B Sc ELECTRONICS

LOCF SYLLABUS 2023

Department of Electronics

School of Physical 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 TANSCHE and other higher educational institutions, facilitates seamless credit transfers across diverse disciplines. This underscores the adaptability and uniqueness of the choice-based credit system.

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

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

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

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

Credit system

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

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

For undergraduate (UG) courses, students are required to accumulate a minimum of 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 course are elective modules that complement the primary disciplines by providing additional knowledge and skills. These courses allow students to explore areas of interest outside their major field of study, broadening their understanding and enhancing their skill set.*

Discipline Specific Elective (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

Sl 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 × 1 = 7
B *(compulsory)*			5					5 × 3 = 15
C *(either…or type)*				3				3 × 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)*				1	1*		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)*				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
• 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
• Self-paced Learning • Comprehensive Examination	25 + 25 = 50	50 *(CoE)*	100
• Value Education • Environmental Studies	50	50 *(CoE)*	100
• Skill Enhancement Course: Soft Skills	100	-	100
• Generic Elective	100	100 *(CoE)*	100
• 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:

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

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

Where,

Ci - credit earned for the Course i

Gpi - Grade Point obtained for the Course i

Mi - Marks obtained for the Course i

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

WAM - Weighted Average Marks

Classification of Final Results

- For each of the first three parts in the UG Programme, there shall be separate classification on the basis of CGPA, as indicated in Table - 2.
- For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/Science/Commerce/Management as Outstanding/Excellent/Very Good/Good/Above Average/Average, the marks and the corresponding CGPA earned by the candidate in Part III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in all the five Parts of the programme.

- Grade in Part IV and Part V shall be shown separately and it shall not be taken into account for classification.
- A pass in SHEPHERD will continue to be mandatory although the marks will not be counted for the calculation of the CGPA.
- Absence from an examination shall not be considered as an attempt.

Table - 1: Grading of the Courses

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

Table - 2: Grading of the Final Performance

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

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

Vision

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

Mission

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

Programme Educational Objectives (PEOs)

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

Programme Outcomes (POs)

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

Programme Specific Objectives (PSOs)

1. Graduates will be able to familiarize the theories of electronics to develop Critical and analytical skills to meet the real-life needs.
2. Graduates will be able to enhance their experimental, problem solving skill and design electronic circuits for complex problems.
3. Graduates will be equipped with hardware, software trouble shooting and programming skill.
4. Graduates will be competent in applying the appropriate techniques, handling electronic instruments and use of modern tools.
5. Graduates will be able to pursue higher education, adapt excellently to the change in work environment and turn out to be Entrepreneur.

PROGRAMME STRUCTURE					
Part	**Semester**	**Specification**	**No. of Courses**	**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	10	46	35
	1 - 6	Core Practical	6	24	17
	2	Workshop	1	3	2
	1, 2	Allied Course	2	12	8
	3, 4	Allied Optional	2	8	6
	3, 4	Allied Optional Practical	1	4	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 (Soft Skills)	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	**50(5)**	**180(6)**	**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	23UEL13CC01	**Core Course - 1:** Semiconductor Theory and Electronic Devices	5	4	100	100	100
		23UEL13CP01	**Core Practical - 1:** Semiconductor Devices	3	2	100	100	100
		23UEL13AC01	**Allied Course - 1:** Mathematics for Electronics - 1	6	4	100	100	100
	4	23UEL14FC01	**Foundation Course:** Introductory Electronics	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**	**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	23UEL23CC02	**Core Course - 2**: Electric Circuit Analysis	5	4	100	100	100
		23UEL23CP02	**Core Practical - 2:** Circuit Analysis	3	2	100	100	100
		23UEL23WS01	**Workshop:** Circuit Design and Trouble Shooting	3	2	100	-	100
		23UEL23AC02	**Allied Course - 2:** Mathematics for Electronics - 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	23UEL33CC03	**Core Course - 3:** Digital Electronics	5	4	100	100	100
		23UEL33CC04	**Core Course - 4:** Electronic Circuits	5	3	100	100	100
		23UEL33CP03	**Core Practical - 3:** Digital and Analog Circuits	3	3	100	100	100
		23UEL33AO01A	**Allied Optional - 1:** Applied Physics - 1	4	3	100	100	100
		23UEL33AO01B	**Allied Optional - 1:** Computer Science - 1					
		@	**Allied Optional Practical:** Applied Physics	2	-	-	-	-
		@	**Allied Optional Practical:** Computer Science					
	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**	**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	23UEL43CC05	**Core Course - 5:** Linear Integrated Circuits	5	4	100	100	100
		23UEL43CC06	**Core Course - 6:** Communication Electronics	5	4	100	100	100
		23UEL43CP04	**Core Practical - 4:** Communication and LIC	3	2	100	100	100
		3UEL43AO02A	**Allied Optional - 2:** Applied Physics - 2	4	3	100	100	100
		23UEL43AO02B	**Allied Optional - 2:** Computer Science - 2					
		23UEL43OP01A	**Allied Optional Practical:** Applied Physics	2	2	100	100	100
		23UEL43OP01B	**Allied Optional Practical:** Computer Science					
	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**	**22(3)**			
5	3	23UEL53CC07	**Core Course - 7:** Microprocessors and Applications	4	3	100	100	100
		23UEL53CC08	**Core Course - 8:** Sensors and Electronic Instrumentation	4	3	100	100	100
		23UEL53CP05	**Core Practical - 5:** Microprocessors, C and Python	6	4	100	100	100
		23UEL53ES01A	**Discipline Specific Elective - 1:** Mobile Communication	5	3	100	100	100
		23UEL53ES01B	**Discipline Specific Elective - 1:** Medical Electronics					
		23UEL53ES02A	**Discipline Specific Elective - 2:** C and Python Programming	5	3	100	100	100
		23UEL53ES02B	**Discipline Specific Elective - 2:** Computer Hardware and Networks					
		23UEL53IS01	Internship	-	1	100	-	100
		23UEL53SP01A	**Self-paced Learning:** RF, Microwave and Optical Communications*	-	2	50	50	50
		23UEL53SP01B	**Self-paced Learning:** PCB Design and Fabrication*					
	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	23UEL63CC09	**Core Course - 9:** Microcontroller and Embedded System	4	3	100	100	100
		23UEL63CC10	**Core Course - 10:** Power Electronics	4	3	100	100	100
		23UEL63CP06	**Core Practical - 6:** Microcontroller and Power Devices	6	4	100	100	100
		23UEL63ES03A	**Discipline Specific Elective - 3:** Control System	5	3	100	100	100
		23UEL63ES03B	**Discipline Specific Elective - 3:** Virtual Instrumentation					
		23UEL63ES04A	**Discipline Specific Elective - 4:** Robotics and Industrial Automation	5	3	100	100	100
		23UEL63ES04B	**Discipline Specific Elective - 4:** Digital Image Processing					
		23UEL63PW01	Project Work and Viva Voce	-	2	100	100	100
		23UEL63CE01	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	-	(3)			
			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 Meeting 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
Mathematics	23UMA14SE01	Skill Enhancement Course - 1: (Non-Major Elective): Mathematics for Competitive Examinations
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
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
Mathematics	23UMA54EG01	Generic Elective - 1: Numerical Ability
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
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
Mathematics	23UMA64EG02	Generic Elective - 2: Quantitative Techniques
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
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
SPS	23UCH64SE02	Skill Enhancement Course - 3 (WS): Instrumental Analysis
	23UPH64SE02A	Skill Enhance Course - 3: (WS): Radiation Physics and Safety
	23UPH64SE02B	Skill Enhance Course - 3: (WS): Non-Destructive Testing

**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-பதினெண்கீழ்கணக்கு 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 - சுடர்த்தொடீஇக் 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 குடியல்லோம் எனத் தொடங்கும் பாடல் மட்டும்
- மாணிக்கவாசகர் திருவாசகம் - நமச்சிவாய வாஅழ்க நாதன்தாள் வாழ்க முதல் சிரம்குவிவார் ஓங்குவிக்கும் சீரோன் கழல் வெல்க வரை
- பொய்கையாழ்வார்-வையந் தகளியா வார்கடலே
- 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)*

பாடநூல்

1. **பொதுத்தமிழ்**-*1 (* **தமிழ் இலக்கிய வரலாறு**-*1),* **தமிழாய்வுத்துறை**, **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 பாலசுப்ரமணியம், & பத்மநாபன். நீல., புதிய தமிழ் இலக்கிய வரலாறு *(3* தொகுதிகள்), சாகித்ய அக்காதெமி, புதுடெல்லி,*2013*
8. பெருமாள். அ.கா., தமிழ் இலக்கிய வரலாறு, சுதர்சன் புக்ஸ், நாகர்கோவில், *2014*
9. ஏசுதாசன். ப.ச., தமிழ் இலக்கிய வரலாறு, நியூ செஞ்சுரி புக் 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.chennailibrary.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** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
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**	**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
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

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 A1*, Didier, Paris 2020.
2. J.Girardet and J.Pecheur, *Echo A1*, CLE International, 2^{e}edition ,2017
3. Isabelle Fournier, *Talk French*, Goyal Publishers, 2011

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2. https://francais.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/exercises/exercise-french-2/exercise-french-3295.php

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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 priksha par adharit nibandho dwara bhasha ki kshamta badhane vale prashikshan kary.

Teaching Methodology	Videos, PPT, Quiz, Group Discussion, Project Work.

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** On successful completion of the course, the student will be able to	**Cognitive Levels (K - Level)**
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 toPancamahakavyas.
To understand the Raghuvasa Mahakava and Kalidasa.

UNIT I **(15 Hours)**

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

Grammar:

akārāntaḥpuṁliṅgaḥśabda-s - 1. बाल (*Bāla*) and 2. देव (*Deva*) *ākārāntaḥstrīliṅgaḥśabda-s* - 1. बाला (*Bālā*) and 2. लता (*Latā*)*akārāntaḥnapuṁsakaliṅgaḥśabda-s* -

1. फल (*Phala*) and 2. वन (*Vana*)

UNIT II **(15 Hours)**

Introduction to *Rāmāyana,Kālidāsa* and his poetic works

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

UNIT III **(15 Hours)**

Introduction to the works of *Bhāravi* -

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

UNIT IV **(15 Hours)**

Introduction to the works of *ŚrīHarṣha* -

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

UNIT V **(15 Hours)**

Grammar:

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

(i) गच्छतत (*Gacchati*) (ii) ततष्ठतत (*Tiṣṭhati*) (iii) पठतत (*Paṭhati*)

(iv) नृत्यतत (*Nṛtyati*) (v) कु प्यतत (*Kupyati*) (vi) कथयतत (*Kathayati*)

(vii) गणयतत (*Gaṇayati*) (viii) अततत (*Asti*)

(ix) करोतत (*Karoti*) (x) शृणोतत (*Śṛṇoti*)

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

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

Teaching Methodology	Videos, PPT, demonstration.

Book for Study

1. Murugan, C., et al. (eds.). (2022). *Kalasala Samskrta 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/AShortHistoryOfsanskritLiterarure
5. https://archive.org/details/raghuvamsha_with_sanjivini_edited_by_mr_kale

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	remember the usage of grammatical tenses inconstructing 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 hypothesisin 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

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

Poem

3. Where the Mind is Without Fear – Gitanjali 35 – Rabindranath Tagore
4. Love Cycle – Chinua Achebe

UNIT II: Empathy (15 Hours)

Poem

5. Nine Gold Medals – David Roth
6. Alice Fell or poverty – William Wordsworth

Short Story

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

UNIT III: Parts of Speech (15 Hours)

9. Articles
10. Noun
11. Pronoun
12. Verb
13. Adverb
14. Adjective
15. Preposition

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

Poem

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

Readers Theatre

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

Unit V: Paragraph and Essay Writing (15 Hours)

20. Descriptive
21. Expository
22. Persuasive
23. Narrative
24. Reading Comprehension

Teaching Methodology	Interactive methods, and multimedia presentations

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/9rVzlNv
5. https://archive.org/details/in.ernet.dli.2015.44179

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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	23UEL13CC01	**Core Course -1:** Semiconductor Theory and Electronic Devices	5	5

Course Objectives
To explain the physics of semiconducting materials and devices
To evaluate the characteristics of passive and active components
To apply the theory in simple applications
To provide simple solutions to the electronics problems
To develop simple electronic circuits

UNIT I: Semiconductor Physics **(15 Hours)**

Types of Solids- Crystal Structure- Crystal Planner and Miller Indices- Formation of Energy Bands - Electrical Conduction in Solids - Energy Band and Band Model - Classification of Materials Based on Band Theory - Semiconductor Materials - Intrinsic Semiconductors Extrinsic Semiconductors- Drift and Diffusion Currents - Excess Carriers - Density of States - Fermi Function Carrier Distribution - Electron and Hole Concentration - np Product- Carrier Concentration Calculations- Fermi Level Determination - Band Bending - Carrier Generation and Recombination (concept only) - Continuity Equations - Minority Carrier Lifetime - Diffusion Length

UNIT II: Passive Elements **(15 Hours)**

Resistance - Resistor Color Code - Calculating Resistor Value - Resistor Parameters Connecting Resistors Together - Capacitance and Charge - Dielectric Materials of a Capacitor - Voltage Rating of a Capacitor - Energy Stored in Capacitors -Types of Capacitors Characteristics of Capacitors - Charging and Discharging of a Capacitor - Capacitor in Parallel- Capacitor in Series -Construction of Inductor - Inductance-Factors Affecting Inductance -Time Constant of an Inductor-Power and Energy in an Inductor- Inductor in Series and Parallel-Self Inductance -Mutual Induction -Working Principle of Transformer

UNIT III: Semiconductor Diodes **(15 Hours)**

Introduction PN-junction - Barrier Potential - Basic Diode Circuit - Ideal Diode- Diode Testing - DC Resistance of Diode - Unbiased Diode - Forward Bias - Breakdown - Reverse Biased Diode - No uniformly Doped Junctions - PN Junction Current - Small-Signal Model of PN Junction- Charge Storage and Diode Transients - Tunnel Diode -Special Purpose Diodes -Zener Diode - Schottky Diode - Varactor Diode - Step Recovery Diode - Gunn Diode

UNIT IV: Transistors **(15 Hours)**

PNP and NPN Transistors - Transistor Characteristics - Unbiased Transistors - Biased Transistor - Transistor Current - CE, CB and CC Configurations - Base Curve - Collector Curve - Surface Mount Transistors- Variations in Current Gain - Load Line - Darlington Pair - JFET and Characteristics - MOSFET and Characteristics - High Electron Mobility Transistor

UNIT V: Opto Electronic Devices **(15 Hours)**

LED: Construction - Operation - Calculating an LED Resistor Value - Advantages and Disadvantages of LED - LCD: Construction and Working - Photodiode working Principle - Photo Transistor working Principle - PIN Diode - Solar Cell - LASER Diodes - Applications of optoelectronic devices.

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation

Books for Study

1. Neamen, D. A. (2012). *Semiconductor physics and devices,* (4th Ed.). McGraw Hill Higher Education.
2. Malvino, A. (2014). *Electronics principles,* (4th Ed.). McGrawHill Education.
3. Borse, R. Y. (2014). *Basic electronic passive components,* (1st Ed.). Adhyayan Publishers and Distributors.

Books for Reference

1. Thareja, B. L. (2012). *Basic electronics*, (3rd Ed.). S. Chand and Compnay.
2. Bell, D. (2009). *Electronic devices and circuits*, (5th Ed.). Oxford.
3. Mehta, V. K. (2008). *Principles of electronics*, (11th Ed.). S. Chand & Company.
4. Mims, F. M. (n.d). *Getting started in electronics*. E-book

Websites and eLearning Sources

1. https://www.instructables.com/Basic-Electronics/
2. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_filters.html
3. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	describe various passive and active electronic components	**K1**
CO2	discuss the functioning of passive and active electronic devices	**K2**
CO3	apply the theory to understand the working of semiconducting devices	**K3**
CO4	compare the characteristics of active and passive components	**K4**
CO5	assess the need of modern society with professional ethics in Electronics and recommend solutions for the same	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
1	**23UEL13CC01**			**Core Course - 1:** Semiconductor Theory and Electronic Devices					**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	1	3	3	3	2	2	**2.4**
CO2	3	3	3	2	1	3	2	2	2	2	**2.3**
CO3	3	3	3	2	2	3	2	3	2	2	**2.5**
CO4	3	3	2	2	2	3	3	2	2	2	**2.4**
CO5	3	3	2	2	1	3	3	2	3	2	**2.4**
Mean Overall Score											**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/ Week	Credits
1	23UEL13CP01	**Core Practical - 1**: Semiconductor Devices	3	2

Course Objectives
To define various semiconductor devices
To summarize the characteristics of semiconductor devices
To apply the theory and verify it with the experiment results
To compare the properties of various devices
To evaluate the operations of semiconductor devices

List of Experiments (Any twelve experiments)

1. Verification of ohm's law
2. Study of Series and parallel connection of resistance in circuits 3. Study of series and parallel connection of capacitor in circuits.
3. Study of RC time constant using DC source
4. Study of Diode characteristics
5. Study of Zener Diode characteristics
6. Study of Transistor characteristics - CB
7. Study of Transistor characteristics - CE
8. Study of Transistor characteristics - CC
9. Study of opto electronic devices I- photodiode, phototransistor and LDR
10. Study of different colour LED characteristics
11. Energy band gap of semiconductor
12. Study of sinusoidal steady state analysis of series RC and LC 14. Study of steady state and transient analysis of series RLC circuit.
13. Study of transient analysis of series RC and LC
14. Study of steady state and transient analysis of Parallel RLC circuit.
15. JFET Characteristics
16. MOSFET Characteristics
17. Diode rectifiers
18. Voltage regulator using Zener diode
19. Characteristics of LASER diode
20. Inductor and Transformer characteristics

Book for Study

1. Practical Manual prepared by the Department

Semester	Course code	Title of the Course	Hours/Week	Credits
1	23UEL13AC01	**Allied Course - 1:** Mathematics for Electronics - 1	6	4

Course Objectives
To explore the basic ideas of matrices
To know the methods of solving differential equations
To train the students to use their basic skills of differentiation for successive differentiation
To have knowledge on integration and its properties
To understand the nature of Central tendency

UNIT I **(18 Hours)**

Solutions of system of linear equations –Using Cramer's rule - Eigen values and Eigen vectors of a matrix – Cayley Hamilton's Theorem (Without proof).

UNIT II **(18 Hours)**

Expansion of cos $n\theta$ and sin $n\theta$ – Powers of sines and cosines of θ in terms of functions of multiples of θ.

UNIT III **(18 Hours)**

Second order differential equations – all the types of equations including Constant coefficients and particular integral when X is of the form x, sin x and cos x.

UNIT IV **(18 Hours)**

Integration – Definite Integral – Methods of Integration – Fourier series – Even and odd functions - Half range Fourier series.

UNIT V **(18 Hours)**

Measures of Central tendency: Mean, Median, Mode (Direct method only) – Measures of variation: Range, Standard deviation.

Teaching Methodology	Lectures, Demonstrations

Books for Study

1. Venkataraman, M. K. (1988). *Engineering mathematics (Vol-II),* (3rd Ed.). The National Publishing Company.
   Unit – I: Chapter 1 (*Pages: 534-570)*
   Unit – III: Chapter 5, Sections 5.1 – 5.3 *(Pages: 220 – 242)*.
2. Narayanan, S., Rao, R. H., Pillay, T. K. M. & Kandaswamy. (2010). *Ancillary mathematics*, Vol-I. Viswanathan, S., Printers & Publishers Pvt Ltd.
   Unit – II: Chapter 5, Sections 5.1 – 5.3 *(Pages: 220 – 242)*.
3. Narayanan, S., Rao, R. H., Pillay, T. K. M. & Kandaswamy. (2010). *Ancillary mathematics*, Vol-II. Viswanathan, S., Printers & Publishers Pvt Ltd.
   Unit – IV: Chapter 1 *(Pages 1 – 14)* Chapter 2 *(Pages 123 – 149)*
4. Pillai, R. S. N & Bagavathi. (2014). *Statistics -Theory and practice*. S. Chand & Company. Ltd.
   Unit – V: Chapter 9 *(Pages 124 – 170)* Chapter 10 *(pages 241 - 245, 259 - 267)*

Books for Reference

1. Narayanan, S. & Pillay, T. K. M. (1999). *Ancillary mathematics.* Book II. Viswanathan, S., Printers & Publishers Pvt Ltd.
2. Vittal, P. R. (2004). *Mathematical statistics*. Margham Publications.
3. Kapur, J. N. & Saxena, H. C. (2010). *Mathematical statistics (*20th Ed.). S. Chand & Company Ltd.

Course Outcomes

CO No.	CO-Statements	Cognitive Levels (K-Level)
	On successful completion of this course, the students will be able to	
CO1	Acquire knowledge of basics of matrices and understand the process of finding the eigen values and eigen vectors	**K1**
CO2	Understand the types of second order differential equations	**K2**
CO3	Apply the various method in real life problems in Measures of central tendency and measures of variation	**K3**
CO4	Analyse the importance of cos $n\theta$ and sin $n\theta$	**K4**
CO5	Evaluate Integration and Fourier series	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
1	**23UEL13AC01**			**Allied Course - 1:** Mathematics for Electronics - 1						**6**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	1	3	3	2	2	3	**2.3**
CO2	3	2	2	1	2	3	3	3	2	3	**2.4**
CO3	2	3	2	2	1	2	3	2	3	2	**2.2**
CO4	2	3	2	3	1	2	3	2	2	3	**2.3**
CO5	2	2	2	2	1	2	3	2	2	3	**2.1**
										Mean Overall Score	**2.36 (High)**

Semester	Course code	Title of the Course	Hours/Week	Credits
1	23UEL14FC01	**Foundation Course:** Introductory Electronics	2	1

Course Objectives
To describe the tools used to service electronic devices
To classify the electronic components
To apply the techniques to troubleshoot the electronic devices
To point out the problems in electronic devices
To wire a house and develop the circuits

UNIT I: Tools **(6 Hours)**

Line tester - Multimeter - CRO - DSO - Function Generator - LCR meter - soldering station De soldering pump.

UNIT II: Electronic components **(6 Hours)**

Electronic components identification - Transformer Identification - Resistance color code calculation and verification - testing and troubleshooting using tools

UNIT III: PCB and Components assembling **(6 Hours)**

PCB Layout design and etching - Soldering and de-soldering the components in PCB - SMD component Soldering and De-soldering - Construction of single power supply - Construction of Dual Power supply - SMPS

UNIT IV: Circuits **(6 Hours)**

LEDs in series and parallel - Simple emergency lamp with 12V battery - Hobby circuits

UNIT V: House wiring **(6 Hours)**

House wiring-I (fitting switches, AC pin sockets and indicator lamp in switch box) - House wiring-II (Two-way switches, circuit breaker-ELCB, MCB) - Industrial wiring - Safety.

Teaching Methodology	Practical, Demo Videos, PPT, simulation

Book for Study

1. Text prepared by the department

Books for Reference

1. Gates, E. (2009). *Introduction to electronics*, (6th Ed.). Cengage Learning India Private Limited.
2. Tucker, D. G. (1959). *Introductory electronics*. Nature.
3. McComb, G. (2005). *Electronics for dummies*. Wesley Publishing Inc.

Websites and eLearning Sources

1. https://www.makerspaces.com/basic-electronics/
2. https://www.open.edu/openlearn/science-maths-technology/an-introductionelectronics/content-section-0
3. https://www.explainthatstuff.com/electronics.html
4. https://www.makerspaces.com/basic-electronics/
5. https://ocw.mit.edu/courses/6-071j-introduction-to-electronics-signals-andmeasurement-spring-2006/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	list the tools available to study the electronic devices	**K1**
CO2	explain the procedure of components handling	**K2**
CO3	use the components in electronic devices	**K3**

Relationship Matrix

Semester	Course Code	Title of the Course					Hours	Credits			
1	23UEL14FC01	**Foundation Course:** Introductory Electronics					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	2	3	3	3	3	2	2	2	**2.6**
CO2	3	3	2	3	3	3	3	2	3	2	**2.7**
CO3	3	3	2	2	2	3	3	3	3	3	**2.7**
Mean Overall Score											**2.67 (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 - Crimens against Women - Women rights - Time-line of Women achievements in India

Teaching Methodology	Chalk and Talk, Power point

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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**	**PSO 4**	**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

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

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

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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 பானையின் 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 என்தாய் மண்ணே
ஹைபுன் கவிதைகள்
சிறுகதை – நான்கு முதல் ஆறு சிறுகதைகள்
நற்றமிழ்க் கோவை – நான்கு முதல்ஆறு கட்டுரைகள்

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

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** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
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

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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

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** On successful completion of the course, the student will be able to	**Cognitive Levels (K - Level)**
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

Books for Study

1. Saralasamkritham 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*. Bharathiys 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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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. Humourous 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

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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	23UEL23CC02	**Core Course - 2**: Electric Circuit Analysis	5	4

Course Objectives
To introduce fundamental laws and elements of circuits.
To understand different methods of circuit analysis using network theorems.
To provide the ability to apply circuit analysis for DC and AC circuits
To analyse the transient and steady state response of RC, RL and RLC circuits.
To evaluate the performance of electrical circuits in real time applications

UNIT I: Circuit Analysis **(15 Hours)**

The Circuit - Ohm's Law - Kirchhoff's Voltage Laws - Voltage Division - Power in Series Circuit - Kirchhoff's Current Law - Current Division - Power in a Parallel Circuit - Tree and Co-tree - Incidence Matrix and KCL - Cut-Set and Tree Branch Voltages - Mesh Analysis - Nodal Analysis.

UNIT II: Network Theorems **(15 Hours)**

Star-Delta Transformation - Superposition Theorem - Thevenin's Theorem - Norton's Theorem - Reciprocity Theorem - Compensation Theorem - Maximum Power Transfer Theorem - Duals and Duality - Sample Problems.

UNIT III: Series and Parallel AC Circuits **(15 Hours)**

Purely Resistive- Inductive and Capacitive AC Circuit - R-L Series AC Circuit - R-C Series AC Circuit - R-L-C Series AC Circuit - Series Resonance - Q-factor - Bandwidth and Selectivity - Power in AC Circuits - Power Triangle and Power Factor - R-L Parallel AC Circuit - R-C Parallel AC Circuit - L-C Parallel A.C. Circuit - L-R-C Parallel A.C. Circuit - Three Phase Supply - Star Connection - Delta Connection - Power in Three Phase System - Measurement of Power in Three-Phase Systems - Comparison of Star and Delta Connection.

UNIT IV: Steady State and Transient Response of Circuits **(15 Hours)**

Steady State and Transient Response - DC Response of an R-L Circuit - DC Response of an R-C Circuit - DC Response of an R-L-C Circuit - Practice Problems - Sinusoidal Response if an R-L Circuit - Sinusoidal Response of an R-C Circuit - Sinusoidal Response of an R-C Circuit - Sinusoidal Response of an R-L-C Circuit - Simple Problems.

UNIT V: Coupled Circuits **(15 Hours)**

Conductivity Coupled Circuit and Mutual Impedance - Mutual Inductance - Dot Convention - Coefficient of Coupling - Analysis of Multi-Winding Coupled Circuits - Tuned Circuits - Simple Problems.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Sudhakar A., Shymmohan, S.P. (2017). *Circuits and Networks Analysis and Synthesis,* (5th Ed.). Tata McGraw Hill Publishing Company Ltd.
2. John, B. (2010). *Electrical Circuit Theory and Technology,* (4th Ed.). Elsevier Ltd.

Unit	Book	Chapter	Sections
I	1	1,2	1.4, 1.9 - 1.15, 2.2, 2.6, 2.12
II	1	3	3.1 - 3.8
III	2	15,16,19	15.1 - 15.11, 16.1 - 16.7,19.2 - 19.7
IV	1	11	11.1 - 11.7
V	1	10	10.2 -10.5, 10.7, 10.10

Books for Reference

1. Paranjothi, S.R. (2011). *Electric Circuit Analysis,* (4th Ed.). New Age International.
2. Theraja, B.L., Theraja, A.K. (2005). *A Textbook of Electrical Technology.* S.Chand and Company Ltd.
3. Robert, L.B. (2015). *Introductory Circuit Analysis*. (13th Ed.). Pearson.

Websites and eLearning Sources

1. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic
2. https://www.khanacademy.org/science/electrical-engineering/ee-circuit-analysis-topic/eedc-circuit-analysis/a/ee-circuit-analysis-overview
3. https://www.circuitbasics.com/circuit-analysis/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Level (K- Level)**
CO1	describe and write Network Theorems and Circuit concepts	**K1**
CO2	discuss and predict the appropriate electric circuits to the need	**K2**
CO3	illustrate and use the electric circuits in real time applications	**K3**
CO4	investigate and explain the responses of AC and DC circuits	**K4**
CO5	recommend Electrical Circuits for ecofriendly environment with energy saver mode.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours**			**Credits**
2	**23UEL23CC02**			**Core Course - 2**: Electric Circuit Analysis				**5**			**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	3	3	2	2	**2.5**
CO2	3	3	2	2	2	3	3	3	2	2	**2.5**
CO3	3	3	2	2	2	3	3	3	2	2	**2.5**
CO4	2	2	2	2	2	3	3	3	2	2	**2.3**
CO5	2	2	2	2	2	3	2	3	2	2	**2.2**
									Mean Overall Score		**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UEL23CP02	**Core Practical - 2:** Circuit Analysis	3	2

List of Experiments (Any 12 experiments)

1. Verification of Kirchhoff's voltage law
2. Verification of Kirchhoff's current law.
3. Branch voltage identification using Mesh analysis
4. Node current measurement using Nodal analysis
5. Verification of Thevenin's theorem
6. Verification of Norton's theorem
7. Verification of Superposition theorem
8. Verification of Compensation theorem
9. Verification of Reciprocity theorem
10. Verification of Maximum power transformation theorem
11. Study of sinusoidal steady state analysis of series RC and LC
12. Study of steady state and transient analysis of series RLC circuit.
13. Study of transient analysis of series RC and LC
14. Study of steady state and transient analysis of Parallel RLC circuit.
15. Study of load current and load voltage in star delta transformation.
16. Determination of Z and Y parameters of a two-port network
17. determination of transmission and hybrid parameters of a two-port network

Book for Study

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UEL23WS01	**Workshop:** Circuit Design and Trouble Shooting	3	2

List of Practices (Any 10 Jobs)

1. Electronic components identification and testing using multimeter
2. Resistance color code calculation and verification
3. Study the function of CRO and Function Generator
4. Study the function of Multimeter and LCR meter
5. Soldering and de-soldering the components in PCB layout.
6. Construction of power supply-I (single supply)
7. Construction of Power supply-II (Dual supply)
8. Cabinet making for power supply.
9. Construction and testing of LEDs in serial and parallel
10. PCB layout preparation using software. (PCB track width and copper square area
2. calculation)
11. PCB Layout design and etching.
12. SMD component Soldering and De-soldering
13. Transformer Identification and troubleshooting
14. Construction of Transformer-less power supply
15. Hobby circuit - I
16. Hobby circuit - II
17. Hobby circuit - III
18. House wiring-I (fitting switches, AC pin sockets and indicator lamp in switch box)
19. House wiring-II (Two-way switches, circuit breaker-ELCB, MCB)
20. PC hardware assembling
21. Audio system assembling (amplifier and speaker)
22. Mobile phone troubleshooting
23. Study of SMPS power supply
24. Simple emergency lamp with 12V battery

Book for Study

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	23UEL23AC02	**Allied Course - 2:** Mathematics for Electronics - 2	6	4

Course Objectives
To train the students in mastering the techniques of various branches of Mathematics.
To acquire knowledge of Laplace transform and its applications.
To understand numerical problems and its applications.
To understand Correlation coefficient problems and its applications.
To motivate the students to apply the techniques in their respective major discipline.

UNIT I **(18 Hours)**

Correlation coefficient- Rank correlation - curve fitting by least square methods - Fitting a straight line (No derivation, Numerical problems only)

UNIT II **(18 Hours)**

Laplace Transforms - Definition - properties the inverse transforms- solving differential equations using Laplace transforms (simple problem only).

UNIT III **(18 Hours)**

Solving algebraic and transcendental equations: Bisection Method - Newton-Raphson method. Solving simultaneous equations - Gauss elimination - Gauss-Seidal Methods (problems only).

UNIT IV **(18 Hours)**

Numerical Integration - Trapezoidal rule and Simpson's 1/3rd rule. Interpolation - Newton Gregory forward and backward interpolation formulae - Lagrange's interpolation formula.

UNIT V **(18 Hours)**

Initial value Problems for ordinary differential equations: single step methods -Taylor's series method - Euler's Method- Method - Runge Kutta Method for solving (fourth order only)

Teaching Methodology	Chalk and Talk, PPT, Group Discussion.

Books for Study

1. Pillai, R. S. N. & Bagavathi. (2014*). Statistics- Theory and Practice.* S. Chand and Co. Ltd.
   Unit I *Chapter 12 (Pages 396-410), Chapter 15 (Pages 602-608).*
2. Narayanan, S. & Pillay, T.K.M. *Ancillary Maths Book I.*, S. Viswanathan Pvt. Ltd.
   Unit II *Chapter 12 (Pages 289-311).*
3. Venkataraman, M. K. (1987). *Numerical Methods in science and Engineering*, (2nd Ed.). The National Publishing Co.
   Unit III *Chapter 3 (Sec: 5*),
   Chapter IV (Sec: 1,6) *(Pages* 81-85,97-106,113-120,140-146).
   Unit IV *Chapter 6: Sec-3 (pages 195-206), Chapter 8: Sec-4 (pages 253-259)*
   Chapter 9: Sec-8 (pages 281), sec-10 (pages 285-287, 290-291, 293-295)
   Unit V *Chapter 11 (Sec: 6,10,12,13*) *(Pages pages 350-357, 357-364*).

Books for Reference

1. Vitta, P.R. (2003). *Allied Mathematics*. Margham Publications, Reprint.
2. Kandasamy, P., Thilagavathy, K., & Gunavathy, K. (1999). N*umerical Methods.* S. Chand & Company Ltd.

Course Outcomes		
CO No.	**CO - Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	get equipped with the knowledge of Rank Correlation, Fourier series, numerical methods.	**K1**
CO2	understand methods and properties of Rank Correlation, Fourier series and numerical methods.	**K2**
CO3	apply the fundamental concepts of Rank Correlation, Fourier series, and numerical methods.	**K3**
CO4	analyze the Half range Fourier series and the roots of equations using numerical methods.	**K4**
CO5	evaluate the efficiency of different numerical methods.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
2	**23UEL23AC02**			**Allied Course - 2:** Mathematics for Electronics - 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	3	2	1	3	3	1	2	3	**2.3**
CO2	2	3	2	1	2	3	3	2	2	2	**2.3**
CO3	3	2	3	1	2	2	3	2	3	2	**2.3**
CO4	3	2	3	1	2	3	2	1	2	3	**2.2**
CO5	2	3	3	2	2	2	3	1	2	3	**2.4**
										Mean Overall Score	**2.3 (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

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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

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**	**PSO4**	**PSO5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
Mean Overall Score											**2.1 (Medium)**

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

ஔவையார்
காவிரியே தார்வேந்தன் (16) **கற்றது கைமண்ணளவு** *(39)* **மதியாதார் முற்றம்** *(42)*
இனியது கேட்கின் *(55)* **தாயொடு அறுசுவை** *(64)*
காளமேகப் புலவர் -
நஞ்சிருக்குத் தோலுரிக்கு நாதர்முடி*(4)* **ஓடுஞ் சுழிசுத்த முண்டமாகும்** *(16)*
அடிநந்தி சேர்தலால் ஆகம் *(22)* **செருப்புக்கு வீரரைச் சென்றுழக்கும்** *(52)*
துதிவாணி வீரம் *(80)*
இராமச்சந்திர கவிராயர் – **வஞ்சகர்பா னடந்தலைந்த** - *19*
பொற்களந்தைப் படிக்காசுத் தம்பிரான் – **குட்டுதற்கோபிள்ளைப் பாண்டிய** - *21*
தமிழ்விடுதூது,- 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)*

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** **இப்பாடத்தின் நிறைவில் மாணவர்கள்**	**Cognitive Levels (K - Level)**
CO1	**இடைக்காலப் புலவர்களின் பாட்டுதிதிறனை அறிந்து கொள்வர்**	**K1**
CO2	**சிற்றிலக்கிய வகைகளையும் வகைமைகளையும் அறிந்து கொள்வர்**	**K2**
CO3	**பள்ளு, பரணி, பிள்ளைத்தமிழ், குறவஞ்சி போன்ற இலக்கியங்கள் வழி வீரம், பக்தி, காதல் உணர்வை அறிந்து கொள்வர்**	**K3**
CO4	**சிற்றிலக்கியங்களின்அமைப்பு 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

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

Websites and eLearning Sources

1. https://francais.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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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 Khooon
- 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 - Sahithyik 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

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** On successful completion of the course, the student will able to	**Cognitive Levels (K - Level)**
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

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.learnsanskrit.org/guide/uninflected-words/the-upasarga/

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

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** On completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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	23UEL33CC03	**Core Course - 3:** Digital Electronics	5	4

Course Objectives
To describe the basics of digital electronics and HDL
To demonstrate the logical circuits
To apply digital concepts and circuit ideas in the automated applications
To analyse the functioning of digital circuits to solve the real time problems
To decide the suitable digital circuit for the applications

UNIT I: Fundamentals of Digital Concepts **(15 Hours)**

Digital and Analog Quantities - Binary Digits - Logic Levels and Digital Waveforms- Digital Integrated Circuits- Introduction to Number Systems - Binary Codes - Error Detection and Correction Codes- Boolean Operations and Expressions - Laws and Rules of Boolean Algebra - DE Morgan's Theorem- Consensus Theorem- Simplification Using Boolean Algebra- Boolean Expressions: SOP And POS - Minimization of Boolean Expression Standard Forms of Boolean Expressions - Karnaugh Map - Five Variable K-Map - Quine McCluskey - Introduction To Digital Logic Families

UNIT II: Logic Gates and Combinational Circuits **(15 Hours)**

Logic Gates - NAND and NOR as Universal Building Blocks - Implementation by using NAND only - Combinational Circuits: Half and Full Adder - Half and Full Subtractor - Parallel Binary Adders Magnitude Comparators - 4 Bit Decoders - BCD To Decimal Decoder - BCD to 7 Segment Decoder - Decimal to BCD Encoder - Priority Encoder - Code Converters - 4 Input Multiplexer - Implementation of Combinational Logic using MUX - 1:4 Demultiplexer - Designing Combinational Circuits for Real Time Problems

UNIT III: Sequential Logic Circuits **(15 Hours)**

Sequential Logic Circuits - Latches vs Flip-Flops- Edge Triggered Flip-Flops - SR Flip-Flop - D Flip-Flop - JK Flip-Flop - Master-Slave Flip-Flops - T Flip-Flop - Realization of one F/F using another F/F - Shift Registers: SISO - SIPO - PISO - PIPO - Bidirectional Shift Registers - Pseudo- Random Sequence Generator- Basics of Semiconductor Memory - RAM

UNIT IV: Counters, ROM and PLDs **(15 Hours)**

Asynchronous Counter - 2-Bit and 3-Bit Asynchronous Binary Counter - Asynchronous Decade Counter - Synchronous Counter - 2-Bit and 3-Bit Synchronous Binary Counter - Up/Down Synchronous Counter - Johnson Counter - Ring Counter - ROM - PROMs and EPROMs - Flash Memories - Memory Expansion - Programmable Logic Devices: PLA - PAL - FPGA - 2-Bit ALU Design

UNIT V: Hardware Description Language **(15 Hours)**

Verilog HDL - Data Types - Operators -Entity Declaration and Statements - Architecture Body Continuous Assignment Statement - Procedural Assignment Statement -Always statement- If Statement Case Statement - Loop Statement -Functions- Tasks- Module Instantiation Statement- Parameterized Designs - HDL Models for Simple Circuits

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials.

Books for Study

1. Godse, A.P., Godse D.A. (2019). *Digital Logic Circuits,* (2nd Ed.). Technical publications.
2. Floyd, T. L., & Jain R.P. (2008). *Digital Fundamentals,* (8th Ed.). Pearson Education.
3. Bhasker, J. (2015). *A Verilog HDL Primer,* (3rd Ed.). B.S. Publications.

Unit	Book	Chapter	Sections
I	12	1,2,101	1.1,1.2,1.9,1.10, 2.1-2.15, 10.1,10.2 1.1,1.3,1.4
II	12	3,45,6	3.1-3.3,3.8,4.1-4.6, 4.12-4.17 5.5, 6.11
III	12	510	5.1-5.4,5.5.3,5.5.4 10.1,10.2
IV	1	5,8,9	5.5.5, 5.5.6, 8.1-8.3,9.1-9.5
V	3	2, 3	2.1-2.7, 2.12-2.16, 2.19, 2.20, 2.23, 3.1, 3.2

Books for Reference

1. Morris Mano, M., & Michael, D. C. (2008). *Digital Design*, (4th Ed.). Pearson Education.
2. Kharate, G. K. (2010). *Digital Electronics*, (1st Ed.). Oxford University Press.
3. John, F. W. (2006). *Digital Design: Principles and Practices*, (4th Ed.). Prentice Hall.
4. Donald, P., Leach., Malvino, A.P., & Saha, G. (2010). *Digital Principles and Applications*, (7th Ed.). Tata McGraw Hill Publishing Company Ltd.

Websites and eLearning Sources

1. https://nptel.ac.in/courses/108/105/108105132/
2. https://www.coursera.org/learn/digital-systems
3. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe digital signals, digital building blocks and digital circuits	**K1**
CO2	outline and compare the digital logic circuits for green environment	**K2**
CO3	infer, analyze and identify the digital circuits for real time needs	**K3**
CO4	use modern tools to compare and contrast the digital circuits	**K4**
CO5	appraise, evaluate digital concepts and recommend digital solutions for Entrepreneurship	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**23UEL33CC03**			**Core Course - 3:** Digital Electronics					**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	2	3	1	2	3	2	1	2	**2.1**
CO2	3	3	2	3	2	3	3	3	2	2	**2.6**
CO3	2	2	2	2	3	2	2	2	2	3	**2.2**
CO4	3	3	2	3	2	3	3	3	2	2	**2.6**
CO5	2	3	2	3	2	2	3	2	1	3	**2.3**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UEL33CC04	**Core Course - 4:** Electronic Circuits	5	3

Course Objectives
To give exposure to all types of devices and circuits using discrete components.
To understand the working of electronic circuits using diodes and transistors.
To apply the circuit fundamentals in various applications.
To analyze the frequency response of small signal amplifiers, performance of feedback amplifiers and oscillators.
To experiment different electronic circuits of applications.

UNIT I: Applications of Diodes **(15 Hours)**

Half Wave Rectifier - Full Wave Rectifier - Efficiency - Filter Circuits - Clippers - Clampers - Zener Voltage Regulator - Regulated Power Supply

UNIT II: Biasing of transistors and FET **(15 Hours)**

Selection of Operating Point for BJT- DC Load Line - BJT: Types of Biasing (Fixed, Emitter Feedback, Collector Feedback &Voltage Divider) - Bias Stabilization - Bias Compensation - FET: Types of Biasing (Gate, Self, Voltage Divider, Source &Current Source) - MOSFET: Types of Biasing (Drain Feedback &Voltage Divider)

UNIT III: Small Signal Analysis **(15 Hours)**

BJT Amplifiers: AC Equivalent - AC Load Line and Compliance - BJT Amplifiers: Small Signal Analysis: Classifications of Amplifier - Common Emitter Amplifier - Common Base Amplifier - Emitter Follower - Re' Model - h Parameter - Hybrid S Model - Frequency Response Analysis of CE Amplifier- Miller Effect - Multistage Amplifier - Cascade Connection (N Stage CE) - Darlington Amplifier.

JFET and MOSFET Amplifiers: Small Signal Model - Common Source - Common Drain - Common Gate - Small Signal Parameters - Small Signal Equivalent Circuit - Common Source Amplifier - Common Drain Amplifier

UNIT IV: Feedback Amplifiers and Oscillators **(15 Hours)**

Effect of Positive and Negative Feedback on Amplifiers - Feedback Connection Types - Feedback Amplifiers - Merits and Demerits - Oscillators - Principle of Operation - Phase Shift - Wien's Bridge - Crystal - LC Oscillators using BJT - UJT Relaxation Oscillator

UNIT V: Tuned and Power Amplifiers **(15 Hours)**

Single Tuned - Double Tuned - Stagger Tuned Amplifiers - Working Principle of Class A, Class AB, Class B, Class C, Class D and Class S Power Amplifiers - Efficiency of Class A, B and C Power Amplifiers.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials.

Books for Study

1. Salivahanan, S., Kumar, S.N., & Vallavaraj, A. (2008). *Electronic Devices and Circuits*, (2nd Ed.).
2. Borse, R. Y. (2012). *Basic Electronic Devices and Circuits*, (1st Ed.). Adhyayan Publishers and Distributors.

Unit	Book	Chapter	Sections
I	1	16,18	16.3,16.5, 18.1,18.2
II	1	6,7	6.3, 6.12, 7.16, 7.18
III	1	6,9,10	6.1, ,6.6-6.8, 6.10-6.13,9.3-9.13,10.1-10.3
IV	1	14, 15,17	14.1 - 14.6, 15.1-15.6, 15.11, 15.12,15.14,17.2
V	1	12, 13	13.1,13.2,13.4-13.6, 12.1,12.3,12.6-12.9,12.13,12.14

Books for Reference

1. Thareja, B. L. (2012). *Basic electronics*, (3rd Ed.). S. Chand and Co.
2. Bell, D. (2008). *Electronic Devices and Circuits*, (5th Ed.). Oxford.
3. Mehta, V. K. (2008). *Principles of Electronics*, (11th Ed.). S. Chand & Co.

Websites and eLearning Sources

1. https://www.allaboutcircuits.com/technical-articles
2. https://www.tutorialspoint.com/electronic_circuits/electronic_circuits_filters.html
3. https://www.physics-and-radio-electronics.com/electronic-devices-and-circuits.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe and relate electronic circuits	**K1**
CO2	explain and demonstrate the functioning of electronic circuits	**K2**
CO3	classify and investigate various electronic circuits	**K3**
CO4	examine and categorize the electronic circuits	**K4**
CO5	assess and evaluate the electronic circuits need of modern society with professional ethics in electronics.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**23UEL33CC04**			**Core Course - 4:** Electronic Circuits					**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	3	3	3	2	**2.6**
CO2	3	3	3	2	2	3	3	3	2	2	**2.6**
CO3	3	3	3	2	2	3	3	3	2	2	**2.6**
CO4	3	3	3	2	2	3	3	2	3	2	**2.6**
CO5	3	3	2	2	2	3	3	3	3	2	**2.6**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UEL33CP03	**Core Practical - 3:** Digital and Analog Circuits	3	3

List of Experiments (Any 12 experiments)

Digital Experiments

1. Construction and study of basic gates (NOT, AND and OR) using transistor and diodes
2. Simplification logical expression using K-map and implementation using gates
3. Construction and study of 4:1 Multiplexer and 1:4 Demultiplexer and study of IC 74151 and IC74154
4. Construction and study of encoder and decoder
6. Construction and study of Flip-Flops
7. Construction and study of Shift registers
8. Construction and study of Asynchronous counters
9. 2-bit ALU

Analog experiments (Electronics devices and Circuits)

10. Study of Zener diode characteristics.
11. Study of clipper and clamper circuits using diodes
12. Study of transistor biasing, calculation of Q-point and DC load line analysis
13. Study of FET biasing.
14. Study of Transistor characteristics -CE, CB and CC mode
15. Construction and Study of RC coupled Transistor amplifier
16. Construction and verification of Hartley oscillator and Colpitts's oscillator
17. Construction and verification of RC phase shift oscillator and Wien's bridge oscillator
18. Construction and study of Class A and Class B Power Amplifier

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UEL33AO01A	**Allied Optional - 1:** Applied Physics - 1	4	3

Course Objectives
To acquire knowledge of various quantum numbers associated with the vector atom model.
To analyse the work and heat interactions associated with a prescribed path and perform an analysis of a flow system.
To apply the Quantum mechanics principles and derive the Schrodinger equation and its applications.
To impart knowledge on the properties of different types of materials.
To evaluate the carrier concentration of semiconductors and study the variation of Fermi level with temperature.

UNIT I: Atomic Physics and Thermal Physics (12 Hours)

Atomic Physics: Vector atom model - Associated quantum numbers - Coupling Schemes - Pauli's Exclusion principle - Magnetic Dipole moments due to orbital motion and spinning of electrons - Stern and Gerlach experiment.

Thermal Physics: Specific heat capacity of gases - Newton's law of cooling - Cooling method - Thermal conductivity - Forbe's method - Determination of thermal conductivity of bad conductors - Lee's disc method.

UNIT II: Quantum Mechanics (12 Hours)

Introduction - Black body radiation - Matter waves - De-Broglie's Hypothesis - Properties of Matter Waves - Davison and Germer experiment - Heisenberg Uncertainty Principle - Schrodinger Time independent equation - Schrodinger Time - dependent wave equation - Particle in a one-dimensional box.

UNIT III: Conducting Materials and Semiconducting Materials (12 Hours)

Classical free electron theory of metals - Quantum theory - Free electron gas - Fermi energy and carrier concentration. Fermi level - variation of Fermi level with temperature (Intrinsic semiconductor) - Bandgap Determination - Extrinsic Semiconductors - Variation of Fermi level with temperature and impurity concentration - Hall Effect and its Applications.

UNIT IV: Magnetic Materials and Superconducting Materials (12 Hours)

Origin of the magnetic moment - Bohr magnetron - Diamagnetism, Para magnetism and Ferromagnetism - Hysteresis - Meissner effect - Transition temperature - Isotope effect - Types of superconductors - BCS theory - High - TC superconductors - Applications of superconductors.

UNIT V: Ultrasonics (12 Hours)

Introduction - Production of ultrasonic waves - Detection of ultrasonic waves - Properties of ultrasonic waves - Industrial applications - SONAR - Non-destructive testing - Medical applications.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Murugeshan, R., & Sivaprasath, K. (2014). *Modern Physics*, (17th Ed.). S. Chand & Company Private Ltd.
2. Rajendran, V., & Marikani, A. (1999). *Applied Physics for Engineers*, (2nd Ed.). Tata McGraw-Hill Publishing Company Limited.
3. Bhattacharya, D. K., & Bhaskaran, A. (2010). *Engineering Physics.* Oxford University Press.

UNIT	BOOK	CHAPTERS	SECTIONS
I	1 2 2	6 16 17	6.12, 6.13, 6.14, 6.15, 6.18, 6.19, 6.20 16.1, 16.1.1, 16.2.1, 16.2.2, 16.2.3 17.1, 17.1.1, 17.2, 7.7.4, 17.8
II	3	4	4.1, 4.2, 4.4, 4.4.1, 4.4.2, 4.4.3, 4.5, 4.6, 4.6.1, 4.6.2, 4.6.4
III	3	6 7	6.2, 6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.3, 6.3.1, 6.4, 6.5, 6.5.1, 6.5.2, 7.4, 7.5, 7.7, 7.9, 7.11
IV	3	8 9	8.1, 8.2, 8.3, 8.4, 8.4.1, 8.4.2, 8.4.3, 8.5 9.2, 9.3, 9.4, 9.5, 9.5.1, 9.5.2, 9.6, 9.8
V	3	1	1.1, 1.2, 1.2.1, 1.2.2, 1.2.3, 1.3, 1.3.1, 1.3.2, 1.4, 1.7, 1.7.1, 1.7.2, 1.8, 1.9, 1.9.1, 1.10, 1.10.1

Books for Reference

1. Aruldhas, G, (2010). *Engineering Physics*, Prentice-Hall of India Pvt. Limited.
2. Young, H.D., Freedman, R. A. (2017). *University Physics with Modern Physics.* (14th Ed.). Pearson Education.

Websites and eLearning Sources*

1. https://www.iuac.res.in>atomic-physics
2. https://www.sciencedirect.com>journal>materials-scien...
3. https://www.frontiersin.org>materials>sections>about

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	identify the basic scientific principles and fundamental concepts in physics.	**K1**
CO2	summarise the various theories and discuss them accordingly.	**K2**
CO3	interpret the different effects by means of experiments.	**K3**
CO4	analyse and classify the various materials based on their properties.	**K4**
CO5	evaluate the carrier concentration of semiconductors and study the variation of Fermi level with temperature.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours/Week**		**Credits**
3	**23UEL33AO01A**			**Allied Optional - 1:** Applied Physics - 1					**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	1	3	2	3	3	1	2	2	2.2
CO2	3	2	2	3	2	3	3	2	2	3	2.5
CO3	3	2	2	3	2	3	3	2	2	3	2.5
CO4	3	3	2	3	2	3	3	2	2	2	2.5
CO5	3	3	2	3	3	3	3	2	2	3	2.7
										Mean Overall Score	**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	23UEL33AO01B	**Allied Optional - 1:** Computer Science - 1	4	4

Course Objectives

UNIT- I **(12 Hours)**

Introduction to the Internet: Computers in Business - Networking - Internet - Email - Resource Sharing - WWW - Protocols.

UNIT - II **(12 Hours)**

Introduction to HTML: Designing a home page - HTML document - Anchor tag - Hyperlinks - Head and Body sections - Header section - Title - Prologue - links - colourful pages - comments - body section - heading - Horizontal ruler - paragraph - tabs.

UNIT - III **(12 Hours)**

Images and pictures - Lists and their types - nested lists - table handling. Forms and form elements.

UNIT - IV **(12 Hours)**

Database System Applications - Database Systems versus File Systems - View of Data -Data Models - Database Languages - Database Users and Administrators - Transaction Management - Database System Structure - Application Architectures.

UNIT - V **(12 Hours)**

SQL Statements: Data Retrieval: SELECT, Data Definition Languages: Create, Alter, Drop, Rename, and Truncate, Data Manipulation Language: Insert - Update, Delete - Merge. Transactional Control: Commit, Rollback and Data Control Language: Grant, Revoke, Select Order By - Select Group By.

Teaching Methodology	Chalk and Talk, PPT

Books for Study

1. Xavier, C. (2000). *World Wide Web Design with HTM*, Tata McGraw Hill, New Delhi. Unit 1-3
2. Henry F. Korth Abraham Silberschatz. (2002). D*atabase System Concepts*, (4th Ed.). McGraw Hill, New Delhi.

Books for reference

1. Willard, W. (2009). W*eb Design - A beginners Guide.* Tata McGraw Hill Education, New Delhi.
2. Powell, T.A. *The Complete Reference Web Design*", Tata McGraw Hill, New Delhi.
3. Date, C.J. (2002). *An Introduction to Database System,* (7th Ed.). Pearson Education, New Delhi.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	define and understand the Internet concepts and Protocols.	**K1**
CO2	understand and classify the basic knowledge of HTML.	**K2**
CO3	apply the knowledge of HTML tags in web related applications.	**K3**
CO4	analyze the basic concepts of database &	**K4**
CO5	examine and analyze the skills of queries using SQL.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
3	**23UEL33AO01B**	**Allied Optional - 1:** Computer Science - 1								**4**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	3	3	2	2	3	**2.4**
CO2	2	3	2	2	2	3	3	2	2	3	**2.4**
CO3	2	2	3	2	3	2	3	3	3	2	**2.5**
CO4	2	2	2	3	2	2	3	2	3	3	**2.4**
CO5	1	2	2	2	3	2	3	2	2	3	**2.2**
										Mean Overall Score	**2.38 (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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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)**

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** ***இப்பாடத்தின் நிறைவில் மாணவர்கள்***	**Cognitive Levels (K - Level)**
CO1	பண்டைய தமிழர்களின்; அறிவியல் அறிவை அறிந்து கொள்வர்.	**K1**
CO2	பண்டைய தமிழ் இலக்கியங்களுள் காணாலும் அறிவியல் சிந்தனைகளைப் புரிந்துகொள்வர்.	**K2**
CO3	தமிழரின் அறிவியல் மருத்துவத்தையும், நீர் மேலாண்;மை 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 taches 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 passées, 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

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*. (2nd Ed.). CLE International.
2. Mérieux, R., & Loiseau, Y. (2012). *Latitudes A1*. 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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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

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). *Anuwad: 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** On successful completion of the course, the student will able to	**Cognitive Levels (K - Level)**
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

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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	23UEL43CC05	**Core Course - 5:** Linear Integrated Circuits	5	4

Course Objectives
To know about IC fabrication and use of LICs in circuit design.
To understand the basic concepts of op-amp and its various applications.
To apply the characteristics of op amp and IC555 in different applications.
To deduce the linear and nonlinear applications of op amp and IC555.
To assess the performance of op amp and IC555 in different applications, .

UNIT I: Integrated Circuit Fabrication **(15 Hours)**

Introduction - Classification - IC Chip Size and Circuit Complexity - Fundamentals of Monolithic IC Technology - Basic Planar Process - Fabrication of a Typical Circuit - Active and Passive Components for ICs - Fabrication of FETs - Thin and Thick Film Technology - Technology Trends

UNIT II: Operational Amplifier **(15 Hours)**

Op-Amp - Ideal Operational Amplifier - Open Loop Operation of Op-Amp - Feedback in Ideal Op-Amp - Inverting Amplifier - Input Resistance - Output Resistance - Non-Inverting Amplifier -Voltage Follower - Differential Amplifier - Difference Mode and Common Mode Gain - Common Mode Rejection Ratio - Operational Amplifier Internal Circuit - AC Characteristics and DC Characteristics.

UNIT III: Applications of Operational Amplifier **(15 Hours)**

Basic Op-Amp Application - Summing Amplifier - Inverting Summing Amplifier - Non-Inverting Summing Amplifier - Subtractor - Adder - Subtractor - Instrumentation Amplifier - AC Amplifier - V to I and I To V Converter - Op-Amp Circuits using Diodes: - Half-Wave Rectifier - Full-Wave Rectifier - Peak Detector - Clipper - Clamper - Sample and Hold Circuit - Differentiator -Integrator - Comparator - Zero Crossing Detector - Window Detector - Phase Detector - Schmitt Trigger.

UNIT IV: Waveform Generators and Filters Using Op Amp **(15 Hours)**

Square Wave Generator (Astable Multivibrator) - Monostable Multivibrator - Triangular Wave Generator - Basic Principle of Sine Wave Oscillators - Saw Tooth Wave Generator - Active Filters 1st and 2nd Order: Low Pass - Bandpass - Band Reject - High Pass.

UNIT V: 555 Timers and A/D, D/A Converters **(15 Hours)**

555 Timers - Operating Modes - Pin Functions - Free Running or Astable Operation - Application in Astable Operation - One Shot or Monostable Operation - Application in Monostable Operation- Introduction of Digital-To-Analog Converter-DAC Characteristics - R-2R Ladder DAC - Analog-To-Digital Converter-ADC Characteristics-Integrating ADC Successive Approximation ADC - Flash Converter

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials.

Books for Study

1. Choudhury, R. D., & Shail, B. J. (2017). *Linear Integrated Circuits*, (4th Ed.). New Age International (P) Limited.
2. Robert, F., Coughlin, Frederick, F., & Driscoll. (2001). *Operational Amplifiers and Linear Integrated Circuits* (6th Ed.). Prentice Hall.

Unit	Book	Chapter	Sections
I	1	1	1.1 - 1.10
II	1	2, 3	2.1 - 2.4, 3.2.1, 3.2.2, 3.3.1, 3.3.2
III	1	4, 5	4.1 - 4.8, 4.10, 4.11, 5.2, 5.3.
IV	1 2	5, 76, 11	5.3-5.7,7.1-7.36.4, 11.1 - 11.6, 11.8, 11.9, 11.10
V	1 2	8,1013, 14, 15	8.1-8.5, 10.1-10.413.0 -13.6, 14.0-14.2, 15.0-15.3 15.7

Books for Reference

1. James, M. F. (2020). *Operational Amplifiers and Linear Integrated Circuits: Theory and Application*. (Creative Commons Edition).
2. Salivahanan, S., & Kanchana Bhaaskaran, V. S. (2008). *Linear Integrated Circuits*, (1st Reprint). TataMcGraw Hill.
3. Ramakant, A. G. (2002). *Op-Amps and Linear Integrated Circuits*, (4th Ed.). Printice Hall.

Websites and eLearning Sources

1. https://www.tutorialspoint.com/linear_integrated_circuits_applications/basics_of_linear_integrated_circuits_applications.htm
2. https://www.tutorialspoint.com/linear_integrated_circuits_applications/index.htm
3. https://whatis.techtarget.com/definition/linear-integrated-circuit-linear-IC

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe linear integrated circuits using op-amp and timer	**K1**
CO2	explain the fabrication techniques and applications of linear integrated circuits	**K2**
CO3	apply op-amp for various applications in electronics	**K3**
CO4	analyze different analog integrated circuit and is used in real time problems	**K4**
CO5	evaluate, compare and construct different circuits using op-amp and timer ICs	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UEL43CC05**			**Core Course - 5:** Linear Integrated Circuits					**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	3	2	2	2	**2.4**
CO2	3	3	3	2	2	3	3	3	2	2	**2.6**
CO3	3	3	3	2	2	3	3	3	2	2	**2.6**
CO4	3	2	3	2	2	3	2	2	2	2	**2.3**
CO5	3	3	2	2	2	3	3	2	2	2	**2.4**
										Mean Overall Score	**2.46 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UEL43CC06	**Core Course - 6:** Communication Electronics	5	4

Course Objectives
To describe the mathematical formulation of AM, FM and PM and transmitter and receiver.
To understand the characteristics of AM and FM band and various digital communication systems.
To apply different modulation techniques in electronic communication.
To analyse the various bands in communication system.
To evaluate the performance levels (Signal-to-Noise Ratio) of AM, FM and PM systems in the presence of noise.

UNIT I: Amplitude Modulation **(15 Hours)**

Modulation - Need of Modulation - Types of Modulation - Mathematical Expression for AM Wave - Side Frequencies - Modulation Index - Power Relationship - Component Phasor of AM Signal - Spectrum of AM Wave. Generation of AM Waves - DSB - SC - AM - SSB - AM - VSB - AM - Linear Modulation -: Collector, Base and Emitter Modulation - Square Law Modulator - Balanced Modulator - DSS- SC-SSB - SC Generation - VSB Demodulation of AM Waves - AM Applications

UNIT II: Angle Modulation **(15 Hours)**

Phase and Frequency Modulation - Mathematical Representation of FM And PM - Frequency Spectrum of FM - Bandwidth Of FM: Bessel's Identity - Carson's Rule - Spectrum of Narrow Band and Wide Band FM- Generation of FM From PM And PM From FM. Generation of FM - Direct and Indirect Method - Demodulation of FM Waves - Pre-Emphasis and De-Emphasis in FM - FM Applications.

UNIT III: Transmitter and Receivers **(15 Hours)**

Communication Transceiver - Block Schematic Study of Transmitters - AM Transmitter - High Level and Low-Level AM Transmitters - SSB-SC Transmitter - FM Transmitter - Direct and Indirect FM Transmitters - Block Schematic Study of Receivers - TRF Receiver Super Heterodyne Receiver -Double Conversion Receiver - Choice of IF Frequencies - Tracking -Alignment - AGC - AFC - Characteristics of Receivers

UNIT IV: Digital Communication Techniques **(15 Hours)**

Sampling Process - PAM - PWM- PPM - PCM - DPCM - Delta Modulation - ASK - FSK - PSK - QAM - TDMA - FDMA - CDMA - Spread Spectrum Communication

UNIT V: Transmission Lines and Noise **(15 Hours)**

Fundamentals of Transmission Lines - Characteristic Impedance - SWR - Losses In Lines - Transmission Line Components: Double Stub - Baluns - Noise - Classification Of Noise - Atmospheric Noise - Extra-Terrestrial Noise - Man Made Noise - Thermal Noise - Shot Noise -Addition of Noise Due To Several Sources - Addition of Noise Due to Several Amplifiers in Cascade - Noise in Reactive Circuits - Signal to Noise Ratio - Noise Figure - Calculation of Noise Figure - Noise Figure in Terms of Equivalent Noise Resistance - Noise Temperature

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Kennedy., & Davis, G. (2017). *Electronic Communication Systems*, (6th Ed.). McGraw Hill Education.
2. Tomasi, W. (2008). *Electronic Communication Systems*, (5th Ed.). Pearson education.
3. Sklar, B. (2021). *Digital Communications Fundamentals and Applications*, (3rd Ed.). Prentice Hall

Unit	Book	Chapter	Sections
I	1 2	3, 4, 6	3.1,3.2, 4.1, 4.2, 4.3 6.1-6.6
II	1 2	5 7	5.1, 5.2, 5.3 7.5- 7.16
III	1	13	13.1, 13.2
IV	1 3	6, 4, 11	6.1,6.2,6.3,6.4,6.5 4.2, 4.4, 11.1
V	1	2, 7	2.1, 2.2,2.3,2.4,2.5,7.1,7.2,7.3

Books for Reference

1. Haykin, S. (2007). *Communication Systems*, (4th Ed.). John Wiley.
2. Mithal, G. K. (2002). *Radio Engineering*, (20th Ed.). KannaPublication.
3. Roddy, D., & Coolen, J. (2008). *Electronic Communications*, (4th Ed.). Pearson Education.

Websites and eLearning Sources

1. https://onlinecourses.nptel.ac.in/noc20_ee69/
2. https://www.vlab.co.in/ba-nptel-labs-electronics-and-communications
3. https://www.circuitstoday.com/basic-terminologies-electronic-communication

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	list and describe different types of modulation techniques	**K1**
CO2	deduce solutions to reduce noise to establish green communication	**K2**
CO3	examine and develop the concepts of communication for real time needs	**K3**
CO4	analyze and perceive communication modules to troubleshoot them	**K4**
CO5	asses the communication modules and adapt for Entrepreneurship and higher education	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**23UEL43CC06**			**Core Course - 6:** Communication Electronics						**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	1	2	2	2	2	3	2	**2.2**
CO2	3	2	2	3	2	3	2	3	2	2	**2.4**
CO3	2	2	3	3	3	3	2	2	2	2	**2.6**
CO4	2	3	2	3	1	2	2	3	3	2	**2.3**
CO5	2	3	2	3	2	3	3	2	2	3	**2.5**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UEL43CP04	**Core Practical - 4:** Communication and LIC	3	2

List of Experiments (Any 12 experiments)

Communication and LIC Experiments

1. Study of AM
2. Study of FM
3. Study of PAM, PWM
4. Study of PPM and PCM
5. Study of Transmission Line Characteristics
6. Construction and study of ASK and FSK
7. Study of op-amp characteristics using LM741
8. Construction and study of inverting, non-inverting, voltage follower, summing amplifier using op-amp LM741
9. Construction and study of comparator, integrator and differentiator using op-amp TL064
10. Construction and study of instrumentation amplifier using op-amp LM358
11. Construction and study of filters using op-amp LM358 (Low pass filter, High pass filter And Band pass filter)
12. Construction and study of Phase shift and Wiens's bridge oscillator using op-amp LM358
13. Construction and study of astable and monostable multivibrator using IC555.
14. Construction and study of 4-bit DAC using R-2R ladder method
15. Construction and study of 4-bit flash type ADC

Book for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UEL43AO02A	**Allied Optional - 2:** Applied Physics - 2	4	3

Course Objectives
To recognize the propagation and interaction of light with matter.
To describe the fundamental concepts in physics particularly optics and materials.
To interpret the daily life applications of wave optics, fibre optics, laser, crystal, dielectric and modern engineering materials.
To solve the numerical problems in basic physics.
To categorise the properties of materials like glass, alloys, nanomaterials and solar cells and characterization and to apply them for various engineering applications.

UNIT I: WAVE OPTICS **(12 Hours)**

Superposition - Superposition of Waves - Young's double slit Experiment - Coherence - Wedge Shaped Films - Newton's Rings.

Diffraction - Types: Fresnel and Fraunhoffer - Diffraction of Circular Aperture - Diffraction Grating - Resolving Power - Grating, Prism Comparison.

Polarization - Types of Polarized Light - Polarization by reflection - Malus Law - Double Refraction (Huygen's PPL.), Nicol Prism.

UNIT II: LASERS AND FIBER OPTICS **(12 Hours)**

Lasers: Introduction - Principle - Einstein's theory - Methods of achieving population inversion - Ruby Laser - He-Ne Laser - Applications. Fibre Optics: Introduction - Structure of optical fibres - Materials - Classifications - Fibre Loss - FOC.

UNIT III: CRYSTAL PHYSICS **(12 Hours)**

Lattice (unit cell) - Bravais lattice - Miller indices - d-spacing - number of atoms per unit cell - Atomic radius - Coordination number - Packing factor - Crystal structure (examples) - Crystal defects - Burger vector.

UNIT IV: DIELECTRIC MATERIALS **(12 Hours)**

Basic definitions - Various types of polarization in dielectric materials - Frequency and temperature dependence of polarization - Internal field or local field - Clausius-Mosotti equation - Dielectric losses - Dielectric breakdown - Applications of dielectric materials - Ferro electricity.

UNIT V: MODERN ENGINEERING MATERIALS **(12 Hours)**

Engineering Physics Metallic glasses - Shape memory alloys - Nano materials - Carbon nanotubes - Solar Cells.

Books for Study

1. Bhattacharya, D.K., & Bhaskaran, A. (2010). *Engineering physics*. Oxford University Press.
2. Rajendran, V. (2010). *Engineering physics*. Tata McGraw Hill Education.
3. Aruldhas, G. (2010). *Engineering Physics*. Prentice-Hall of India Pvt Limited.

Book for Reference

1. Young, H.D., Freedman, R. A. (2017). *University Physics with Modern Physics.* (14th Ed.). Pearson Education.

UNIT	BOOK	CHAPTERS	SECTIONS
I	3	3,4,5	3.1, 3.2, 3.4, 3.8, 3.9; 4.1, 4.2, 4.4, 4.5, 4.8; 5.2, 5.3, 5.5, 5.6, 5.8, 5.9
II	2	11,12	11.1,11.2, 11.3, 11.4, 11.7.1, 11.7.2, 11.10.10, 12.1-12.6, 12.8, 12.9
III	1	5	5.1-5.10, 5.12, 5.13
IV	1	10	10.1-10.10
V	1	11	11.1-11.4
	2	15	15.4

Course Outcomes		
CO No.	**CO-Statements** On the successful completion of the course, student will be able to	**Cognitive Levels (K-Level)**
CO1	acquire the required basic concepts in general physics and be able to interpret them in daily life.	**K1**
CO2	categorize various dielectric materials by comparing various crystal properties accordingly.	**K2**
CO3	analyse and summarise various Modern materials based on studying the physics behind them.	**K3**
CO4	apply the concept of LASER and Fibre optics on various applications through analysing various problems.	**K4**
CO5	experiment with and give solutions on choosing various materials for fabrication thereby managing the existing eco system.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours/Week**		**Credits**
4	**23UEL43AO02A**			**Allied Optional - 2:** Applied Physics - 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	3	2	1	3	2	3	3	1	2	2	**2.2**
CO2	3	2	2	3	2	3	3	2	2	3	**2.5**
CO3	3	2	2	3	2	3	3	2	2	3	**2.5**
CO4	3	3	2	3	2	3	3	2	2	2	**2.5**
CO5	3	3	2	3	3	3	3	2	2	3	**2.7**
									Mean Overall Score		**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UEL43AO02B	**Allied Optional - 2:** Computer Science - 2	4	3

Course Objectives

UNIT I **(12 Hours)**

Introduction to Computer Networks and Data Communication: Need for Computer Networks-Evolution-Data Communication Fundamentals-Data Transmission- Transmission Media.

UNIT II **(12 Hours)**

Network Classification, Communication and Components: Classification of Computer Networks-Switching and Routing-Routing-Multiplexing and Concentration-Concentrator-Terminal Handling-Components of Computer Network.

UNIT III **(12 Hours)**

Network Standards and OSI Model: Need for Network Standards-The OSI Reference Model. Local Area Network: The Evolution of LAN-LAN Architecture-LAN advantages and Services-Characteristics of LAN-LAN Topologies.

UNIT IV **(12 Hours)**

Wireless LAN and VSAT: Wireless LANs-Components of Wireless LAN-Working of Wireless LANs - Infrared Technology-Wireless LAN Types-Protocols for Wireless LAN-Uses of Wireless LANs-Bluetooth Technology.

UNIT V **(12 Hours)**

Introduction to Internet of Things: Definition of Internet of Things -Application Areas of IoT-Characteristics of IoT-Things in IoT-IoT Stack-Enabling Technologies-IoT Challenges.

Teaching Methodology	Chalk and Talk, PPT

Books for Study

1. Rajesh, E., & Balasubramanian. (2002). *Computer Networks, Fundamentals and Applications*, Vikas Publishing House Pvt. Ltd.
   Unit I: Chapter-1
   Unit II:Chapter-2
   Unit III: Chapter-3 (Sec.3.1 & 3.2) Chapter-5 (Sec.5.1 to 5.5)
   Unit IV: Chapter-7 (Sec.7.1 to 7.3, 7.5 to 7.7, 7.9 & 7.12)
2. Vasudevan, S.K., Nagarajan, A.S., & Sundaran, R.M.D. (2020). *Internet of Things*, (2nd Ed.). Wiley Publication.
   Unit V: Chapter-1 (Sec.1.1, 1.3 to 1.8)

Books for reference

1. Stallings, W. (2004). *Data and Computer Communications*, (7th Ed.). Prentice Hall of India.
2. Tanenbaum, A.S. (1999). *Computer Networks*. Prentice Hall of India, New Delhi.
3. Bahga, A., & Madisetti, V. (2015). *Internet of Things- A Hands-on Approach*. Universities Press Private Limited, India.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, the students will be able to	**Cognitive Levels (K-Level)**
CO1	understand the foundations of data communications	**K1**
CO2	appraise the classification and basic concepts of Switching and Routing	**K2**
CO3	analyze the concepts of LAN Network	**K3**
CO4	use the concepts of Wireless LAN Technology	**K4**
CO5	acquire the basic knowledge on IoT	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**23UEL43AO02B**			**Allied Optional - 2:** Computer Science - 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	2	2	3	3	2	2	3	**2.4**
CO2	2	3	2	1	2	3	3	2	2	3	**2.3**
CO3	1	2	3	2	3	2	3	2	3	3	**2.4**
CO4	2	2	2	3	2	2	3	2	2	3	**2.3**
CO5	2	2	2	2	3	1	3	2	2	3	**2.2**
									Mean Overall Score		**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UEL43OP01A	**Allied Optional Practical:** Applied Physics	2	2

Any 16 of the following

1. Young's modulus of a Uniform Bar by pin and microscope method: Uniform bending
2. Young's modulus of a Uniform Bar by pin and microscope method: Non-Uniform bending
3. Vibration of Strings: Melde's Apparatus
4. Sonometer - Frequency
5. Spectrometer - Refractive index of a prism
6. Spectrometer - Normal Incidence: Grating - Wavelength
7. Air Wedge - Thickness of a wire
8. Newton's Rings - Determination of R
9. Convex lens
10. Concave lens
11. P.O Box - Temperature coefficient - Thermistor
12. Specific Heat of the liquid by cooling - Cooling Graph
13. Thermal Conductivity of a bad (cardboard) conductor - Lee's Disc
14. Carey Foster's Bridge - low resistance and specific resistance
15. Potentiometer - Ammeter Calibration
16. Potentiometer - Specific Resistance of a coil of wire R
17. Young's modulus of a Uniform Bar by optical lever method: Uniform bending
18. Young's modulus of a Uniform Bar by optical lever method: Non-Uniform bending
19. Field along the axis of a circular coil - deflection magnetometer
20. Comparison of Magnetic Moments - null method (one in Tan A, other in Tan B)

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	23UEL43OP01B	**Allied Optional Practical:** Computer Science	2	1

Course Objectives

1. Simple web page with all the Text Formatting tags
2. Adding Images to Web Pages
3. Creating Lists (Ordered and Unordered List)
4. Adding Links to Web Pages
5. Creating Tables using various attributes
6. Creating Frames
7. Designing forms (DDL)
8. Implementation of Data Definition language commands
9. Implementation of DML, TCL and DCL commands

Simple Projects using HTML

1. Web blogs creation.
2. Department Website creation.

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
CO1	understand the various text formatting tags, adding images to web page, presenting list of information.	**K1**
CO2	apply the knowledge in creating a simple web page with links to other web page and display information in table form.	**K2**
CO3	design a form in a web page and divide the browser window in multiple sections using frames.	**K3**
CO4	categorize various commands in SQL.	**K4**
CO5	analyze and build a web page.	**K5**

Relationship Matrix											
Semester	**Course code**			**Title of the Course**				**Hours**			**Credits**
4	**23UEL43OP01B**			**Allied Optional Practical:** Computer Science				**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	2	2	1	2	3	3	2	2	2.3
CO2	2	3	2	2	1	2	3	3	2	2	2.2
CO3	3	2	2	2	2	2	3	3	2	2	2.3
CO4	3	3	2	3	2	2	2	3	2	1	2.3
CO5	3	3	2	3	2	2	3	3	2	2	2.5
										Mean Overall Score	**2.32 (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*

Working with Passion. Australia, Woodslane Pty Limited.

Websites and eLearning Sources

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

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

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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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	23UEL53CC07	**Core Course -7:** Microprocessors and Applications	4	3

Course Objectives
To describe the structure and working of microprocessors and required peripherals
To understand the basics of microprocessor programming
To use the microprocessors in real time applications
To select suitable microprocessor for an application and analyse its working
To evaluate the performance of microcontroller system in an application

UNIT I: INTEL 8085 **(12 Hours)**

Overview of Microprocessors - Architecture of 8085 Microprocessor - Pin Configuration - Intel 8085 Instructions - Opcode and Operands - Instruction Cycle - Machine Cycle and T State Instruction and Date Flow - Timing Diagram: Opcode Fetch Cycle - Memory Read - I/O Read - Memory Write - I/O Write - Stack and Stack Operations.

UNIT II: 8085 Programming **(12 Hours)**

Instruction Set - Data Format - Addressing Modes - Status Flags - Assembly Language - High Level Language; Programming Exercises: Addition - Subtraction - Multiplication - Division; Array Manipulation: Average in Array - Ascending -Descending - BCD to Seven Segment Display - Subroutines - Delay Subroutine - Interrupt and Programming

UNIT III: Peripheral Interfaces **(12 Hours)**

PPI 8255 - UART 8251 - 8253 Timer - 8259 Interrupt Controller - 8257 Programmable DMA - 8275 Programmable CRT Controller - 8279 Keyboard and Display Interface Controller - Applications Stepper Motor and Traffic Controller Using 8085 Microprocessors - 8085 Simulator Software

UNIT IV: INTEL 8086 **(12 Hours)**

Intel 8086 Architecture - Pin Description and Function Overview - Minimal and Maximum Mode - Bus Activities During Read/Write Operation - Interrupt Structure and Operation - Comparative Study of 286,386,486 and Pentium Processors - Simple Programs

UNIT V: INTEL Core I5 **(12 Hours)**

Multi Core - Thread - Cache Memory - Processor Configuration - Register Definitions - Host Bridge - DRAM Controller - Processor Graphics - PCI Controller - Dynamic Tuning Technology - Power and Performance - Debug - Power Management - Thermal Management -Signal Description

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Ram, B. (2003). *Fundamentals of Microprocessors and Microcomputers*, (5th Ed Reprint). Dhanpat Rai Publications.
2. Study Material Prepared by the Department.

Unit	Book	Chapter	Sections
I	1	3	Relevant sections
II	1	4, 5	Relevant sections
III	1	7, 10, 11, 12	Relevant sections
IV	2	1	All
V	2	2	All

Books for Reference

1. Ramesh, G. S. (2013). *Microprocessor Architecture, Programming and Application with the 8085*, (6th Ed.). Penram International Publishing.
2. Vijayendran, V. (2009), *Fundamentals of Microprocessor-8085*, (1st Ed.). S. Viswanathan Publishers.
3. Barry, B. B. (2008), *the Intel Microprocessors: 8086 --- Core2 … - Architecture Programming*

and Interfacing, (8th Ed.). Pearson Education.

Websites and eLearning Sources

1. https://www.youngwonks.com/blog/What-is-A-Microprocessor-And-What-Are-ItsApplications
2. https://www.javatpoint.com/microprocessor-applications
3. https://www.watelectronics.com/what-is-a-microprocessor-architecture-types-itsapplications/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe microprocessor and explain its working	**K1**
CO2	explain and illustrate microprocessor programs	**K2**
CO3	examine real time problems and solve them with microprocessor by employing modern tools.	**K3**
CO4	assess the need of microprocessors to solve the problems with professional tools and recommend the solutions for the same	**K4**
CO5	evaluate the constructed microprocessor projects	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
5	**23UEL53CC07**			**Core Course -7:** Microprocessors and Applications					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	3	3	2	2	**2.5**
CO2	3	3	3	2	2	3	3	3	2	2	**2.6**
CO3	3	3	3	2	2	3	3	3	2	2	**2.6**
CO4	3	3	3	2	2	3	3	2	2	2	**2.5**
CO5	3	3	2	2	2	3	3	2	2	2	**2.4**
										Mean Overall Score	**2.52 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53CC08	**Core Course - 8:** Sensors and Electronic Instrumentation	4	3

Course Objectives
To define sensors and the principles of instrumentation
To understand the working of sensors, the concepts and techniques of instrumentation
To experiment different measuring instruments in real time
To analyse the working and functions of various instruments
To evaluate and select the suitable sensor and technique to construct an instrument for needed instrument

UNIT I: Sensors **(12 Hours)**

Analogue and Digital Quantities - Classification of Sensing Devices - Sensors - Transducers -Actuators - Basic Sensor Technology - Sensor Systems - Characteristics of Sensor - System Characteristics- Resistive Sensor - Capacitive Sensor - Inductive Sensor - Level Sensor - Photosensor - Piezoelectric Pressure Sensors

UNIT II: Measurement and Instrumentation System **(12 Hours)**

Functions and Characteristics of Instruments - Electrical Units - Measurement Standards - Error in Measurement - Statistical Analysis of Error in Measurement - Limiting Errors - Elements of Electronic Instruments - Selection, Care, and Use of Instruments - Static and Dynamic Characteristics of Instrumentation.

UNIT III: Measurement of AC and DC Bridges **(12 Hours)**

Wheat Stone Bridge - Kelvin Bridge - A.C. Bridges - Sources and Detectors - General Equation for Bridge Balance - General Form of A.C. Bridge - Maxwell Inductance Bridge - Hay's Bridge -De Santy's Bridge - Schering Bridge - Source of Errors in A.C. Bridges - Factors to reduce the Errors.

UNIT IV: Electronic Instruments and Interpretation **(12 Hours)**

Electronic Voltmeters - Advantage of Electronic Voltmeters - Transistors Voltmeters (TVM) - Permanent Magnet Moving Coil (PMMC) - Multi Range DC Voltmeter - Ohmmeter - Multimeter - Ammeter - Function Generators - Resonant Wave Analyzers - Heterodyne Wave Analyzer -Distortion Meters - Basic Spectrum Analyzer - Spectral Displays - Spectra of Different Signals.

UNIT V: Various Analytical Instruments **(12 Hours)**

Elements of an Analytical Instrumentation - Colorimeter/Photometers - Spectrophotometers - Chromatography - Gas Chromatography - Principle of NMR - Constructional Details of NMR Spectrometers - Thermo Analytical Methods - Thermo Gravimetric Analysis - Principle of pH Measurement - pH Meters - Air Pollution Monitoring Instruments - Water Pollution Monitoring Instruments.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Usher, M. J., & Keating, D. A. (1996). *Sensors and Transducer Characteristics, Applications, Instrumentation, Interfacing*, (2nd Ed.). MACMILLAN Press Ltd.
2. Jon, S. W. (2005). *Sensor Technology Handbook*, (Har/Cdr Edition). Newness is an imprint of Elsevier, Elsevier Inc.
3. Larry, D. J. (2007). *Electronic Instruments and Measurements*, (2nd Ed.). Prentice-Hall International Editions.
4. Khandpur, R S. (2006). *Handbook of Analytical Instrumentation*, (2nd Ed.). McGraw-Hill Education Private Limited.
5. Sawhney, A. K. (2015). *A course in Electrical and Electronic Measurements and Instrumentation*, (4th Ed.). Educational and Technical Publisher.

Unit	Book	Chapter	Sections

I	1 2	11,8,14, 16,19	1.1 - 1.51.1, 1.2, 8.2, 8.3, 14.1, 16.2, 19.1, 19.2,
II	3	1	1.1 - 1.10
III	4 5	20, 822	20.1 - 20.9, 8.5, 8.11 - 8.2222.17 - 22.27
IV	4	13, 16	13.5 - 13.11, 13.12, 13.13, 13. 16,6.1, 16.2, 16.3, 16.4,16.5, 16.6, 16.7, 16.11, 16.12, 16.15, 16.16, 16.21
V	4	1, 2, 10, 16,18, 21,24	1.1, 2.5, 2.6, 10.1, 10.4, 16.1, 16.3, 18.1, 18.2, 21.1, 21.4, 24.1, 24.8

Books for Reference

1. Gregory, B. A. (1981). *An introduction to electrical instrumentation and measurement systems*, (2nd Ed.). A Halsted Press book.
2. Sapra, S., & Navani, J. P. (2014). *Sensors and Instrumentation*, (1st Ed.). Chand, S Publishing.
3. Placko, D. (2007). *Fundamentals of Instrumentation and Measurement*, (1st Ed.). Wiley.

Websites and eLearning Sources

1. https://www.seia-conference.com/
2. https://www.edibon.com/en/mechatronics-automationcompumechatronics/mechatronics /electronics/sensors-and-electronic -instrumentation
3. https:/www.mdpi.com/journal/sensors/special_issues/SEIA_2020

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	list and discuss the basics of sensors	**K1**
CO2	predict the errors in measurement, list the characteristics of instrumentation and use to solve the problems in instruments.	**K2**
CO3	apply electronic instruments in various applications of real time problems.	**K3**
CO4	analyze various type of AC and DC bridges in instruments and develop a modern tool.	**K4**
CO5	inspect and construct various instruments	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
5	**23UEL53CC08**		**Core Course - 8:** Sensors and Electronic Instrumentation							**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	2	3	3	3	2	2	**2.6**
CO2	3	2	3	2	2	3	3	2	3	2	**2.5**
CO3	3	2	3	2	2	3	3	3	2	2	**2.5**
CO4	2	2	3	2	2	3	3	2	2	2	**2.3**
CO5	3	3	3	2	2	3	3	2	2	2	**2.5**
										Mean Overall Score	**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53CP05	**Core Practical - 5:** Microprocessors, C and Python	6	4

List of experiments:

Any sixteen: Microprocessor, Sensor and Instrumentation and 'C' and Python Programming

1. Microprocessor 8085- Programming I {Data transfer and rotate operations}
2. Microprocessor 8085- Programming II {addition, subtraction, multiplication and division}
3. Microprocessor 8085- Programming III {Code conversion - Gray to Binary, Binary to BCD Binary to Gray, BCD to Binary}
4. Microprocessor 8085 - Programming IV {largest, smallest, sorting in ascending order and Descending order}
5. Microprocessor 8085 - Programming V {Using user routines in Monitor program}
6. Microprocessor Interfacing - Input and Output using8255 PPI
7. Microprocessor Interfacing - 8253
8. Microprocessor Interfacing - Traffic Controller.
9. Microprocessor Interfacing - Stepper Motor Controller.
10. Microprocessor 8086- Programming I {Data transfer and rotate operations}
11. Microprocessor 8086- Programming II {addition, subtraction, multiplication and division}
12. Study the linearity characteristics of Pressure using capacitive transducer and Distance Using Ultrasonic transducer
13. Study of Sensors - I {Temperature - LM35, RTD, Thermocouple)
14. Study of Sensors - II {LVDT, Hall Effect, Strain Gauge, Flow and Level}.
15. Study of Sensors - III {optotriac, opto SCR, Opto coupler}
16. C programming-I (input, output, string and file manipulation)
17. C programming-II (implementation of statistical functions)
18. C programming-III (functions and header file creation)
19. C programming-IV (pointers and structures)
20. Programs on operators & I/O operations.
21. Programs on basic control structures & loops.
22. Programs on strings and Lists.
23. Programs on functions and tuples
24. Study of Solar Panel with Controller

Book for Study

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53ES01A	**Discipline Specific Elective - 1:** Mobile Communication	5	3

Course Objectives
To observe the principle and functions of different mobile communication systems
To understand the principles and applications of mobile communication system
To apply modulation and demodulation techniques in different communication systems
To analyse signals, methods and working of mobile communication systems in applications
To assess the performance of a mobile communication system for a particular application

UNIT I: Wireless Communication **(15 Hours)**

Signals - Antennas - Signal Propagation - Path Loss of Radio Signals - Additional Signal Propagation Effects - Multipath Propagation - Multiplexing - Space Division Multiplexing - Frequency Division Multiplexing - Time Division Multiplexing - Code Division Multiplexing - Modulation: ASK - FSK - PSK - Multi Carrier Modulation - Spread Spectrum - Cellular Systems

UNIT II: Telecommunication Systems **(15 Hours)**

GSM: Mobile Services - System Architecture - Radio Interface - Protocols - Localization and Calling - Handover - Security - New Data Services - DECT: System Architecture - Protocol Architecture - TETRA - UMTS and IMT-2000: UMTS Releases and Standardization - UMTS System Architecture - UMTS Radio Interface - UTRAN - Core Network - Handover - SDMA - FDMA - TDMA - CDMA

UNIT III: Satellite and Broadcast System **(15 Hours)**

Introduction - GEO - LEO - MEO - Routing - Localization - Handover - Cyclical Reception of Data - Digital Audio Broadcasting - Digital Video Broadcasting - DVB Data Broadcasting - DVB for High-Speed Internet Access - Convergence of Broadcasting and Mobile Communications.

UNIT IV: Wireless LAN **(15 Hours)**

Infra-Red vs Radio Transmission - Infrastructure and Ad-Hoc Network - IEEE 802.11: System Architecture - Protocol Architecture - Physical Layer - Medium Access Control Layer - MAC Management - 802.11b 231 - 802.11a 234 - Newer Developments - HIPERLAN - Bluetooth

UNIT V: Generation of Mobile Communication **(15 Hours)**

From 1G to 3G - From UMTS ToLTE - LTE to LTE Advanced: High Level System Architecture - Principle and Operation - 4G Communication - Volte - 5G Communication: Architecture - Research and Development - 5G Internet

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Schiller, J. (2003). *Mobile Communications*, (2nd Ed.). Pearson Education limited.
2. Cox, C. (2014). *An Introduction to LTE*, LTE-Advanced, SAE VoLTE and 4G *Mobile Communication*, (2nd Ed.). Wiley.
3. Rodriguez, J. (2015). *Fundamentals of 5G Mobile Networks*, (1st Ed.). Wiley.
4. Rappaport, T. S. (2012). *Wireless Communications: Principles and Practice*, (2nd Ed.). Pearson Education.

Unit	Book	Chapter	Sections
I	1	2	2.2 - 2.8
II	1	3, 4	3.2 - 3.5, 4.1 - 4.4
III	1	5, 6	5.1 - 5.6, 6.2 - 6.5
IV	1	7	7.1 - 7.5
V	2,3	1,2	1.1 - 1.6, relevant section

Books for Reference

1. Saad, Z. A. (2019). *5G mobile communications*. CRC Press.
2. Schiller, J. (2014). *Mobile Communications*, (2nd Ed.). Pearson Education.
3. Verma, B. (2013). *Mobile Communications*, (Reprint Ed.). Kataria, S. K. and Sons.

Websites and eLearning Sources

1. https://itlaw.wikia.org/wiki/Mobile_communications
2. https://www.nibusinessinfo.co.uk/content/advantages-and-disadvantages-mobiletechnology
3. https://www.sciencedirect.com/topics/social-sciences/mobile-communication

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe the basics of mobile communication	**K1**
CO2	compare and outline mobile communication protocols	**K2**
CO3	illustrate wireless communication	**K3**
CO4	investigate the functionality of transport and application layer	**K4**
CO5	categorize and recommend mobile system	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**23UEL53ES01A**			**Discipline Specific Elective - 1:** Mobile Communication						**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	2	2	3	2	2	2	2	**2.2**
CO2	3	3	2	2	2	2	3	2	2	2	**2.3**
CO3	3	2	2	2	2	3	2	2	2	2	**2.2**
CO4	3	2	2	2	2	3	3	2	2	2	**2.3**
CO5	3	3	2	2	2	3	3	2	2	2	**2.4**
										Mean Overall Score	**2.28 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53ES01B	**Discipline Specific Elective - 1:** Medical Electronics	5	3

Course Objectives
To identify modules to sense the bio signals and describe different techniques of bio signal measurement
To understand the role of electronics in medical field
To apply the characteristics of electronic devices in bio signal and condition measurement
To analyse the working of biomedical instruments
To test the biomedical instruments in real time applications

UNIT I: Electrodes and Transducers **(15 Hours)**

Origin of Bioelectric Signals-Electrode-Electrolyte Interface-Skin Contact Impedance - Half Cell Potential - Types of Electrodes - Surface, Needle and Micro Electrodes -Electrodes for ECG - Electrodes for EEG - Electrical Conductivity of Electrode Jellies and Cream - Pressure Transducers - Pulse Sensors - Respiration Sensors.

UNIT II: Biomedical Recorders **(15 Hours)**

Basic Recording System - General Considerations for Bioelectric Recorder Amplifiers - Sources of Noise in Low Level Recording Circuits -Preamplifiers Main Amplifier and Driver Stage - Writing Systems - Electrocardiograph - Electroencephalograph -Electromyography

UNIT III: Measurement and Analysis Techniques in Blood **(15 Hours)**

Blood Flow Meters: Electromagnetic Blood Flow Meter-Blood Gas Analyzers: Blood pH Measurement-Measurement of Blood pCO2 - Blood pO2Measurement - Blood Cell Counters: Methods of Cell Counting - Coulter Counters - Automatic Recognition and Differential Counting of Cells.

UNIT IV: Modern Imaging Systems **(15 Hours)**

X-Ray Machine - CT scanner: Basic Principle - Contrast Scale - System Components-NMR: Principles of NMR Imaging- Fourier Transform of The FID - Bloch Equation - Image Reconstruction Techniques - Discrimination Basedon Relaxation Rates- Basic NMR Components -Applications - Biological Effects - Advantages of NMR Imaging System.

UNIT V: Advances in Biomedical Instrumentation **(15 Hours)**

Pacemakers - Types - Artificial Heart Valves - Defibrillators Types - Ventilators - Audiometers - Anesthesia Machine - Angiography - Endoscope.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Cromwell, L. (2007). *Biomedical Instrumentation and Measurement,* (2nd Ed.). Prentice Hall.
2. Aurmugan, M. (2003). *Biomedical Instrumentation,* (2nd Ed.). Gomathi Sekar.

Unit	Book	Chapter	Sections
I	1	2,4	2.2-2.4,4.1-4.3
II	2	4	4.1-4.6
III	1 2	66,7	6.1-6.3, 6.13,6.14,7.2
IV	2	7,10	7.8,7.9,10.7,10.10
V	2	5,6,7,10	5.2,5.4,5.5, 6.8,6.9,7.7,7.12,10.4

Books for Reference

1. *Khandpur, R. S. (2007). Handbook* of Biomedical Instrumentation, (2nd Ed.). Tata McGraw-Hill.
2. Kutz, M. (2003). *Standard Handbook of Biomedical Engineering and Design,* (1st Ed.). McGraw Hill Publisher.

3. Joseph, Carr, J., John., & Brown, M. (2004). *Introduction to Biomedical Equipment Technology*, (4th Ed.). Pearson Education.

Websites and eLearning Sources

1. https://www.sciencedirect.com/topics/engineering
2. https://www.myklassroom.com/Engineering-branches/80/MEDICAL-ELECTRONICS
3. https://ieeexplore.ieee.org/document/6123659/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	classify and know the various types of electrodes and transducers	**K1**
CO2	explain the functioning of bio medical recorders	**K2**
CO3	solve issues by employing measurement and analysis techniques	**K3**
CO4	compare the results from the measurements	**K4**
CO5	assess the need of modern society with professional ethics in imaging system and recommend solutions for the same	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
5	**23UEL53ES01B**	**Discipline Specific Elective - 1:** Medical Electronics								**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	3	2	1	3	2	2	2	2	**2.2**
CO2	3	3	2	1	1	3	3	3	2	1	**2.2**
CO3	3	3	3	2	1	3	2	2	2	1	**2.2**
CO4	3	2	2	2	1	3	3	3	2	1	**2.2**
CO5	3	2	2	2	1	3	3	2	2	2	**2.2**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53ES02A	**Discipline Specific Elective - 2:** C and Python Programming	5	3

Course Objectives
To define syntax and structure of C and Python functions
To understand C and Python programming techniques
To apply the logical steps and functions of C and Python to solve the problems by writing the programs
To analyse the flow of C and Python programs
To test C and Python programs in an application

UNIT I: Data Types, Operators and Expressions **(15 Hours)**

Structure of C Language - Lexical Elements of C Language: C Character Set - Constants - Keywords - Delimiters - Variables - Data Types and Sizes - Variable Declaration - Labels - Expressions - Statements. Operators and Expressions: Arithmetic Operators- Relational Operators - Logical Operators - Assignment Operators - Increment and Decrement Operators- Conditional Operator-Bitwise Operators- Special Operators-Arithmetic Expressions Evaluation of Expressions- Precedence of Arithmetic Operators- Type Conversions in Expressions- Operator Precedence and Associativity- Simple Problems

UNIT II: I/O and Control Statements **(15 Hours)**

Input Functions - Output Functions - Formatted Input / Output - Control Structures - Unconditional Control - Bidirectional Conditional Control - Multi-Conditional Control - Loop Control Structures.

UNIT III: Arrays and Functions **(15 Hours)**

Array Declaration - Multidimensional Array - Array Initialization - Rules to Initialize an Array Strings/Character Arrays - Rules - C Functions - Library Functions - User Defined Functions - Advantages of the Functions - Arguments - Function Declaration - Recursive Functions -Storage Class Specifiers - Scope of the Variables - Scope Rules for Identifiers - Simple Electronics Problems.

UNIT IV: Basics of Python **(15 Hours)**

Basic Elements of Python - Branching Programs-Strings and Input-Iteration-Functions and Scoping - Specifications - Recursion - Global Variables - Modules - Files - Simple Programs.

UNIT V: Higher-Order Functions **(15 Hours)**

Tuples - Ranges - Lists and Mutability - Functions as Objects- Strings - Extrapolation - Micro Python IDE - Numpy - Scipy - Circuit Python - Classes and Object-Oriented Programming.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Balagurusamy, E. (2019). *Programming in ANSI C,* (8th Ed.). McGraw Hill Education Private Limited.
2. John, G. V. (2021). *Introduction to Computation and Programming Using Python*, (3rd Ed.). Prentice Hall of India.

Unit	Book	Chapter	Sections
I	1	2, 3,4	2.7, 3.2 -3.16, 4.1- 4.4
II	1	5,6, 7	5.1-5.4,6.1-6.5, 7.1-7.8
III	1	8, 9,10	8.1 - 8.10, 9.1- 9.20,10.1,10.2
IV	2	2, 4	2.1- 2.4, 4.1- 4.6
V	2	5	5.1-5.5

Books for Reference

1. Schaum's Outlines: Byron, G.S. (2018). *Programming with C*, (4th Ed.). Tata McGraw Hill Pub. Co Ltd.
2. Kanetkar, Y. (1998). *Programming with C,* (2nd Ed.). Tata McGraw Hill.

3. SciPy community. (2017). *SciPy Reference Guide Release 1.0.0 ().*

Websites and eLearning Sources

1. https://www.quora.com/What-is-the-use-of-learning-python-for-electronics-engineer
2. https://lms.decibelslab.com/courses/PythonforECEE
3. https://opensource.com/life/16/8/python-vs-cc-embedded-systems

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	outline the programming of C Language and python	**K1**
CO2	examine and explain Electronics related problems with the help of Python and C Language	**K2**
CO3	assess C language program in solving problems related to Electronics	**K3**
CO4	compose Programs in Python and C language for novel applications	**K4**
CO5	construct programing and analytical skills using C and Python to solve real time problems	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
5	**23UEL53ES02A**	**Discipline Specific Elective - 2**: C and Python Programming								**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	3	3	2	3	2	3	2	2	**2.6**
CO2	3	3	2	3	2	2	3	3	2	2	**2.5**
CO3	3	3	2	3	2	3	3	2	3	2	**2.5**
CO4	3	3	2	2	2	3	3	2	2	2	**2.4**
CO5	3	3	3	2	2	3	2	3	2	2	**2.5**
										Mean Overall Score	**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53ES02B	**Discipline Specific Elective - 2:** Computer Hardware and Networks	5	3

Course Objectives
To list and recognize the components of computer and networks
To understand the functions of computer boards and networks
To apply the hardware peripherals to assemble a computer and setup the network
To compare different hardware components used in computer and networks
To predict the required hardware components to setup a computer and networks

UNIT I: Motherboards **(15 Hours)**

Motherboard Types and Features - Configuring a Motherboard - Maintaining a Motherboard - Installing a Motherboard - Types and Characteristics of Processors - Selecting and Installing a Processor - Memory Technologies - Upgrading Memory

UNIT II: Power Supply and Trouble Shooting Hardware **(15 Hours)**

Cooling Methods and Devices - Selecting a Power Supply - Approaching Hardware Problem- Troubleshooting the Electrical System - Troubleshooting the Motherboard, Processor and RAM - Selection and Installation of Hard Drives - Troubleshooting Hard Drives.

UNIT III: Installation and Servicing **(15 Hours)**

Windows Installation - Installing I/O Devices - Troubleshooting I/O Devices - Backup Procedures - Managing Files, Folders, and Storage Devices - Understanding the Boot Process - Tools to Troubleshooting Windows Startup Problems - Understanding the Boot Process - Troubleshooting Windows Startup.

UNIT IV: Computer Networks **(15 Hours)**

Basic Networking Concepts-Physical and Logical Topologies - Network Topologies: Bus, Star, Ring and Mesh Topologies - Types of Networks: LAN, WAN, MAN, PAN, CAN - Networking Model-The OSI Model-TCP/IP Model -Network Adapters - Protocols. -Network Switching Technologies

UNIT V: Trouble Shooting Networks **(15 Hours)**

Concept of Server - Client - Node - Segment - Backbone - Host - Network Interface Card - Crimping Tools and Color Standards for Straight Crimping and Cross Crimping Functions of NIC- Repeaters - Hub - Switches - Routers - Bridges - Transmission Media and Topologies - Media Types: STP Cable - UTP Cable - Coaxial Cable - Fiber Cable - Base Band and Broad band Transmission - Cables and Connectors- Cabling and Troubleshooting.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Andrews, J. (2002). *A+ Guide to Hardware, Managing, Maintaining and Troubleshooting,* (6th Ed.). Course Technology Inc.
2. Scott., M. (2015). *Upgrading and Repairing PCs*, (22nd Ed.). QUE.
3. Andrew, T. S., & David, W. J. (2013). *Computer Networks,* (5th Ed.). Pearson.
4. Study Material prepared by the department.

Unit	Book	Chapter	Sections
I	1	3,4	All
II	1	5,6	All
III	1	3, 7, 8, 9	All
IV	3	1	1.2 - 1.5
V	1, 4	7	All

Books for Reference

1. Englander, I., & Wong, W. (2021). *The Architecture of Computer Hardware, Systems Software and Networking,* (6th Ed.). Wiley.
2. Mittal, A., & Rana, A. (2014). *Mastering PC Hardware and Networking,* (1st Ed.). Khanna Book Publishing Company.
3. Mohan, C. I. (2019). *Fundamentals of Computer Networks,* (1st Ed.). International Publishing House Pvt. Ltd.

Websites and eLearning Sources

1. https://en.wikipedia.org/wiki/Networking_hardware
2. https://en.wikiversity.org/wiki/Basic_computer_network_components
3. https://www.tutorialspoint.com/Basic-Network-Hardware

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe the fundamentals of Computer Hardware	**K1**
CO2	outline the hardware problems encountered in Computer	**K2**
CO3	solve various issues in computers	**K3**
CO4	analyze computer hardware and Networks with the knowledge of protocols	**K4**
CO5	develop troubleshooting skills and to become an entrepreneur	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
5	**23UEL53ES02B**	**Discipline Specific Elective - 2:** Computer Hardware and Networks								**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	3	2	2	3	2	3	2	2	**2.4**
CO2	3	3	3	2	2	3	2	3	2	2	**2.5**
CO3	2	3	3	2	2	2	3	3	2	2	**2.4**
CO4	3	3	3	2	2	3	3	3	2	2	**2.6**
CO5	3	3	3	2	2	2	3	3	2	2	**2.5**
										Mean Overall Score	**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53SP01A	**Self-paced Learning:** RF, Microwave and Optical Communications	-	2

Course Objectives
To acquire the knowledge on the principle and fundamental of Microwaves, RF and optical communications
To understand the concepts of RF, Microwaves and optical communications
To use the operations of Optoelectronic Detector
To examine and analyze the Laser Applications
To asses and recommend the optical and RF instruments

UNIT I: Introduction to Microwaves and Rf

Microwave and RF Engineering - General Applications- Frequency Band Definitions Overview of the RF and Microwave - Microwave Engineering: Semiconductor Materials for RF and Microwave Applications - Propagation and Attenuation in the Atmosphere - Systems Applications - Communications - Navigation - Sensors (Radar) - Heating - Measurements - Circuits and Circuit Technologies - Low Noise Amplifier - Power Amplifier - Mixer - RF Switch - Filter - Oscillator.

UNIT II: Microwave Measurements

Measuring Instruments - VSWR meter - Power meter - Spectrum analyzer - Network analyzer - Impedance Measurement - Frequency - Power - Q-factor - Dielectric Constant - Scattering Coefficients - Attenuation - S-parameters.

UNIT III: Basics of Optical Fiber

Block Diagram of Optical Communication System - Advantages of Fibre Optic Communication - Snell's Law - Critical Angle and Total Internal Reflection - Step and Graded Index Fibers - Meridional and Skew Rays in Optical Fiber- Acceptance Angle and Numerical Aperture -Mono mode and Multimode Fibers - Mode Number - Glass and Plastic Fibers - Signal Attenuation and Dispersion.

UNIT IV: Optical Sources and Detectors

LEDs - DH Structures - Materials - Internal, External and Coupling Quantum Efficiencies - Semiconductor Materials for Optical Sources - Surface Emitting LED - Edge Emitting LED -Modulation Capability - Electrical and Optical Bandwidth - LASER Principle - FP, DFB Laser Diode Structures - Optical Detectors - PIN Diode - APD.

UNIT V: Transmission and Reception

Source to Fiber Power Launching and Lensing Schemes - Fiber Joints - Splicing Techniques Connectors and Optical Couplers - Semiconductor Optical Amplifiers - EDFA Operation - Modulation: Analog and Digital Modulation - Receiver Block Diagram - Power Budget and Bandwidth Budget Calculation.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Golio, M., & Golio, J. (2008). *RF and Microwave Circuits, Measurements, and Modeling*,
2. (2nd Ed.). CRC Press.
3. Keiser, G. (2007). *Optical Fiber Communications,* (3rd Ed.). McGraw Hill Education.
4. Ghione, G., & Torino, P.D. (2009). *Semiconductor Devices for High-Speed Optoelectronics*, (1st Ed.). Cambridge University Press.

Unit	Book	Chapter	Sections
I	1	1	1.1 -1.8
II	1	2	2.1-2.3.4, notes
III	2	1,2	1.1-1.4,2.1-2.7
IV	3	4,5	4.1,4.6-4.9,4.11-4.16,5.1 - 5.8,
V	2	5,7	5.1-5.6, 7.1

Books for Reference

1. Samuel, L. Y. (2003). *Microwave Devices and Circuits*, (3rd Ed.). Pearson Education.
2. Kulkarni, M. (2012). *Microwave and Radar Engineering*, (4th Ed.). Umesh Publications.
3. Robert, C. E. (2012). *Foundation of Microwave Engineering*, (2nd Ed.). Wiley India.

Websites and eLearning Sources

1. https://eecs.oregonstate.edu/rf-micro-optics
2. http://ieeexplore.ieee.org/document/7173150/
3. https://www.york.ac.uk/electronic-
4. engineering/research/communicationtechnologies/applied-electromagnetics-devices/microwave-optic/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	list the principle and fundamental of Microwaves and RF	**K1**
CO2	outline the concepts of Laser Fundamentals	**K2**
CO3	illustrate and use the operations of Optoelectronic Detector	**K3**
CO4	examine and analyze the Laser Applications	**K4**
CO5	asses and recommend the optical and laser instrumentation system	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
5	**23UEL53SP01A**	**Self-paced Learning:** RF, Microwave and Optical Communications								**-**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	3	3	2	2	3	3	2	**2.4**
CO2	2	2	2	2	2	2	2	2	2	3	**2.1**
CO3	2	2	2	2	3	3	2	2	2	2	**2.2**
CO4	2	2	3	2	2	2	2	3	3	3	**2.2**
CO5	2	2	3	2	2	3	2	2	2	2	**2.2**
										Mean Overall Score	**2.2 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	23UEL53SP01B	**Self-paced Learning:** PCB Design and Fabrication	-	2

Course Objectives
To state different methods of PCB design and fabrication
To understand the techniques of PCB design and fabrication
To apply the rules and methods of PCB design while making PCB for an application
To analyse the PCB design of a specific application
To evaluate the designed PCB and recommend the solutions

UNIT I: Introduction To PCB

Definition and Need/Relevance of PCB - Background and History of PCB - Types of PCB - Classes of PCB Design - Terminology in PCB Design - Different Electronic Design Automation (EDA) Tools and Comparison - Example Software Tool - Protues / Express PCB / Eagle / Altium

UNIT II: PCB Design Process

PCB Design Flow - Placement and Routing - Steps Involved in Layout Design - Artwork Generation Methods - Manual and CAD - General Design Factor for Digital and Analog Circuits - Layout and Artwork Making for Single - Side, Double-Side and Multilayer Boards - Design for Manufacturability

UNIT III: PCB Fabrication and Assembly

Steps Involved in Fabrication of PCB - PCB Fabrication Techniques - Single, Double Sided and Multilayer - Etching: Chemical Principles and Mechanisms - Post Operations - Stripping - Black Oxide Coating - Solder Masking - PCB Component Assembly Processes - Crosstalk and Thermal Issues

UNIT IV: Schematic Capture

Placing Schematic Component from Various Integrated Libraries into Protues / Eagle / Altium Designer Schematics - Connection of Components using Wire, Bus, Net-Label, Harness Connector or a Port Compiling- Checking the Schematic Design against Warnings, Errors and Faults - Creating Output Reports -BOM (Bill of Material) - Exporting and Importing Schematic Data

UNIT V: PCB Layout

PCB Board Profile - Number of Signal - Layers and Power - Fabrication Outputs: Generation of GERBER File - Design Considerations: Optimizing the Copper - Tracks Width - Design Rule Check (DRC) - Design PCB (Schematic and Layout) - Design a Regulator Circuit Using 7805 PCB - Design a Dual and Variable Power Supply PCB.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Book for Study

1. Mitzner, K. (2009). *Complete PCB Design Using or CAD Capture and PCB Editor*, (1st Edition).
2. Newnes., Keiser, G. (2007). *Optical Fiber Communications*, (3rd Ed.). McGraw Hill Education.

Unit	Book	Chapter	Sections
I	1	1	Relevant sections
II	1	2	Relevant sections
III	1	3	Relevant sections
IV	1	4	Relevant sections
V	1	5	Relevant sections

Books for Reference

1. Khandpur, R S. (2017). *Printed Circuit Board*, (1st Ed.). Tata McGraw Hill Education Pvt Ltd.
2. Mehta, S. D. (2011). *Electronic Product Design Volume-I*, (1st Ed.). S Chand Publications.
3. Gregory, B. A. (1985). *An Introduction to Electrical Instrumentation and Measurement Systems*, (1st Ed.). Macmillan Education Ltd.

Websites and eLearning Sources

1. https://resources.pcb.cadence.com/blog/2019-what-is-the-pcb-fabrication-process-anintroduction
2. https://www.vse.com/what-is-the-pcb-fabrication-process/
3. https://www.pcbcart.com/article/content/PCB-manufacturing-process.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	appreciate, list out the necessity and evolution of PCB, types and classes of PCB.	**K1**
CO2	explain the steps involved in schematic, layout, process of PCB design	**K2**
CO3	illustrate the basic fabrication and assembly and thermal issues	**K3**
CO4	compare and contrast different PCB designs	**K4**
CO5	recommend and design (layout) and fabricate PCB for simple circuits.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
5	**23UEL53SP01B**		**Self-paced Learning:** PCB Design and Fabrication							**-**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	2	2	2	2	3	3	**2.2**
CO2	3	2	3	3	2	2	3	3	3	2	**2.6**
CO3	2	3	2	2	2	2	3	3	3	3	**2.5**
CO4	2	2	3	2	3	3	2	2	2	2	**2.3**
CO5	3	2	2	2	2	2	2	2	2	2	**2.1**
										Mean Overall Score	**2.3 (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** On successful completion of this course, students will be able to	**Cognitive Levels (K - Level)**
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	23UEL63CC09	**Core Course - 9:** Microcontroller and Embedded System	4	3

Course Objectives
To observe the features and working of microcontroller and embedded systems
To explain the working characteristics of microcontroller and embedded systems
To apply the working of microcontroller and peripherals for an embedded system
To analyse the functions of microcontroller based embedded systems
To recommend the embedded systems for a specific social need

UNIT I: Introduction to 8051 Microcontroller **(12 Hours)**

Introduction to Microcontroller - Comparison of Microcontrollers and Microprocessor - Overview Of 8051- Pin Description Of 8051 - Registers - Program Counters - ROM and RAM Space - Data Types and Directive - Stack and PSW - SFR - Programming 8051 Addressing Modes: Immediate - Register - Direct - Indirect - Interrupt.

UNIT II: Applications of Microcontroller **(12 Hours)**

Counters/Timers - Counter Programming - Basics of Serial Communication - RS232 and MAX 232 IC Connection - Serial Communication Programming - Interfacing: Matrix Keyboard - LCD - ADC - DAC - Temperature Monitoring System - Relays and Opto Isolators - Stepper Motor and DC Motor Interfacing and PWM (Only Embedded C Programming).

UNIT III: Cortex-M Microcontrollers **(12 Hours)**

Cortex-M Processor Architecture -Registers - Stack - Operating Modes - Reset - Clock System- Texas Instruments TM4C123 Launchpad I/O Pins - TM4C1294 - MSP432 - Interfacing to a Launchpad - Microcontroller Input/Output - TM4C I/O programming - MSP432 I/O programming - Interrupts - First in First Out (FIFO) Queues - Edge-triggered Interrupts - Input Capture or Input Edge Time Mode.

UNIT IV: Embedded Systems **(12 Hours)**

Introduction - Definition - Characteristics- Embedded Processors in a System - Single Purpose Processors - Embedded Software in a System-Examples of Embedded Systems Classification of Embedded System- Design process in Embedded System - Arduino Architecture and Programming.

UNIT V: RTOS and IoT **(12 Hours)**

Introduction to Real-Time Operating Systems - Introduction to Threads -States of A Main Thread - Real-Time Systems - Scheduler -Function Pointers - Thread Management- Semaphores - Thread Synchronization - Process Management - Time Management - RTOS: Data Acquisition - Running Event Threads as High Priority Main Threads Systems - Available RTOS - Embedded Internet - Internet of Things (IoT) - Network Processor Interface (NPI) - Application Layer Protocols for Embedded Systems (COAP, MQTT)

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Mazidi, M.A., Mazidi, J. G., & McKinlay, R. D. (2006). *the 8051 Microcontroller and Embedded Systems: Using Assembly and C,* (2nd Ed.). Pearson education.
2. Kamal, R. (2008). *Embedded Systems- Architecture, Programming and Design,* (2nd Ed.). Tata McGraw Hill.
3. Jonathan, W, V. (2017). *Realtime Operating systems For Arm Cortex-M Microcontrollers Volume 3,* (4th Ed.). Jonathan Valvano.

Unit	Book	Chapter	Sections
I	1	2,5,8	2.1-2.7,5.1,8.1
II	1	9,10,12,13,17	9.1-9.3,10.1-10.3.12.1-12.2,13.1-13.2,17.2, 17.3
III	3	1,2	1.3,1.4,2.1,2.3,2.4
IV	2	1	1.1, 1.2, 1.4, 1.5, 1.8, 1.11
V	3	3, 4, 5,9	3.1-3.3,4.1,5.1,9.3,9.4,9.6,9.7

Books for Reference

1. Qian, K., Haring, D.D., Cao, L. (2009). *Embedded Software Development with C*, (1st Ed.). Springer.
2. Calcutt, D., Cowan, F., & Parchizadeh, H. G. (2003). *8051 Microcontrollers: an Applications Based Introduction*, (1st Ed.). Newness.
3. Ayala, K. (2007). *The 8051 Micro controller*, (3rd Ed.). Cenage Learning.

Websites and eLearning Sources

1. https://www.tutorialspoint.com/embedded_systems/es_microcontroller.htm
2. https://www.omnisci.com/technical-glossary/embedded-systems
3. https://www.eit.edu.au/resources/types-and-applications-of-microcontrollers

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe the architecture and different modes of operations of a microcontroller and Cortex-M processor	**K1**
CO2	Outline and restate the microcontroller programs	**K2**
CO3	analyze and use the Microcontrollers in various applications	**K3**
CO4	identify and solve RTOS and IoT applications	**K4**
CO5	asses, develop programming skill, design and construct circuits with 8051 microcontroller, Cortex-M Processor and IoT	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
6	**23UEL63CC09**		**Core Course - 9:** Microcontroller and Embedded System							**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	3	2	3	3	3	3	**2.5**
CO2	2	2	2	3	3	2	2	2	2	3	**2.3**
CO3	2	2	3	2	2	2	3	2	2	3	**2.3**
CO4	2	2	2	2	3	2	3	2	3	2	**2.3**
CO5	2	2	2	3	2	2	2	3	3	3	**2.4**
Mean Overall Score											**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UEL63CC10	**Core Course - 10:** Power Electronics	4	3

Course Objectives
To describe the functions of power electronic devices and systems
To understand the large current handling devices and observe its working
To provide solutions for the electrical needs using power electronic devices
To analyse the working of electronic switches, drivers, converters and inverters
To evaluate the performance of power electronic systems

UNIT I: Introduction to 8051 Microcontroller **(12 Hours)**

Power Electronic Systems - Switching Characteristics - Ideal Switch - Practical Switch - Switching Functions and Matrix Representation - Types of Switches - Bipolar and Unipolar Devices -Thyristor-based Devices - Snubber Circuits - Switching Diode Circuits - Controlled Switching Circuits

UNIT II: Power Converters **(12 Hours)**

Converters - Non-Isolated Switch Mode DC-DC Converters - Isolated Switch-Mode DC-DC Converters - Weinberg Converter - Multi-output Converter - Problems - Soft-Switching DCDC Converters - Classification of Soft - Switching Resonant Converters - Advantages and Disadvantages of ZCS and ZVS - Problems

UNIT III: Controlled Rectifiers **(12 Hours)**

Rectifiers - Uncontrolled Diode Rectifier Circuits - Single-Phase Rectifier Circuits - Three Phase Rectifier Circuits - Half-Wave Rectifiers - Full-Wave Bridge Rectifiers - Phase controlled Converters - Full-Wave Phase-controlled Rectifiers - Three-Phase Phase Controlled Converters - Half-Wave Converters - Full-Wave Converters

UNIT IV: Inverters **(12 Hours)**

Inverters - Full-Bridge Inverters - Harmonic Reduction - Pulse Width Modulation - Equal Pulse (Uniform) PWM -Sinusoidal PWM -Three-phase Inverters - Current-Source Inverters - Problems

UNIT V: Power Drivers **(12 Hours)**

Motor Drive Applications Introduction - Dc Motor Drives - Induction Motor Drives - Synchronous Motor Drives - Other Applications - Residential and Industrial Applications - Design and Construction of Dual Converter Using Thyristor - PWM Converter with High Efficiency

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Batarseh, I. & Harb, A. (2018). *Power Electronics Circuit Analysis and Design,* (2nd Ed.).
2. Bimbhra, P. S. (2002). *Power Electronics*, (3rd Ed.). Khanna Publishers
3. Tore, N.M., Undeland, M., & William, P. R. (2007). *Power Electronics Converters, Applications, and Design*, (3rd Ed.). John Wiley and Sons' Inc.

Unit	Book	Chapter	Sections
I	1	1, 2, 3	1.5, 2.3 - 2.6, 2.9, 3.2-3.5
II	1	4, 5, 6	4.3,5.3, 5.5,6.1,6.2,6.3
III	2	6	6.1-6.6
IV	2	8	8.1,8.4,8.6,8.7,8.8
V	3	13, 14, 16	13.2-13.6, 14.4-14.7, 16.1-16.3

Books for Reference

1. Branko, L. D., & Branko Blanuša. (2015). *Power Electronics Converters and Regulators,* (3rd Ed.). Springer.
2. Keith, H. S. (2005). *Power Electronics Design a Practitioners Guide*, (1st Ed.). Newnes.
3. Muhammad, H. R. (2017). *Power Electronics,* (4th Ed.). Pearson.

Websites and eLearning Sources

1. http://ieeexplore.ieee.org/document/515001

2. https://www.powerelectronics.com/
3. https://www.tutorialspoint.com/power_electronics/index.htm

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	describe and discuss the concepts of Power Electronics	**K1**
CO2	explain and illustrate power electronic devices.	**K2**
CO3	analyze and solve real time problems and by employing modern tools	**K3**
CO4	investigate power electronic circuit problems and solve the same	**K4**
CO5	design and construct the power electronics projects	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
6	**23UEL63CC10**		**Core Course - 10:** Power Electronics							**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	3	2	2	2	**2.4**
CO2	3	3	2	2	2	3	3	3	2	2	**2.5**
CO3	3	3	2	2	2	3	3	3	2	2	**2.5**
CO4	3	3	2	2	2	3	3	2	2	2	**2.4**
CO5	3	3	2	2	2	3	3	2	2	2	**2.4**
Mean Overall Score											**2.45 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UEL63CP06	**Core Practical - 6:** Microcontroller and Power Devices	6	4

List of experiments

Any sixteen - Microcontroller, Power electronics

1. Writing C program for 8051 and to study its equivalent disassembly codes in ASM using Keil Software.
2. Microcontroller program I {Data transfer}
3. Microcontroller program II {Arithmetic and Logical}
4. Microcontroller program III {Code conversion}
5. Interfacing microcontroller with LED {blinking LED, Bi-colour& RGB}
6. Interfacing matrix keypad with a microcontroller.
7. Study of Timers in 8051 micro controller.
8. Study of Counters in 8051 micro controller.
9. Study of interrupts in 8051 micro controller.
10. Study of serial communication in 8051 micro controller.
11. Interfacing ADC with 8051 micro controller.
12. Interfacing LCD with 8051 micro controller.
13. Interfacing GSM with 8051 micro controller
14. Interfacing printer with 8051 micro controller.
15. Frequency measurement using 8051.
16. Full Wave Control of rectifier output using SCR, TRIAC and UJT
17. Construction and study of step up and step down choppers
18. PWM based motor speed control using IGBT.
19. Construction and study of voltage fed inverters using IGBT/SCR.
20. Construction and study of static circuit breakers.
21. Study of DC motor control using PWM with 8051 micro controller (L293 motor driver)
22. Interfacing stepper motor with 8051 micro controller
23. Interfacing LED dot matrix display with 8051 micro controller
24. Interfacing seven segment display with 8051 micro controller
25. Study of charge controller for solar panel
26. DHT11 sensor interfacing with 8051 micro controller (temperature and humidity sensor)
27. Ultrasonic sensor interfacing with 8051 micro controller
28. RTC interfacing with 8051 micro controller
29. Interfacing Relay with 8051 micro controller
30. AC voltage controller using TRIAC with UJT triggering.
31. MSP432 Programs
32. Arduino Programs
33. Lamp dimmer using TRIAC and Diac

Book for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UEL63ES03A	**Discipline Specific Elective - 3:** Control System	5	3

Course Objectives
To describe various types and concepts of control system
To explain the mathematical models of control system with the analytical knowledge of time, frequency response and the control system errors.
To solve control applications problems by employing mathematical tools.
To investigate the real time problems in control systems
To justify the need and recommend control system projects using controller and motors

UNIT I: Mathematical Models and Components **(15 Hours)**

Control System Introduction - Examples of Control System - Mathematical Models of Control System - Mechanical Translational System - Mechanical Rotational System - Electrical System - Transfer Function of Armature-controlled DC Motor - Transfer Function of Field-Controlled DC Motor - Block Diagrams - Block Diagram Reduction Techniques - Signal Flow Graph Reduction Using Mason's Gain Formula

UNIT II: Components of Control System **(15 Hours)**

Components of Automatic Control System - Potentiometer - Synchros - Controllers - Tacho Generators - Servomotors.

UNIT III: Time Response Analysis **(15 Hours)**

Time Response - Test Signals - Order of a System - Transfer Function - Laplace Transform Review Response of First Order System for Unit Step Input - Second Order System Response: Under Damped - Over Damped - Over Damped - Critically Damped - Time Domain Specifications - Response With P, PI, PD And PID Controllers - Steady State Error - Static Error Constants - Unit Step Steady State Error - Unit Ramp and Unit Parabolic Signal - Generalized Error Coefficients.

UNIT IV: Frequency Response Analysis **(15 Hours)**

Frequency Domain Specifications - Estimation of Frequency Domain Specifications for II Order System - Correlation Between Time and Frequency Response - Frequency Response Plots - Bode Plots - Polar Plot - Nichol's Plot - M and N Circles

UNIT V: Concepts of Stability and Root Locus **(15 Hours)**

Stability - Location of Roots on the S-Plane for Stability - Routh Hurwitz Criterion - Mathematical Preliminaries for Nyquist Stability Criterion - Relative Stability - Gain Margin Root Locus.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Book for Study

1. Kani, N. A. (2017). *Control System*, (3rd Edition), RBA publications.

Unit	Book	Chapter	Sections
I	1	1	1.1-1.6,1.9-1.12
II	1	3	3.1-3.7
III	1	2, 4	2.1-2.8,4.1-4.5
IV	1	4	4.1-4.8,4.10,4.11
V	1	5	5.1-5.4,5.6-5.8

Books for Reference

1. Anandanatarajan, R., & RameshBabu, P. (2010). *Control Systems Engineering*, (2nd Ed.). SciTech Publications.
2. Gopal, M. (2012). *Control System Principles and Design*, (4th Ed.). McGraw Hill Education.
3. Menesis, S., & Nikolakopoulos, G. (2018). *Introduction to industrial Automation ().* CRC Press.

Websites and eLearning Sources

1. https://www.tutorialspoint.com/control_systems/control_systems_introduction.htm

2. https://electronicscoach.com/control-system.html
3. https://www.theengineeringprojects.com/2020/04/introduction-to-control-systems.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe various types and concepts control system	**K1**
CO2	explain and examine the mathematical models of control system with the analytical knowledge of time, frequency response as well as the control system errors.	**K2**
CO3	solve control applications problems by employing mathematical tools.	**K3**
CO4	investigate the real time problems and recommend the solutions with control systems	**K4**
CO5	justify the need, design and construct control system projects using controller and motors	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
6	**23UEL63ES03A**	**Discipline Specific Elective - 3:** Control System								**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	3	2	1	3	3	2	1	2	**2.2**
CO2	3	3	2	1	1	3	3	3	2	1	**2.2**
CO3	3	3	3	2	1	3	2	2	2	1	**2.2**
CO4	3	2	2	2	1	3	3	2	2	3	**2.3**
CO5	3	2	3	2	1	3	3	2	2	2	**2.3**
										Mean Overall Score	**2.46 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UEL63ES03B	**Discipline Specific Elective - 3:** Virtual Instrumentation	5	3

Course Objectives
To describe the basics of Virtual Instrumentation and LabVIEW
To explain the working of Virtual Instruments
To use Virtual Instruments in measurements
To analyze the present data effectively, thus resulting in improved concepts and products
To recommend the virtual instrument to control and acquire data from instruments and construct a modern tool by interfacing.

UNIT I: Graphical System Design **(15 Hours)**

Graphical System Design (GSD) Model - Design Flow with GSD - Virtual Instrumentation - Virtual Instrument and Traditional Instrument - Hardware and Software in Virtual Instrumentation - Virtual Instrumentation for Test, Control and Design - Virtual Instrumentation in the Engineering Process.

UNIT II: Introduction to LabVIEW **(15 Hours)**

Lab VIEW - Software Environment - Advantages of Lab VIEW - Software Environment - Creating and Saving A VI - Front Panel Toolbar - Block Diagram Toolbar - Palettes - Shortcut Menus -Property Dialog Boxes - Front Panel Controls and Indicators - Block Diagram - Data Types - Data Flow Program - Lab VIEW Documentation Recourses - Keyboard Shortcuts

UNIT III: Modular Programming **(15 Hours)**

Modular Programming in Lab VIEW - Build A VI Front Panel and Block Diagram - Icon and Connector Pane - Creating an Icon - Building A Connector Pane - Displaying SubVIs and Express VIs as Icons or Expandable Nodes - Creating SubVIs from Sections of a VI - Opening and Editing SubVIs - Placing SubVIs on Block Diagrams - Saving SubVIs - Creating a Stand-alone Application.

UNIT IV: Instrument Control **(15 Hours)**

GPIB Communication - Hardware Specifications - Software Architecture - Instrument I/O Assistant - VISA - Instrument Drivers - Serial Port Communications - Using other Interfaces

UNIT V: Data Acquisition **(15 Hours)**

Transducers - Signals - Signal Conditioning - DAQ Hardware Configuration - DAQ Hardware - Analog Inputs - Analog Outputs - Counters - Digital I/O (DIO) - DAQ Software Architecture - DAQ Assistant - Channels and Task Configuration - Selecting and Configuring a Data Acquisition Device - Components of Computer-based Measurement System.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Book for Study

1. Jerome, J. (2010). *Virtual instrumentation using LabVIEW*, (1st Ed.). PHI Learning Private Limited.

Unit	Book	Chapter	Sections
I	1	1	1.1 to 1.11
II	1	2	2.1 to 2.15
III	1	3	3.1 to 3.12
IV	1	4, 10	4.2, 4.3,5.2, 5.3, 5.4, 5.4, 10.1 to 10.9
V	1	11	11.1 to 11.15

Books for Reference

1. Sumathi, S., & Surekha, P. (2018). *LabVIEW based Advanced Instrumentation Systems*, (1st Ed.). Springer.
2. National Instruments. (2016). *Lab VIEW Basics I and II Course Manual*, (2000 Ed.). National Instruments.

3. Gray, W. J., & Richard Jennings. (2017). *LabVIEW Graphical Programming*, (4th Ed.) McGraw Hill Education.

Websites and eLearning Sources

1. https://www.ni.com/en-vn/innovations/white-papers/06/virtual-instrumentation.html
2. https://www.wirerealm.com/guides/top-10-best-vst-plugin-software
3. https://en.wikipedia.org/wiki/Virtual_instrumentation

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe the basics of Virtual Instrumentation and LabVIEW	**K1**
CO2	explain the working of Virtual Instruments	**K2**
CO3	use the Virtual Instruments	**K3**
CO4	analyze the present data effectively, thus resulting in improved concepts and products	**K4**
CO5	use LabVIEW to control and acquire data from instruments and construct a modern tool by interfacing.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UEL63ES03B**			**Discipline Specific Elective - 3:** Virtual Instrumentation						**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	2	2	3	3	3	2	2	**2.5**
CO2	3	3	3	2	2	3	3	3	2	2	**2.6**
CO3	3	3	3	2	2	3	3	3	2	2	**2.6**
CO4	3	3	3	2	2	3	3	3	2	2	**2.6**
CO5	3	2	2	2	2	3	2	2	2	2	**2.2**
										Mean Overall Score	**2.5 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UEL63ES04A	**Discipline Specific Elective - 4:** Robotics and Industrial Automation	5	3

Course Objectives
To describe the concepts of robotics and industrial automation
To discuss the functioning of robot end effectors, stepper motors and actuators in Automation
To experiment and solve the issues by employing robot programming techniques and Automation.
To estimate the components of automation in an industry
To recommend the basic robot projects using stepper motor and other tools for the social needs

UNIT I: Robotics **(15 Hours)**

Definition of A Robot - Laws of Robotics - Comparison of Human and Robot Manipulator - Robot Writs T and End of Arm Tools - Robot Terminology - Robotic Joints - Classification of Robots — Robot Classification on the basis of Co-Ordinate Systems - Robot Classification on the basis of Power Source - Robot Classification on the basis Method of Control - Robot Classification on the basis of Programming Method - Robot Selection.

UNIT II: Robot End Effectors and Robot Programming. **(15 Hours)**

End Effectors - Classification of End Effectors - Grippers - Selection of Gripper - Gripping Mechanisms - Tools - Types Tools - Element of End of Arm Tooling -Types of Grippers - Finger Grippers - Mechanical Grippers - Vacuum Grippers - Magnetic Grippers-Robot Programming -Robot Programming Techniques-Online Programming-Lead -Through Programming - Walk- Through Programming -Motion Programming-Over View of Robot Programming Language.

UNIT III: Automation **(15 Hours)**

Definition of Automation - Mechanization vs Automation - Advantages of Automation - Types of Automation - Issues of Automation in Factory Operations - Fluid Properties: Pressure, Flow Rate, Gas, Viscosity - Introduction to Fluid Power - Basic Elements of Fluid Power System-Applications of Fluid Power - Application of Pneumatics - Application of Hydraulics - Basic Pneumatics System - Basic Hydraulic System - Hydraulic System Design

UNIT IV: Pumps and Compressors **(15 Hours)**

Pumps vs Compressors - Classification of Hydraulic Pumps - Air Compressors - Types of Air Compressors - Specification of Compressors- Cylinders - Classification of Cylinders on the Basis of Construction - Other Types of Cylinders - Introduction to Motors - Hydraulic and Pneumatic Motors - Symbol of Motors - Application of Motors - Classification of Valves Symbols for Valve Actuators - Classification DC Valves on the Basis of Construction- Speed Control Circuits - Time Delay Circuits - Bleed Off Circuit - Pressure Reduction Circuit

UNIT V: Cylinders Motors and Valves **(15 Hours)**

Introduction to PLC - PLC vs Microcontroller - Basic Components and Their Symbols - Control Transformers - Fuses - Switches - Relays - Time Delay Relays - Fundamentals of Ladder Diagram - Basic Diagram Framework - Wiring Reference Designators - Boolean Logic and Relay Logic - AND-OR And OR-AND - Ground Test - Latch - Two Handed Anti-Tie Down-Anti-Repeat - Combined Circuit - Machine Control Terminology - PLC Configurations - System Block Diagram - Update - Solve Ladder Physical Components vs Program Components - Light Control - Internal Relays - Disagreement Circuit - Majority Circuits -- Oscillators - Holding Contacts - Always ON And OFF Contacts - Ladder Diagrams Having Complex Rung

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Gupta, A. K., Arora, S. K., & Jean Riescher Westcott. (2017). *Industrial Automation and Robotics,* (1st Edition). Mercury Learning Information. Boston.
2. John, W. W., & Renoald, A. R. (2002). *Programmable Logic Controller Principles and Application,* (5th Edition). Prentice Hall.

Unit	Book	Chapter	Sections
I	1	13	Relevant sections
II	1	15,16	Relevant sections
III	1	1,3	Relevant sections
IV	1	4,6,7,8	Relevant sections
V	2	1,2,3	1.1 - 1.3, 2.2 - 2.6, 3.1 - 3.9

Books for Reference

1. Jaganathan, P. (2013). *Robotics (Industrial Robotics),* (1st Ed.). Lakshmi Publications.
2. Menesis, S. *George Nikolakopoulos.* (2018). *Introduction to Industrial Automation,* (1st Ed.). CRC Press.
3. Rajput, R. K. (2008). *Robotics and Industrial Automation*, (1st Ed.). S Chand.

Websites and eLearning Sources

1. https://www.conestogac.on.ca/fulltime/robotics-and-industrial-automation
2. https://www.robots.com/articles/advantages-of-industrial-automation-with-robots
3. https://blog.robotiq.com/bid/53266/Robot-End-Effector-Definition-and-Examples

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe and discuss the concepts of robotics and industrial automation	**K1**
CO2	explain and solve the functioning of robot end effectors, stepper motors and actuators in Automation	**K2**
CO3	examine and solve issues by employing robot programming techniques and Automation.	**K3**
CO4	identify and recommend the components to automate an industry	**K4**
CO5	design and construct the basic robot projects using stepper motor and other tools.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
6	**23UEL63ES04A**	**Discipline Specific Elective - 4:** Robotics and Industrial Automation							**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	3	2	1	3	2	3	1	2	**2.2**
CO2	3	3	2	1	1	3	3	3	2	1	**2.2**
CO3	3	3	3	2	1	3	2	2	2	1	**2.2**
CO4	3	2	2	2	1	3	2	2	2	3	**2.2**
CO5	3	2	1	2	1	3	2	3	2	2	**2.3**
										Mean Overall Score	**2.22 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UEL63ES04B	**Discipline Specific Elective - 4:** Digital Image Processing	5	3

Course Objectives
To describe the techniques of digital image processing
To express and discuss the digital techniques for an image processing
To apply image restoration to reduce the noise in digital images.
To analyze the images by modern software
To propose / design an algorithm for image processing

UNIT I: Introduction of Image Processing **(15 Hours)**

Image Processing Notation and Data Formats - 8-Bit Level Images - 24-Bit Color Images - 8- Bit Color Images - Intensity Images - Red, Green and Blue Components and Grayscale Conversion -Image Histogram and Equalization - Grayscale Histogram and Equalization - 24-Bit Color Image Equalization - 8-Bit Indexed Color Image Equalization - Image Level Adjustment and Contrast - Linear Level Adjustment.

UNIT II: Morphological Image Processing **(15 Hours)**

Basic Concepts from Set Theory - Binary Images, Sets, and Logical Operators - Dilation and Erosion- Dilation -Structuring Element Decomposition - The Strel Function - Erosion - Combining Dilation and Erosion - Opening and Closing - The Hit-Or-Miss Transformation - Using Lookup Tables - Function BW Morph - Labeling Connected Components - Morphological Reconstruction - Opening by Reconstruction - Filling Holes - Clearing Border Objects - Gray -Scale Morphology - Dilation and Erosion - Opening and Closing.

UNIT III: Image Restoration and Histogram Processing **(15 Hours)**

Image Restoration - Noise Models - Salt and Pepper Noise - Median and Mean Filter - Image Histogram: Definition and Example - Computing Image Histograms - Interpreting Image Histograms - Histogram Equalization - Direct Histogram Specification -Other Histogram Modification Techniques - Histogram Sliding - Histogram Stretching - Histogram Shrinking.

UNIT IV: Edge Detection and Image Segmentation **(15 Hours)**

Basic Concepts - First-Order Derivative Edge Detection - Second-Order Derivative Edge Detection - Laplacian of Gaussian - The Canny Edge Detector - Edge Linking and Boundary Detection - The Hough Transform - Image Segmentation - Image Thresholding- Region Growing Segmentation - Watershed Segmentation.

UNIT V: Application of Image Processing Using MATLAB **(15 Hours)**

Read an Image - Creating Red, Green, Blue Color Separately in an Image- Example of Image Segmentation- Image Conversion-Removal of Salt and Pepper Noise Using Median and Mean Filter- Separation of Higher Intensity from An Image- Use of Histogram Equalization to Improve the Image Contrast -Application of Image Erosion and Dilation on Binary Image.

Teaching Methodology	Demo Videos, PPT, Handouts, Study materials

Books for Study

1. Tan, L., & Jiang, J. (2013). *Digital Signal Processing Fundamentals and Applications*, (2nd Ed.). Elsevier.
2. Rafael, C., Gonzalez., & Richard, E. W. (2009). *Digital Image Processing using MATLAB*, (3rd Ed.). Gatesmark Publishing.
3. Marques, O. (2011). Practical Image and Video Processing Using MATLAB, (1st Ed.). A John Wiley and Sons, Inc., Publication.
4. Study material by the department.

Unit	Book	Chapter	Sections
I	1	14	14.1 to 14.3
II	2	10	10.1 to 10.6
III	3	9, 12	9.1 to 9.6, 12.1 to 12.3
IV	3	14, 15	14.1 to 14.6, 15.1, 15.2.1, 15.3.1, 15.4
V	4	all	

Books for Reference

1. Bianchet, G., & Charbit, M. (2006). *Digital Signal and Image Processing using MATLAB,* (1st Ed.). ISTE Ltd.
2. Sridhar, S. (2016). *Digital Image Processing,* (2nd Ed.). Oxford University Press.
3. Kenneth, R. C. (2007). *Digital Image Processing,* (1st Ed.). Pearson Education India.

Websites and eLearning Sources

1. https://www.tutorialspoint.com/dip/index.htm
2. https://www.geeksforgeeks.org/digital-image-processing-basics/
3. https://www.mygreatlearning.com/blog/digital-image-processing-explained/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	describe the techniques of image processing	**K1**
CO2	examine the images by digital techniques	**K2**
CO3	apply image restoration to reduce the noise in digital images.	**K3**
CO4	analyze the image by modern software	**K4**
CO5	rate and design an algorithm for image processing	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**23UEL63ES04B**			**Discipline Specific Elective - 4:** Digital Image Processing						**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	3	2	2	2	**2.4**
CO2	3	2	2	2	2	3	3	2	2	2	**2.3**
CO3	3	3	2	2	2	3	3	2	2	2	**2.4**
CO4	3	3	2	2	2	3	2	2	2	2	**2.3**
CO5	3	3	2	2	2	3	3	2	2	2	**2.4**
										Mean Overall Score	**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	**23UEL63PW01**	Project Work and Viva Voce	**-**	**2**

Individual Project - Inhouse or Industry
Other than Class Hours

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	23UEL63CE01	Comprehensive Examination	-	2

UNIT I: Semiconductor Theory and Electronic Devices

UNIT II: Analog and Digital Circuits and Analysis

UNIT III: LIC and Communication Electronics

UNIT IV: Microcontroller and Embedded System

UNIT V: Power Electronics

Books for Study

1. Respective course books

Books for Reference

1. Respective course books