypothesis, analysis, conclusion which may know less, the same amount of, or more mathematics to the intended audience
To draw inferences from models using mathematical techniques including problem solving, quantitative reasoning, and exploration using multiple representations such as equations, tables, and graphs

UNIT I: Growth and Decay Models (15 Hours)

Linear Growth and Decay Models-Nonlinear Growth and Decay Models-Spread of infectious diseases-Compartment Models

UNIT II: Modelling in Dynamics (15 Hours)

Mathematical Modelling in Dynamics -Motion of a rocket-Mathematical Modelling of Geometrical Problems through ODE-Orthogonal Trajectories.

UNIT III: Modelling in Population (15 Hours)

Mathematical Modelling in Population Dynamics - Mathematical Modelling of Epidemics - Compartment models through systems of ODE.

UNIT IV: Modelling in Economics (15 Hours)

Mathematical Modelling in Economics -Debt Model-Open and Closed Dynamical Systems- Investment Model -Market Equilibrium-Medicine Arms Race-International Trade Model- modelling through systems of ODE.

UNIT V: Modelling through Differential Equations (15 Hours)

Mathematical Modelling through Linear Differential Equations of Second Order-Electrical Circuit-Stabilization Model for Closed Economy-The Catenary-Curve of Pursuit.

Teaching Methodology	Chalk and talk, Lectures, PPT.
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Book for Study

- Kapur, J.N. (2015). *Mathematical Modelling*, (2nd Ed.). New Age International Publishers.
Unit I Chapter 2 (Sec 2.2,2.3,2.4) Unit II Chapter 2 (Sec2.5,2.6)
Unit III Chapter 3(Sec 3.1,3.2,3.3) Unit IV Chapter 3(Sec 3.4,3.5,3.6)
Unit V Chapter 4(Sec 4.3, 4.4)

Books for Reference

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

Website and eLearning Source

- www.e.sfu-kras.ru

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	Acquire knowledge on basic principles of mathematical modelling.	K1
CO2	Understand the importance of mathematical modelling in the fields of Linear and Nonlinear growth, Dynamics, Epidemics and Economics.	K2
CO3	Apply the concepts of differential equations to study Decay models, Population dynamics, Modelling of Geometric problems and Investment model.	K3
CO4	Identify and appreciate the unifying influence of mathematical modelling in different disciplines	K4
CO5	Analyze and translate a real-world problem into a mathematical problem.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
5	23UMA53ES02B	Discipline Specific Elective - 2: Mathematical Modeling									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	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	23UMA53SP01	Self-paced 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 Noether
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 'Bhillamal acarya' (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

Bhāscara Āchárya (1114-1185) India - Jean-Baptiste le Rond' 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	JosTEL
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Book 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
5	23UMA53SP01		Self-paced Learning: History of Mathematics								-	2
Course Outcomes	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Scores 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	23USS54SE01	Skill Enhancement Course - 2: 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 group discussions

UNIT I: Communication Skills

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

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

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

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

UNIT V: Test of Reasoning

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

Book 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.

Course Outcomes		
CO No.	CO-Statements	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	analyse problems directed at testing their cognitive abilities	K3
CO2	present the best of themselves as job seekers and communicate effectively in all contexts	K4
CO3	assess themselves, set goals, and manage conflicts that are expected of a good leader	K5

Relationship Matrix											
Semester	Course Code		Title of the Course							Hours	Credits
5	23USS54SE01		Skill Enhancement Course - 2: Soft Skills							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	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
Mean Overall Score											2.5 (High)

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UMA63CC11	Core Course - 11: Linear Algebra	6	5

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)
Linear Transformation - Definition and examples - Subspaces - 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 V (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
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Books for Study

- 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. 1 - 7.5)
Unit V Chapter 7 (Sec 7.7, 7.8) Chapter 8 (Sec 8.1, 8.2)

Books for Reference

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

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
6	23UMA63CC11	Core Course - 11: Linear Algebra									6	5
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
6	23UMA63CC12	Core Course - 12: 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
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Book for Study

- 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. 30-67
Unit II: Chapter III, Section 3.2 - 3.4, pp. 67-75, 82-94
Unit III: Chapter VI, Section 6.0 -6.4, pp.132-172
Unit IV: Chapter VII, Section 7.0-7.4, pp.173-208
Unit-V: Chapter VIII, Section 8.0-8.3, pp. 209-255

Books for Reference

- Narayanan, S. & Pillai, T.K.M. (2007). *Complex Analysis*. S. Viswanatha printers and publishers Pvt. Ltd.
- Duraipandian, P., Laxmi, D., & Muhilan, D. (2001). *Complex Analysis*. Emerald Publishers.
- Spiegel, M.R. (1964). *Theory and Problems of Complex Variables*. Schaum's Outline Series, McGraw Hill book Company.

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	23UMA63CC12	Core Course - 12: 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	23UMA63CP01	Core Practical: C Language	2	1

Course Objectives
The students learn to write C programs to solve quadratic equations,
To Generate Fibonacci series, Prime numbers checking, finding mean, S.D and median, sorting numbers, series expansion of $\sin x$ and $\cos x$ etc.,
The students learn to write C programs for matrix manipulations, Palindrome verification, computing nCr , nPr using function subprograms.
The students learn to write C programs to solve numerical, algebraic and transcendental equations and learn to write C programs for numerical Integration.
The students learn to write C programs to solve Ordinary Differential Equations numerically and Interpolation and Learning to rectify the errors in 'C' Programming.

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 solving equations.
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	Cognitive Levels (K - Level)
	On successful completion of this course, students will be able to	
CO1	acquire knowledge to write C programs.	K1
CO2	understand functions of various keywords involved in a C program.	K2
CO3	apply user defined functions and loops while write a C program.	K3
CO4	analyze and evaluate the exact solution of a problem with output of a C program.	K4
CO5	evaluate and create a C programme and write solution for real life problems.	K5

Relationship Matrix												
Semester	Course Code	Title of the Course									Hours	Credits
6	23UMA63CP01	Core Practical: C Language									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	23UMA63ES03A	Discipline Specific Elective - 3: Computer Oriented Numerical Methods	5	3

Course Objectives
Basics of C programming and various data types and operators in C language.
Knowledge on Decision making-branching and looping statements in C programming and the concept of arrays.
Learn to handle character strings and the concept of user define function and Creating simple 'C' Programmes for solving problems in numerical methods
Concepts of curve fitting, finding solution to numerical, algebraic and transcendental equations and to solve simultaneous linear equations
Solution of Ordinary Differential Equations using numerical methods and gets introduced to interpolation and numerical Integration.

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* - Pointers.

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 - Euler method and Runge-Kutta fourth order method .

Note:

1) For Numerical methods: Problems and Programs only. 2)For topics in italics- programs only.

Teaching Methodology	Chalk and Talk, PPT
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Books for Study

- Balagurusamy, E. (2012). *Programming in ANSI C*, (6th Ed.). Tata Mc-Graw Hill Publishing Co. Ltd.
Unit I: Chapters 1-4 **Unit II:** Chapters 5-7 **Unit III:** Chapters 8-9,11
- Venkatraman, M.K. (2001). *Numerical methods in Science and Engineering*, (5th Ed.). National Publisher Company.
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 (Sections 10, 16)

Books for Reference

1. Kanetkar, Y.P (2002). *Let us 'C'*. BPB Publications.
2. Rajaraman. (1971). *Computer oriented numerical methods*. Prentice-Hall of India.

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 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 solve the given problems and evaluate their solutions.	K3
CO4	analyze the best approximated value of the root of the given function 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	23UMA63ES03A	Discipline Specific Elective - 3: Computer Oriented Numerical Methods									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											2.36 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UMA63ES03B	Discipline Specific Elective - 3: Optimization Techniques	5	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 (15 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 (15 Hours)
Introduction The Recursive Equation Approach - Characteristics of Dynamic Programming - Dynamic Programming Algorithm.

UNIT III (15 Hours)
Introduction -- Decision making Problem - Decision making Process - Decision making Environment - Decision under Uncertainty

UNIT IV (15 Hours)
Introduction - Replacement of Equipment/Asset That Deteriorates Gradually-Replacement of Equipment that fails suddenly.

UNIT V (15 Hours)
Introduction Graphical solution - Kuhn-Tucker conditions with non- negative constraints - Quadratic programming.

Teaching Methodology	Chalk and Talk, PPT, Group Discussion
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Book 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 to 12.6.
Unit II: Chapter 13, Sections 13.1 to 13.4.
Unit III: Chapter 16, Sections 16.1 to 16.5.
Unit IV: Chapter 18, Sections 18.1 to 18.3.
Unit V: Chapter 28, Sections 28.1 to 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.

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 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	23UMA63ES03B		Discipline Specific Elective - 3: Optimization Techniques								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	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	23UMA63ES04A	Discipline Specific Elective - 4: Astronomy	5	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 (15 Hours)
Celestial sphere and diurnal motion - Celestial coordinates - Sidereal time.

UNIT II (15 Hours)
Morning and evening stars - circumpolar stars - zones of earth - perpetual day - twilight.

UNIT III (15 Hours)
Refraction - laws of refraction - tangent formula - horizontal refraction - geocentric parallax horizontal parallax

UNIT IV (15 Hours)
Kepler's laws - Anomalies - Kepler's equation - Calendar.

UNIT V (15 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 a year.

Teaching Methodology	Chalk and Talk, PPT, Group Discussion, Flipped classrooms, Kinesthetic Learning.
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Book for Study

- 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.
UNITIV: Art. 146 - 149, 156 - 159, 175 - 179.
UNIT V: Art. 229 - 241, 256 - 263, 267, 268, 271 - 275.

Books for Reference

- Ramachandran, G.V. (1965). *Text Book of Astronomy*. Mission Press.
- Seeds, M. (1992). *Foundations of Astronomy*, (3rd Ed.). Wadsworth Publishing Company.

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	23UMA63ES04A		Discipline Specific Elective - 4: Astronomy								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	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	23UMA63ES04B	Discipline Specific Elective - 4: Fuzzy Theory	5	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 projections and extensions on fuzzy sets and fuzzy relations.

To understand the decision making process and apply them to real life problems.

UNIT I (15 Hours)

Fuzzy sets - definition - Different Types of Fuzzy sets - General Definitions and Properties of Fuzzy Sets - Other Important Operations - General Properties: Fuzzy vs. Crisp.

UNIT II (15 Hours)

Introduction - Some Important Theorems - Extension Principle for Fuzzy Sets - Fuzzy Complements - Further Operations on Fuzzy Sets.

UNIT III (15 Hours)

Fuzzy numbers - Algebraic Operations with fuzzy numbers - Binary Operation of two Fuzzy Numbers - special extended operations - fuzzy arithmetic - arithmetic operation on fuzzy numbers in the form of α -cut sets - fuzzy equations.

UNIT IV (15 Hours)

Introduction - Projections and Cylindrical Fuzzy Relations - Composition - Properties of Min- Max Composition - Binary Relations on a Single Set - Compatibility Relation.

UNIT V (15 Hours)

Introduction - Individual Decision Making - Multi person Decision Making - Multi criteria Decision Making - Fuzzy Ranking Method - Fuzzy Linear Programming.

Teaching Methodology	Chalk and Talk, PPT
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Book for Study

- Pundir, S.K., & Pundir, S. (2010). *Fuzzy sets and their applications*. (3rd Ed.). Prakashan Educational Publishers.

Unit - I Chapter 1 (Sec 1.16 - 1.21)

Unit - II Chapter 2 (Sec 2.1 - 2.5)

Unit - III Chapter 3 (Sec 3.1 - 3.9)

Unit - IV Chapter 4 (Sec 4.1 - 4.6)

Unit - V Chapter 9 (Sec 9.1 - 9.6)

Books for Reference

- Zimmermann, H.J. (1987). *Fuzzy sets Decision making and expert systems*. Kluwer.
- Chen, S.J., & Hwang, C.L. (1992). *Fuzzy Multiple Attributes Decision Making*. Springer verlag.

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 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	23UMA63ES04B		Discipline Specific Elective - 4: Fuzzy Theory								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	2	2	1	2	2	3	2	2	3	3	2.2	
CO2	2	1	2	1	2	2	3	3	3	2	2.1	
CO3	1	2	2	3	1	2	3	3	3	2	2.2	
CO4	3	2	1	2	3	2	3	3	2	1	2.2	
CO5	2	3	2	3	1	3	3	2	3	3	2.5	
Mean Overall Score											2.2 (High)	

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UMA63CE01	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: Algebra

Groups - Permutation Groups- Lagrange's Theorem - Normal Subgroups and Quotient Groups - Rings - Ideals - Quotient rings - Maximal and Prime Ideals - Polynomial Rings.

UNIT II: 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 - Quadratic forms.

UNIT III: Real Analysis

Functions -Countability - Cauchy sequences- Limit of a function on the real line - Metric spaces - Functions continuous at a point on the real line - Discontinuous functions on \mathbb{R} - Derivatives- Rolle's Theorem - Fundamental theorems of calculus - Taylor's theorem.

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).

Unit V: Differential Equations ODE:

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 $\frac{1}{x^2}$, $\frac{1}{x^2} \ln x$, $\frac{1}{x^2} \ln^2 x$.

Teaching Methodology	Lectures
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Books for Study

1. Arumugam, S., & Isaac, T.A. (2016). *Modern Algebra*. SciTech Publications (India) Private Ltd. (Unit I)
2. Arumugam, S., & Isaac, T.A. (2012) *Modern Algebra*. Sci Tech Publications (India) Ltd. (Unit II)
3. Goldberg, R.R. (1970). *Methods of Real Analysis*. Oxford & IBH Publishing Co. Pvt. Ltd. (Unit III)
4. Arumugam, S., Isaac, T.A., & Somasundaram, A. (2002). *Complex Analysis*. SciTech Publications (India) Pvt. Ltd. (Unit IV)
5. Narayanan, S., & Pillay, T.K.M. (2013). *Differential equations and its Applications*. Viswanathan 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	Cognitive Levels (K - Level)
CO1	On successful completion of this course, students will be able to 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