B Sc ELECTRONICS

LOCF SYLLABUS 2025

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) UNDERGRADUATE COURSES

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

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

The overarching objectives of these five schools are as follows:

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

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

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

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

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

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

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

Credit system

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

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

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

OUTCOME-BASED EDUCATION (OBE)

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

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

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

Here are some key aspects of Outcome-Based Education:

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

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

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

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

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

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

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

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

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

Some Important Terminologies

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Course Coding

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

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

Course Specific Initials

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

EVALUATION PATTERN (UG)

Continuous Internal Assessment

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

Passing minimum: 40 marks

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

Question Paper Blueprint for Mid and End Semester Tests

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

***** *Compulsory*

Question Paper Blueprint for Semester Examination

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

***** *Compulsory*

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

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

Grading System

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

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

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

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

Where,

Ci - credit earned for the Course i

Gpi - Grade Point obtained for the Course i

Mi - Marks obtained for the Course i

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

WAM - Weighted Average Marks

Classification of Final Results

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

Table - 1: Grading of the Courses

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

Table - 2: Grading of the Final Performance

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

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

Vision

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

Mission

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

Programme Educational Objectives (PEOs)

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

Programme Outcomes (POs)

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

Programme Specific Outcomes (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.

B. Sc. Electronics					
Programme Structure					
Part	**Semester**	**Specification**	**No. of Courses**	**Hours**	**Credits**
1	1- 4	Languages (Tamil / Hindi / French / Sanskrit)	4	16	12
2	1 - 4	General English	4	20	12
3	1 - 6	Core Course	10	51	37
	1 - 6	Core Practical	6	24	14
	1 – 2	Workshop	2	7	4
	1 & 2	Allied Course	2	12	8
	1 & 2	Allied Practical	-	-	-
	3 & 4	Allied Optional	2	8	6
	3 & 4	Allied Optional Practical	2	4	2
	5 & 6	Discipline Specific Elective	4	16	12
	5	Internship	1	-	1
	6	Project / Industrial Visit / Field Visit	1	-	1
	6	Comprehensive Examination	1	-	2
4	1 - 4	Value Education	4	8	4
	1 & 2	Ability Enhancement Compulsory Course	2	2	3
	2 - 5	Self - Learning	4	-	8
	3 & 4	Skill Enhancement Course	2	4	2
	5 & 6	Open Elective	2	8	4
5	2 - 6	Outreach Programme (SHEPHERD)	-	-	4
	2 - 6	Co-curricular and Extracurricular Activities	-	-	1
	2 - 6	Extra Credit Courses (MOOC) / Certificate Courses	5	-	(15)
		Total	**58**	**180**	**137 (15)**

B. Sc. ELECTRONICS PROGRAMME PATTERN									
Course Details							Scheme of Exams		
Sem.	Part	Course Code	Course Type	Title of the Course	Hours	Credits	CIA	SE	Final
1	I	25UTA11GL01	GL	General Tamil – 1	4	3	100	100	100
		25UFR11GL01		Language French – 1					
		25UHI11GL01		Language Hindi – 1					
		25USA11GL01		Language Sanskrit – 1					
	II	25UEN12GE01A	GE	**General English – 1:** Pre-Intermediate Stream	5	3	100	100	100
		25UEN12GE01B		**General English – 1:** Intermediate Stream					
	III	25UEL13CC01	CC Major	**Core Course - 1:** Semiconductor Theory and Electronic Devices	6	5	100	100	100
		25UEL13CP01		**Core Practical - 1:** Semiconductor Devices	3	2	100	100	100
		25UEL13WS01	WS	**Workshop - 1:** Instruments and Trouble Shooting	4	2	100	100	100
		25UEL13AC01	AC Minor	**Allied Course - 1:** Mathematics for Electronics - 1	6	4	100	100	100
	IV	25UHE14VE01	VE	**Value Education – 1:** Essentials of Humanity*	2	1	50	50	50
		25UEN14AE01	AECC	Communicative English	-	2	100	-	100
				Total	**30**	**22**			
2	I	25UTA21GL02	GL	General Tamil – 2	4	3	100	100	100
		25UFR21GL02		Language French – 2					
		25UHI21GL02		Language Hindi– 2					
		25USA21GL02		Language Sanskrit – 2					
	II	25UEN22GE02A	GE	**General English – 2:** Pre-Intermediate Stream	5	3	100	100	100
		25UEN22GE02B		**General English – 2:** Intermediate Stream					
	III	25UEL23CC02	CC Major	**Core Course - 2:** Electric Circuit Analysis	5	4	100	100	100
		25UEL23CP02		**Core Practical - 2:** Circuit Analysis	3	2	100	100	100
		25UEL23WS02	WS	**Workshop - 2:** Circuit Design and Fabrication	3	2	100	100	100
		25UEL23AC02	AC Minor	**Allied Course - 2:** Mathematics for Electronics - 2	6	4	100	100	100
	IV	25UHE24AE02	AECC	Environmental Studies*	2	1	50	50	50
		25UHE24VE02	VE	**Value Education - 2:** Fundamentals of Human Rights*	2	1	50	50	50
		25UEL24SL01	SL	Online Courses: (NPTEL / SWAYAM)	0	2	-	100	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
3	I	25UTA31GL03	GL	General Tamil – 3	4	3	100	100	100
		25UFR31GL03		Language French– 3					
		25UHI31GL03		Language Hindi– 3					
		25USA31GL03		Language Sanskrit – 3					
	II	25UEN32GE03B	GE	General English – 3: English for Science - 1	5	3	100	100	100
	III	25UEL33CC03	CC Major	**Core Course - 3:** Digital Electronics	4	3	100	100	100
		25UEL33CC04		**Core Course - 4:** Electronic Circuits	4	3	100	100	100
		25UEL33CP03		**Core Practical - 3:** Digital and Analog Circuits	3	2	100	100	100
		25UEL33AO01A	AO Minor	**Allied Optional - 1:** Applied Physics - 1	4	3	100	100	100
		@		**Allied Optional Practical:** Applied Physics - 1	2	-	-	-	-
		25UEL33AO01B		**Allied Optional - 1:** Computer Science - 1	4	3	100	100	100
		@		**Allied Optional Practical:** Computer Science	2	-	-	-	-
	IV	25UHE34VE03A	VE	**Value Education - 3:** Social Ethics -1 *	2	1	50	50	50
		25UHE34VE03B		**Value Education - 3:** Religious Doctrine – 1*					
		25UNC34SE01 / 25USS34SE01	SEC	**Skill Enhancement Course – 1:** Introduction to NCC / **Skill Enhancement Course – 1:** Soft Skills	2	1	100	-	100
		25UAI34SL02	SL	Artificial Intelligence (Online)	0	2	100	-	100
				Extra Credit Course	0	(3)			
				Total	**30**	**21 (3)**			
4	I	25UTA41GL04B	GL	General Tamil – 4: அறிவியல் தமிழ் (Scientific Tamil)	4	3	100	100	100
		25UFR41GL04		Language French– 4					
		25UHI41GL04		Language Hindi– 4					
		25USA41GL04		Language Sanskrit – 4					
	II	25UEN42GE04B	GE	General English – 4: English for Science - 2	5	3	100	100	100
	III	25UEL43CC05	CC Major	**Core Course - 5:** Linear Integrated Circuits	4	3	100	100	100
		25UEL43CC06		**Core Course - 6:** Communication Electronics (Internship Embedded Course)	4	3	100	100	100
		25UEL43CP04		**Core Practical - 4:** Communication and LIC	3	2	100	100	100
		25UEL43AO02A	AO Minor	**Allied Optional - 2:** Applied Physics - 2	4	3	100	100	100
		25UEL43OP01A		**Allied Optional Practical:** Applied Physics	2	2	100	100	100
		25UEL43AO02B		**Allied Optional - 2:** Computer Science - 2	4	3	100	100	100

		25UEL43OP01B		**Allied Optional Practical:** Computer Science	2	2	100	100	100
	IV	25UHE44VE04A	**VE**	**Value Education - 4:** Social Ethics – 2*	2	1	50	50	50
		25UHE44VE04B		**Value Education - 4:** Religious Doctrine – 2*					
		25UNC44SE02	**SEC**	**Skill Enhancement Course – 2:** NCC (Special Subject)	2	1	100	-	100
		25UEL44SE02A		**Skill Enhancement Course – 2:** 3D Printing					
		25UEL44SE02B		**Skill Enhancement Course – 2:** Drone Techniques					
		25UEL44SL03A	**SL**	**Self Learning:** Sound Engineering*	0	2	50	50	50
		25UEL44SL03B		**Self Learning:** PCB Design and Fabrication*					
				Extra Credit Course	0	(3)			
	Total				**30**	**23 (3)**			
5	III	25UEL53CC07	**CC Major**	**Core Course - 7:** Microprocessors and Applications	6	4	100	100	100
		25UEL53CC08		**Core Course - 8:** Sensors and Electronic Instrumentation	6	4	100	100	100
		25UEL53CP05		**Core Practical - 5:** Microprocessors, C and Python	6	3	100	100	100
		25UEL53ES01A	**DSE**	**Discipline Specific Elective – 1:** Computer Hardware and Networks	4	3	100	100	100
		25UEL53ES01B		**Discipline Specific Elective – 1:** Medical Electronics					
		25UEL53ES02A	**DSE**	**Discipline Specific Elective – 2:** C and Embedded C	4	3	100	100	100
		25UEL53ES02B		**Discipline Specific Elective – 2:** Mobile Communication					
		25UEL53IS01	**IS**	Internship	0	1	100	-	100
	IV	25UEL54OE01A	**OE**	**Open Elective - 1 (WS):** Lab Equipment maintenance and Servicing	4	2	100	100	100
		25UEL54OE01B		**Open Elective - 1 (WS):** PC Assembling and Servicing					
		25UEL54SL04A	**SL**	**Certificate Course:** Python and MicroPython	0	2	100	-	100
		25UEL54SL04B		**Certificate Course:** Fuzzy logic					
		25UEL54SL04C		**Certificate Course:** Deep learning					
				Extra Credit Course	0	(3)			
	Total				**30**	**22 (3)**			
6	III	25UEL63CC09	**CC Major**	**Core Course - 9:** Microcontroller and Embedded System	6	4	100	100	100
		25UEL63CC10		**Core Course - 10:** Power Electronics	6	4	100	100	100
		25UEL63CP06		**Core Practical - 6:** Microcontroller and Power Devices	6	3	100	100	100
		25UEL63ES03A	**DSE**	**Discipline Specific Elective – 3:** Control System	4	3	100	100	100
		25UEL63ES03B		**Discipline Specific Elective – 3:** RF, Microwave and Optical Electronics					
		25UEL63ES04A	**DSE**	**Discipline Specific Elective – 4:** Robotics and Industry 4.0	4	3	100	100	100
		25UEL63ES04B		**Discipline Specific Elective – 4:** e-Security systems					
		25UEL63EL01A/ 25UEL63EL01B/ 25UEL63EL01C	**EL**	Project / Industrial Visit / Field Visit	0	1	100	-	100
		25UEL63CE01	**CE**	Comprehensive Examination*	0	2	50	50	50
	IV	25UEL64OE02A	**OE**	**Open Elective – 2:** CCTV and Smart Security Systems	4	2	100	100	100
		25UEL64OE02B		**Open Elective – 2:** Entrepreneurial Electronics					
				Extra Credit Course	0	(3)			
	Total				**30**	**22 (3)**			
	V	25UCW65OR01 25UCW65EC01	**OR EC**	Outreach Programme Co-Curricular & Extra Curricular Activities	-	4 1			
1-6	**TOTAL**				**180**	**137 (15)**			

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

Open Elective - 1 (WS): 5th Semester

School	Course Code	Title of the Course
SPS		
Chemistry	25UCH54OE01	Everyday Chemistry
Electronics	25UEL54OE01A	Lab Equipment maintenance and Servicing
	25UEL54OE01B	PC Assembling and Servicing
Physics	25UPH54OE01A	Physics for Everyday life
	25UPH54OE01B	Renewable Energy Physics

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

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

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

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

அலகு-1 **(12 மணி நேரம்)**

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

அலகு-2 **(12 மணி நேரம்)**

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

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

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

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

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

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

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

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

பாடநூல்:

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

Websites and eLearning Sources:

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

Course Outcomes

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and e-learning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

1. Dr. A. P. J. Abdul Kalam, *Mere sapnom ka Bharath*, Prabath Prakashan, Noida, 2020,
2. *Meri Pratham Hindi Sulekh Shabd Gyaan*, Wonder House Books, Noida, 2022.
3. Aravind Kumar, *Sampoorna Hindi Vyakaran our Rachana*, Lucent publisher, 2022.
4. *Adhunik Hindi Vyakaran our Rachana*, Bharati Bhavan Publishers & distributors, 2024.
5. Acharya Ramchandra Shukla, *Hindi Sahitya Ka Itihas*, Prabhat Prakashan, 2023.

Websites and e-Learning Sources:

1. https://learningmole.com/hindi-alphabet-letters-pronunciation-guide/
2. https://www.careerpower.in/hindi-alphabet-varnamala.html

3. https://www.youtube.com/watch?v=b0UvXnIC8qc
4. https://www.importanceoflanguages.com/learn-hindi-language-guide/
5. https://parikshapoint.com/hindi-sahitya/

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

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours/week**			**Credits**
1	**25UHI11GL01**			Language Hindi - 1				**4**			**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean 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	**25USA11GL01**	Language Sanskrit - 1	**4**	**3**

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

UNIT I (**12 Hours)**

Introduction to Sanskrit

UNIT II (**12 Hours)**

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

UNIT III (**12 Hours)**

Vartamankala lat lakaara vakya prayogaha

UNIT IV (**12 Hours)**

Samskrita sharala vakya paricayaha

UNIT V (**12 Hours)**

Selected verses from good saying in Sanskrit

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

Books for Study:

Shadhamanjari

Books for Reference:

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

Websites and e-Learning Sources:

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

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

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

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

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

UNIT I: **(15 Hours)**

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

UNIT II: **(15 Hours)**

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

UNIT III: **(15 Hours)**

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

UNIT IV: **(15 Hours)**

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

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

UNIT V: **(15 Hours)**

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

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

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

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

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

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

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

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

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

Unit 2: Family is Forever! (15 Hours)

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

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

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

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

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

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

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

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

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

Books for Study:

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

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

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

Semester	Course Code	Title of the Course	Hours / Week	Credits
1	25UEL13CC01	**Core Course - 1:** Semiconductor Theory and Electronic devices	6	5

Course Objectives
To explicate the 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 (18 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 (18 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 (18 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 (18 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 (18 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
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Donald A Neamen, 4thEdition (2012), *Semiconductor Physics and Devices*, McGraw Hill Higher Education.
2. Arthur F. Seymour MSEE, Instruction Manual, Model ECK -10
3. V.K. Mehta, Rohit Mehta, 11th Edition (2008), *Principles of Electronics*, S. Chand & Co.

Unit	Book	Chapter	Sections
I	1	1, 3, 4, 5	1.1-1.3, 3.1-3.3, 4.1, 4.3, 4.5, 5.1-5.2
II	2	full	Full
III	1	7,8	7.1-7.4, 8.1- 8.6
IV	3 and 1	8,13	8.1-8.4, 8.7-8.13, 13.1-13.2
V	1	14	14.2-14.5

Books for Reference:

1. Thareja B.L, 3rd Edition (2012), *Basic Electronics*, S. Chand and Co.
2. David Bell, 5th Edition (2009), *Electronic Devices and Circuits*, Oxford.
3. Mehta V.K, 11th Edition (2008), *Principles of Electronics*, S. Chand & Co.
4. Forrest. M. Mims, *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

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
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/Week**		**Credits**
1	**25UEL13CC01**			**Core Course - 1:** Semiconductor theory and Electronic devices					**6**		**5**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL13CP01	**Core practical - 1:** Semiconductor Devices	3	2

List of Experiments (Any 9 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 capacitors in circuits.
4. Study of RC time constant using DC source
5. Study of Diode characteristics
6. Study of Zener Diode characteristics
7. Study of Transistor characteristics – CB
8. Study of Transistor characteristics – CE
9. Study of Transistor characteristics - CC
10. Study of opto electronic devices I- photodiode, phototransistor and LDR
11. Study of different colour LED characteristics
12. Energy band gap of semiconductor
13. JFET Characteristics
14. MOSFET Characteristics
15. Diode rectifiers
16. Voltage regulator using Zener diode
17. Characteristics of LASER diode
18. Inductor and Transformer characteristics

Books for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UEL13WS01	**Workshop - 1:** Instruments and Trouble Shooting	4	2

Tools:

1. Line tester, Multimeter, soldering iron, **De soldering pump** and **Logic analyser**
2. CRO and DSO, Function Generator and LCR meter

Electronic components:

3. Electronic components identification, Transformer Identification, Resistance color code calculation and verification
4. Testing and troubleshooting using tools

PCB and Components assembling:

5. Soldering and de-soldering the components in PCB
6. SMD component Soldering and De-soldering
7. Construction of single power supply
8. Construction of Dual Power supply

Circuits:

9. LEDs in series and parallel
10. Simple emergency lamp with 12V battery

House wiring:

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

Books for Study:

1. Text prepared by the department

Books for Reference:

1. Earl Gates, 6th edition (2009), *Introduction to Electronics*, Cengage Learning India Private Limited.
2. D. G. Tucker, (1959), *Introductory Electronics*, Nature.

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UEL13AC01	**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 $cosn\theta$ and $sinn\theta$ - 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 $x, sinx$ and $cosx$.

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

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- 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

Websites and eLearning Sources:

1. https://www.khanacademy.org/math/linear-algebra
   https://www.khanacademy.org/math/differential-quations
2. https://nptel.ac.in/courses/

3. https://tutorial.math.lamar.edu/Classes/DE/FourierSeries.aspx
4. https://www.khanacademy.org/math/integral-calculus
5. https://www.khanacademy.org/math/statistics-probability
6. https://www.statisticshowto.com/
7. https://www.coursera.org/
8. https://www.udemy.com/courses/search/?q=mathematics

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	Analyze 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	**25UEL13AC01**			**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	2	3	2	2	3	2	2	3	2	**2.4**
CO2	2	3	2	3	2	3	2	3	2	1	**2.3**
CO3	2	2	3	2	1	3	3	2	3	1	**2.2**
CO4	3	3	2	3	2	3	3	2	3	2	**2.6**
CO5	2	2	3	2	1	3	2	3	2	1	**2.1**
										Mean Overall Score	**2.4 (High)**

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

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

UNIT I: Value Education (6 Hours)

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

UNIT II: Human Personality (6 Hours)

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

UNIT III: Human Development (6 Hours)

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

UNIT IV: Responsible Parenthood (6 Hours)

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

UNIT V: Gender Equality and Empowerment (6 Hours)

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

அலகு-1 **(12 மணி நேரம்)**

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

அலகு-2 **(12 மணி நேரம்)**

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

அலகு-3 **(12 மணி நேரம்)**

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

அலகு-4 **(12 மணி நேரம்)**

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

அலகு-5 **(12 மணி நேரம்)**

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

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

பாடநூல்கள்:

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

Websites and eLearning Sources:

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

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

Course Outcomes

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and e-Learning Sources:

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

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

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

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

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

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

UNIT I **(12 Hours)**

Asmathi usmath tat kim (MFN) sarva naama sabdaha

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

Lang lakaarah Kriyapadaani Prayoga Vivaranam

UNIT IV **(12 Hours)**

Raguvamsaha Pratama sargaha (1 –15 slokas)

UNIT V **(12 Hours)**

Suvacanani Vakya Prayoga Vivaranam

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

Books for Study:

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

Books for Reference:

1. Paindrapuram Ashram, Srirangam – 620 006 Gopalavimshanthi 2021
2. R. S. Vadhyar & Sons book – Seller and Publishers, Kalpathi, Palghat – 678 003, Kerala, South Inida, shabdha manjari
3. Kulapthy, K.M Saral sankrit Balabodh, Bharathiys Vidya Bhavan, Munshimarg Mumbai – 400007, 2020

Websites and eLearning Sources:

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

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

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

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

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

UNIT I: **(15 Hours)**

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

UNIT II: **(15 Hours)**

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

UNIT III: **(15 Hours)**

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

UNIT IV: **(15 Hours)**

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

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

UNIT V: **(15 Hours)**

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

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

Books for Study:

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

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

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

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

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

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

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

Unit 2: Travel **15 Hours**

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

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

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

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

Unit 4: Shopping **15 Hours**

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

Unit 5: Ceremonies **15 Hours**

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

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

Books for Study:

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

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

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

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UEL23CC02	**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 – Topology - 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 – Tellegen's 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 of an R-L 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Sudhakar A., Shymmohan S Palli (2017), *Circuits and Networks Analysis and Synthesis* (5th Edition), Tata McGraw Hill Publishing Company Ltd.
2. John Bird (2010), *Electrical Circuit Theory and Technology* (4th Edition), Elsevier Ltd.
3. www.aec.edu.in › aec › Instruction_Material NETWORK THEOREMS - aec.edu.in

Unit	Book	Chapter	Sections
I	2	13	13.1,13.2
II	2,3	13, full	13.3, 13.4,13.5, full
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	2	43	Full

Books for Reference:

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

3. Robert L. Boylstad (2015), *Introductory Circuit Analysis* (13thEdition), 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/

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 an ecofriendly environment with energy saver mode.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UEL23CC02**			**Core Course - 2:** Electric Circuit Analysis						**5**	**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO-1	3	3	2	2	2	3	3	3	2	2	2.5
CO-2	3	3	2	2	2	3	3	3	2	2	2.5
CO-3	3	3	2	2	2	3	3	3	2	2	2.5
CO-4	2	2	2	2	2	3	3	3	2	2	2.3
CO-5	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	25UEL23CP02	**Core Practical - 2:** Circuit Analysis	3	2

List of Experiments (Any 9 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
18. Verification of Tellegen's theorem

Books for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours	Credits
2	25UEL23WS02	**Workshop - 2:** Circuit Design and Fabrication	3	2

List of Practices (Any 8 Jobs)

1. LED display
2. CCTV system
3. Variable power supply
4. Cabinet making for power supply
5. 3D printing
6. LED bulb assembling
7. PCB layout preparation using software
8. Construction of Transformer-less power supply
9. Hobby circuit – I
10. Hobby circuit – II
11. Hobby circuit – III
12. PC hardware assembling
13. Audio system assembling (amplifier and speaker)
14. Mobile phone troubleshooting
15. SMPS
16. Lathe work

Books for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
2	25UEL23AC02	**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-Seidel 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	Chart, PPT, chalk and talk
Assessment Methods	Seminar, Snap Test, MCQ

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, 417 - 418), Chapter 15 (Pages 602-608).*
2. Narayanan, S. & Pillay, T.K.M. *Ancillary Maths Book II.,* 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** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
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	**25UEL23AC02**			**Allied Course - 2:** Mathematics for Electronics - 2					**6**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	**2.2**
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	25UHE24AE02	**Ability Enhancement Compulsory Course - 2:** Environmental Studies	2	1

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

UNIT I: Introduction to Environmental Studies (6 Hours)

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

UNIT II: Natural Resources (6 Hours)

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

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

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

UNIT IV: Environmental Pollution (6 Hours)

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

UNIT V: Environmental Organizations and Treatise (6 Hours)

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

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

Books for Study:

1. Department of Human Excellence, (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	**25UHE24AE02**			**Ability Enhancement Compulsory Course - 2:** Environmental Studies					**2**		**1**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	1	2	2	3	2	2	2	2	**2.1**
CO2	3	2	1	2	2	3	2	2	2	2	**2.1**
CO3	3	2	2	2	2	2	3	2	1	2	**2.1**
Mean Overall Score											**2.1 (Medium)**

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

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

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

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

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

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

UNIT III: India and Human Rights (6 Hours)

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

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

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

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

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

அலகு – 1 : **(12 மணி நேரம்)**

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

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

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

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

அலகு – 2 : **(12 மணி நேரம்)**

சிறுபாணாற்றுப்படை

இலக்கணம் - யாப்பு

அலகு – 3 : **(12 மணி நேரம்)**

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

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

இலக்கிய வரலாறு: சங்க இலக்கியங்கள், சங்க இலக்கியங்களின் தனித்தன்மைகள்

அலகு – 4 : **(12 மணி நேரம்)**

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

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

இலக்கிய வரலாறு: பதினெண்கீழ்க்கணக்கு நூல்கள்

அலகு – 5 : **(12 மணி நேரம்)**

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

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

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

இலக்கணம் - அணி

நாடகம் - விந்தனின் வாழப்பிறந்தவன்

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

பாடநூல்:

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

பார்வை நூல்கள்:

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

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT – I **(12 Hours)**

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

UNIT – II **(12 Hours)**

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

UNIT – III **(12 Hours)**

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

UNIT – IV **(12 Hours)**

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

UNIT – V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

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

UNIT I **(12 Hours)**

Ramodantam, Balakandam (1-15 verses)

UNIT II **(12 Hours)**

Ramodantam, Balakandam (15-30 verses)

UNIT III **(12 Hours)**

Vedas – Vedangas vivaranam

UNIT IV **(12 Hours)**

Asta dasha Purana and Dashopanishads

UNIT V **(12 Hours)**

Upasargas and Bhavishyat Kaalah Vakya Prayoga

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

Books for Study:

1. VEDIC LITERATURE
2. RAMODANTAM

Books for Reference:

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

Websites and eLearning Sources:

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

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K –Levels)**
	On successful completion of this course, students will be able to	
CO1	Remember Characters and events of Ramayana	**K1**
CO2	Understand social ethics and moral duties.	**K2**
CO3	Apply the values learnt, in day-to-day life	**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	**25USA31GL03**			Language Sanskrit - 3					**4**		**3**
Course Outcomes	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	2	3	3	3	3	3	2	1	2.3
CO2	3	3	2	3	3	2	2	3	3	3	2.7
CO3	3	3	1	3	3	1	1	3	3	3	2.4
CO4	2	2	1	2	3	2	2	3	2	1	2.0
CO5	3	3	2	3	2	2	3	3	3	2	2.6
Mean Overall Score											**2.4 (High)**

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

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

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

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

UNIT II: Life After Death (15 Hours)

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

UNIT III: In Communion with Nature (15 Hours)

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

UNIT IV: Mystery of Venus (15 Hours)

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

UNIT V: Think Before You Trash (15 Hours)

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

* Speaking Components are meant only for internal tests

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

Books for Study:

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

Books for Reference:

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

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

Websites and eLearning Sources:

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

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

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

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UEL33CC03	**Core Course - 3:** Digital Electronics	4	3

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 real time problems
To decide the suitable digital concepts and recommend digital solutions for entrepreneurship.

UNIT-I: Fundamentals of Digital Concepts (12 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- Boolean Expressions: SOP and POS - Minimization of Boolean Expression Standard Forms of Boolean Expressions – Karnaugh Map – Five Variable K-Map.

UNIT-II: Logic Gates and Combinational Circuits (12 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 – 4:1 Multiplexer - 1:4 Demultiplexer

UNIT-III: Sequential Logic Circuits (12 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 – static RAM

UNIT-IV: Counters, ROM and PLDs (12 Hours)

Asynchronous Counter - 3-Bit Asynchronous Binary Counter - Asynchronous Decade Counter - Synchronous Counter – 3-Bit Synchronous Binary Counter - Up/Down Synchronous Counter - Johnson Counter - Ring Counter - EPROM - Flash Memories - Programmable Logic Devices - 2-Bit ALU Design

UNIT-V: Hardware Description Language (12 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

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Godse A.P., Godse D.A. (2019), *Digital Logic Circuits* (2nd Edition), Technical publications.
2. Floyd T. L. and Jain R.P. (2008), *Digital Fundamentals* (8thEdition), Pearson Education.
3. Bhasker. J. (2015), *A Verilog HDL Primer* (3rdEdition), 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
II	12	3,45,6	3.1-3.3,3.8,4.1-4.6, 4.12-4.17 5.5
III	12	510	5.1-5.4,5.5.3,5.5.4 10.1
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

Books for Reference:

1. Morris Mano M. and Michael D. Ciletti (2008), *Digital Design* (4thEdition), Pearson Education.
2. Kharate G.K. (2010), *Digital Electronics* (1st Edition), Oxford University Press.
3. John F. Wakerly (2006), *Digital Design: Principles and Practices* (4thEdition), Prentice Hall.

4. Donald P. Leach, Albert Paul Malvino and Goutam Saha (2010), *Digital Principles and Applications* (7thEdition), 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/
4. https://www.tutorialspoint.com/compile_verilog_online.php

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Describe digital signals, digital building blocks and fundamental digital circuits	**K1**
CO2	Identify and compare the digital logic circuits with a focus on environmental sustainability	**K2**
CO3	Analyze, Infer and select appropriate digital circuits for real-time applications	**K3**
CO4	Use modern tools to compare and contrast the digital circuits	**K4**
CO5	Assess and recommend digital solutions for technological advancements and entrepreneurship	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UEL33CC03**			**Core Course - 3:** Digital Electronics						**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	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	25UEL33CC04	**Core Course - 4:** Electronic Circuits	4	3

Course Objectives
To provide exposure to various electronics devices and circuits using discrete components.
To understand the operation of electronic circuits using diodes and transistors.
To apply the circuit fundamentals in diverse applications.
To analyze the frequency response of small signal amplifiers, as well as performance of feedback amplifiers and oscillators.
To experiment with different electronic circuits of practical applications.

UNIT-I: Applications of Diodes (12 Hours)

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

UNIT-II: Biasing of BJT and FET (12 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) – MOSFET: Voltage Divider Biasing

UNIT-III: Small Signal Analysis (12 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 - h Parameter – Frequency Response Analysis of CE Amplifier– Miller Effect - Multistage Amplifier - Darlington Amplifier.

JFET and MOSFET Amplifiers: Small Signal Parameters - Small Signal Equivalent Circuit – Common Source Amplifier

UNIT-IV: Feedback Amplifiers and Oscillators (12 Hours)

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

UNIT-V: Tuned and Power Amplifiers (12 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Salivahanan. S, Suresh Kumar.N, Vallavaraj. A (2008), *Electronic Devices and Circuits* (2ndEdition), TMH.
2. Borse R.Y. (2012), *Basic Electronic Devices and Circuits* (1st Edition), Adhyayan Publishers and Distributors – New Delhi.

Unit	Book	Chapter	Sections
I	1	16,18	16.3,16.5, 18.1,18.2
II	1	6,7	6.11, 6.12, 6.13, 7.16, 7.18
III	1	9,10	9.11.1-9.11.7,9.12.1, 11.7.5
IV	1	14, 15,17	14.1 – 14.4, 15.2, 15.11, 15.12,15.14,17.2
V	1, 2	12, 16	12.7, 12.9, 12.13, 12.14, 16.1, 16.2, 16.3

Books for Reference:

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

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Identify and describe and relate electronic circuits	**K1**
CO2	Explain and demonstrate the functioning of electronic circuits	**K2**
CO3	Classify, analyze and investigate various electronic circuits	**K3**
CO4	Examine, differentiate, and categorize electronic circuits based on their functionality	**K4**
CO5	Assess and evaluate the electronic circuits in modern technological applications with ethical considerations	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UEL33CC04**			**Core Course - 4:** Electronic Circuits						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	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	25UEL33CP03	**Core Practical - 3:** Digital and Analog Circuits	3	2

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

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UEL33AO01A	**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 - T_C 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	Chalk and Talk, Demo Videos, PPT, Hand-outs
Assessment Methods	Seminar, Snap Test, MCQ, Online Quiz, Assignment

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	**25UEL33AO01A**			**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/Weeks	Credits
3	**25UEL33AO01B**	**Allied Optional - 1:** Computer Science - 1	**4**	**3**

Course Objectives
To learn the fundamental concepts and features of HTML5.
To create hyperlinks, multimedia elements, and internal page navigation.
To explore the fundamentals of CSS.
To examine the concepts of DBMS.
To learn SQL syntax and its role in querying and managing data in RDBMS.

UNIT I: Getting Started with HTML5 (12 Hours)

HTML - Features of HTML5 - Importance of Learning HTML5 - Choosing a Text Editor - HTML5 Semantic Markup - Basic Structure of an HTML Document - Essential Tags and Attributes - Creating and Setting Up an HTML Document - Adding Content - Comments in HTML.

UNIT II: HTML Text Formatting, Links, Forms, and Tables (12 Hours)

Text Formatting and Lists HTML Headings and Paragraphs - Ordered, Unordered, and Nested Lists - Formatting Text with HTML. Links and Multimedia Creating Links - Relative URLs - Linking Within a Page - Adding Images, Videos, and Audio. Forms and Input Elements Creating Forms - Inputs - Form Validation. Tables Creating Tables - Basic Table Styling.

UNIT III: Cascading Style Sheets (CSS3) (12 Hours)

CSS Role of CSS in Web Development - CSS Syntax and Rules - Selectors and Declarations - Internal and External CSS - Linking CSS File. CSS Implementation and Styling to CSS Versions - Applying Styles - Media Types - User Styles. CSS Style Properties Text and Font Properties - Colors and Backgrounds - CSS Box Model - Margins, Borders, and Padding - Width and Height.

UNIT IV: Database Systems Concepts (12 Hours)

Database System Applications - Purpose of Database Systems - View of Data - Database Languages - Relational Databases - Database Design - Data Storage and Querying.

UNIT V: Relational Database and SQL (12 hours)

Structure of Relational Databases - Database Schema-Keys - Schema Diagrams - Relational Query Languages - Relational Operations-Overview of the SQL Query - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - Set Operations.

Teaching Methodology	Lectures and Presentations, Demonstrations, Case Studies Examples, Group Discussions and Peer Learning
Assessment Methods	Written Examination, Assignment, Presentation

Book for Study:

1. Smith, S. (2023). *Responsive web development with HTML5 and CSS: Building modern and user-friendly websites for all devices*, (2nd Ed.). TechPress Publishing.
   Unit I *Chapter* 1
   Unit II *Chapter*s 2 and 4
   Unit III *Chapter*s 7 and 8
2. Henry F. Korth Abraham Silberschatz. (2011). *Database System Concepts* (6th Ed). McGraw Hill.
   Unit IV *Chapter 1(Section:1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7)*
   Unit V *Chapter 2(Section:2.1, 2.2, 2.3, 2.4, 2.5), Chapter 3(Section:3.1, 3.2, 3.3, 3.4, 3.5)*

Books for Reference:

1. Powell, T.A. (2000). *The Complete Reference Web Design*, Tata McGraw Hill.
2. Date, C.J. (2002). *An Introduction to Database System*, (7th Ed.). Pearson Education.
3. Willard, W. (2009). *Web Design - A Beginner's Guide*. Tata McGraw Hill Education.

Websites and eLearning Sources:

1. https://www.tutorialspoint.com/html/index.htm

2. https://www.geeksforgeeks.org/dbms/
3. https://www.w3schools.com/sql/
4. https://www.w3schools.com/html/

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Develop responsive and well-structured web pages using HTML5 and CSS3.	**K1**
CO2	Apply text formatting, multimedia integration, and form handling techniques to enhance web content.	**K2**
CO3	Utilize CSS3 styling properties to control the layout, design, and responsiveness of web applications.	**K3**
CO4	Design and manage relational databases using SQL queries for efficient data storage and retrieval.	**K4**
CO5	Demonstrate the ability to build dynamic and interactive web applications with effective database integration.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UEL33AO01B**			**Allied Optional - 1:** Computer Science - 1						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	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	25UHE34VE03A	**Value Education - 3:** Social Ethics - 1	2	1

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

UNIT I: Introduction to Social Ethics (6 Hours)

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

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

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

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

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

UNIT IV: Cyber Crime (6 Hours)

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

UNIT V: Social Integration (6 Hours)

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(6 Hours)**

God of salvation

UNIT II **(6 Hours)**

Life & Mission of Jesus Christ

UNIT III **(6 Hours)**

The Holy Spirit

UNIT IV **(6 Hours)**

Gospel Values

UNIT V **(6 Hours)**

Mary, the mother of God

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

Books for Study:

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

Books for Reference:

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

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

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

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

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

UNIT I Communication Skills (6 Hours)

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

UNIT II Resume Writing & Interview Skills (6 Hours)

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

UNIT III Personal Effectiveness (6 Hours)

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

UNIT IV Numerical Ability (6 Hours)

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

UNIT V (6 Hours)

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

அலகு - 1 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: வியக்க வைக்கும் தமிழரின் அறிவியல்

பயன்முறை கற்றல்: வலைப்பூக்கள் உருவாக்கம்- அறிவியல்கலைச்சொல்லாக்கம்

அலகு - 2 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

புதினம்: இரா. நடராசன் : சர்க்கஸ்.காம்

அலகு - 3 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் வெளிப்படும் நீர் மேலாண்மையியல்

பயன்முறை கற்றல்: நூல் – திறனாய்வு

அலகு - 4 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

பயன்முறை கற்றல்: திரைப்படத் திறனாய்வு- ஆவணப் படத்திறனாய்வு

அலகு - 5 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்;

பயன்முறை கற்றல்: பழமொழிகளில் அறிவியல், மூலிகைகளைக் கண்டறிதல்

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

பாட நூல்கள்:

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

பார்வை நூல்கள்:

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

Websites and eLearning Sources:

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

Course Outcomes

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

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

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

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

UNIT – I **(12 Hours)**

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

UNIT – II **(12 Hours)**

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

UNIT – III **(12 Hours)**

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

UNIT – IV **(12 Hours)**

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

UNIT – V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

Samskrita Vyavahara sahasri vakiya Prayogaha

UNIT II **(12 Hours)**

Lot Lakaarah, Prayaogh Kartari Vaakyaani

UNIT III **(12 Hours)**

Naatakasya Itihaasah Vivaranam, Thuva and Tum Suffixs

UNIT IV **(12 Hours)**

Karnabhaaram, Naatakasya Visistyam

UNIT V **(12 Hours)**

Samskrita Racanani Vubhavoga

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

* Speaking Components are meant only for internal tests

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UEL43CC05	**Core Course - 5:** Linear Integrated Circuits	4	3

Course Objectives
To understand IC fabrication and use of LICs in circuit design.
To grasp 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 (12 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.

UNIT-II: Operational Amplifier (12 Hours)

Op-Amp - Ideal Operational Amplifier - Open Loop Operation of 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 - AC Characteristics and DC Characteristics.

UNIT-III: Applications of Operational Amplifier (12 Hours)

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 (12 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 (12 Hours)

555 Timers - Operating Modes – Pin Functions - Astable Operation - Application in Astable Operation - One Shot or Monostable Operation - Application in Monostable Operation- 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Roy Choudhury D., Shail B. Jain (2017), *Linear Integrated Circuits* (4th Edition), New Age International (P) Limited.
2. Robert F. Coughlin and Frederick F. Driscoll (2001), *Operational Amplifiers and Linear Integrated Circuits* (6thEdition), 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. Fiore (2020), *Operational Amplifiers and Linear Integrated Circuits: Theory and Application*, (Creative Commons Edition).
2. S. Salivahanan and V. S. Kanchana Bhaaskaran (2008), *Linear Integrated Circuits*, (1st Reprint), Tata McGraw Hill.
3. Ramakant A. Gayakwad (2002), *Op-Amps and Linear Integrated Circuits*, (4th Edition), 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
4. https://www.tinkercad.com/circuits
5. https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
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	**25UEL43CC05**			**Core Course - 5:** Linear Integrated Circuits						**4**	**3**
Course Outcome (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO 1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL43CC06	**Core Course - 6:** Communication Electronics (Internship Embedded Course)	4	3

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 (12 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 – SC Generation – VSB Demodulation of AM Waves – AM Applications

UNIT-II: Angle Modulation (12 Hours)

Phase and Frequency Modulation – Mathematical Representation of FM And PM - Frequency Spectrum of FM - Bandwidth Of FM: Carson's Rule - Spectrum of Narrow Band and Wide Band 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 (12 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 (12 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 (12 Hours)

Fundamentals of Transmission Lines - Characteristic Impedance – SWR - Losses In Lines - Transmission Line Components: Balun**s –** Noise - Classification Of Noise - Atmospheric Noise - Extra-Terrestrial Noise - Man Made Noise - Thermal Noise - Shot Noise - Noise in Reactive Circuits - Signal to Noise Ratio - Noise Figure - Calculation of Noise Figure - Noise Temperature

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Kennedy and George Davis (2017), *Electronic Communication Systems*, (6th Edition), McGraw Hill Education.

2. Wayne Tomasi (2008), *Electronic Communication Systems*, (5th Edition), Pearson education.

3. Bernard Sklar (2021), *Digital Communications Fundamentals and Applications*, (3nd Edition), 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. Simon Haykin (2007), *Communication Systems*, (4thEdition), John Wiley.
2. Mithal G.K. (2002), *RadioEngineering*, (20thEdition), KannaPublication.
3. Dennis Roddy and John Coolen (2008), *Electronic Communications*, (4th Edition), 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
4. https://www.khanacademy.org/science/electrical-engineering

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
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	**25UEL43CC06**			**Core Course - 6:** Communication Electronics (Internship Embedded Course)						**4**	**3**
Course Outcome (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Scores 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	25UEL43CP04	**Core Practical - 4:** Communication and LIC	3	2

List of Experiments (Any 10 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
8. Construction and study of inverting, non-inverting, voltage follower, summing amplifier using op-amp
9. Construction and study of comparator, integrator and differentiator using op-amp
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
16. Study of instrumentation amplifier IC

Books for Study:

1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UEL43AO02A	**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 categorize 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.

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

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.

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

Books for Reference:

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

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On the successful completion of the course, student will be able to	
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	**25UEL43AO02A**			**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/ Weeks	Credits
4	25UPH43AO02B	**Allied Optional - 2:** Computer Science - 2	4	3

Course Objectives
To understand the basic concepts of computer networks and data transmission
To impart knowledge of components of computer network
To explore the importance of computer network standards and LAN
To study the features of Wireless LAN and Bluetooth Technology
To acquire the knowledge of Internet of Things

UNIT I: Fundamentals of Computer Networks (12 Hours)

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

UNIT II: Network Classification and Communication Components (12 Hours)

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

UNIT III: Network Standards, OSI Model and LAN (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: Wireless LAN and Bluetooth Technology (12 Hours)

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

UNIT V: Internet of Things (12 Hours)

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	Lecture with Demonstration, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Quiz and Assignment.

Books for Study:

1. Rajesh, E, & Balasubramanian. (2002). *Computer Networks, Fundamentals and Applications,* Vikas Publishing House.
   Unit I: *Chapter*-1
   Unit II: *Chapter*-2
   Unit III: *Chapter*-3(Sec.3.1 and 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 and 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. Bahga, A., & Madisetti, V. (2015). *Internet of Things*-A Hands-on Approach, Universities Press.
2. Tanenbaum, A.S. (1999), *Computer Networks,* Prentice Hall of India.
3. Stallings, W. (2004), *Data and Computer Communications,* (7th Ed.) PHI.

Websites and eLearning Sources:

1. https://www.geeksforgeeks.org/computer-network-tutorials/
2. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
3. https://www.w3schools.com/cybersecurity/cybersecurity_networking.php
4. https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/

5. https://www.tpointtech.com/iot-internet-of-things
6. https://www.tutorialspoint.com/internet_of_things/index.html

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the fundamental concepts of computer network, data communication, OSI model, wireless LAN, and IoT.	**K1**
CO2	Demonstrate data transmission, network components, LAN architectures, and wireless communication.	**K2**
CO3	Apply switching, routing, multiplexing, and wireless protocols to solve network problems.	**K3**
CO4	Analyze network standards, topologies, wireless LANs, and IoT challenges.	**K4**
CO5	Evaluate the applications of networks, wireless LANs, and IoT in real-world scenarios.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UPH43AO02B**			**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	25UEL43OP01A	**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 – f, R and μ
10. Concave lens - f, R and μ
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/Weeks	Credits
4	25UEL43OP01B	**Allied Optional Practical:** Computer Science	2	2

List of Exercises

HTML5 Exercises

1. Create a web page using Text Formatting and semantic tags.
2. Adding Images to Web Pages
3. Creating Lists (Ordered and Unordered List)
4. Design an HTML form with validation attributes
5. Creating Tables and links to structure webpage content

CSS Exercises

5. Apply CSS3 selectors and styles to format a webpage.
6. Implement CSS transitions and transformations.

SQL Exercises

7. Basic operations (Arithmetic Operattions)
8. Set Operations
9. Create and manage tables using DDL commands
10. Perform data operations using DML commands.

Simple Projects using HTML

11. Student Profile Management System.
12. Creating Online Registration form.

- for semester 3 and 4

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

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

UNIT I: Harmony with Nature (6 Hours)

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

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

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

UNIT III: Public Health (6 Hours)

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

UNIT IV: Disaster Management (6 Hours)

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

UNIT V: Counseling for Adolescents (6 Hours)

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

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

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

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

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

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

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

Books for Study:

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

Books for Reference:

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

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

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

Semester	CourseCode	Title of the Course	Hours/Week	Credits
4	25UEL44SE02A	**Skill Enhancement Course - 2:** 3D Printing	2	1

Course Objectives
To understand the principles and history of additive manufacturing
To familiarize themselves with 3D printing processes and materials
To Explore industry applications and challenges
To updated on future trends and innovations
To design for additive manufacturing

UNIT-I: Foundation History of 3D Printing (6 Hours)

Overview of 3D Printing vs. Traditional Manufacturing - Historical Evolution and Milestones Basic Principles: Layer-by-Layer Fabrication - Key Terminology: STL Files, Slicing, G-code

UNIT-II: 3D Printing Technology and Process (6 Hours)

FDM (Fused Deposition Modeling): Mechanics, Materials, and Limitations -SLA/DLP (Stereo lithography/Digital Light Processing): Resin-Based Techniques SLS/SLM (Selective Laser Sintering/Melting): Metal and Polymer Sintering -Binder Jetting and Material Jetting: Multi-Material Capabilities -EBM (Electron Beam Melting): High-Temperature Applications

UNIT-III: Printing Materials and Global effects (6 Hours)

Polymers: PLA, ABS, Nylon, and Resins - Metals: Titanium, Aluminum, Stainless Steel Ceramics and Composites - Biomaterials for Medical Applications (e.g., Bioprinting) Material Properties: Strength, Durability, Thermal Resistance

UNIT-IV: Design for Additive Manufacturing (6 Hours)

CAD Software Tools (Fusion 360, Solid Works, blender) - Topology Optimization and Lattice Structures - Support Structures and Overhang Limitations - Case Studies: Aerospace, Automotive, Healthcare Designs, cabinate designs

UNIT-V: Applications, Challenges, and Future Trends -Industry Applications (6 Hours)

Industry Applications - Aerospace (Lightweight Components) - Healthcare (Prosthetics, Implants) - Construction (3D-Printed Buildings) - Challenges: Cost, Speed, Surface Finish, and Certification- Intellectual Property and Environmental Impact -Future Trends: 4D Printing, AI-Driven Design, Sustainable Materials

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. The 3D Printing Handbook: Technologies, Design, and Applications" by Ben Redwood et.al

Unit	Book	Chapter	Sections
I	1	I	All
II	1	II	All
III	1	III	All
IV	1	IV	All
V	1	V	All

Books for Reference:

1. 3D Printing and Additive Manufacturing: Principles and Applications" by Chee Kai Chua et.al

Websites and eLearning Sources:

1. https://www.coursera.org/courses?query=3d%20printing
2. https://www.udemy.com/topic/3d-printing/?srsltid=AfmBOopEc-xiLVczDNimZwIBzlpUx--KK9qd3obViuCHmiUABfSOJKw8

3. https://www.youtube.com/playlist?list=PLGqRUdq5ULsOwW9G08jV43YTdMyqJ6xGB

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
CO1	Historical evolution of 3D printing and compare it with traditional manufacturing methods.	**K1**
CO2	Working principles, advantages, and limitations of different 3D printing technologies (FDM, SLA, SLS, etc.).	**K2**
CO3	Evaluate various 3D printing materials based on their properties and applications.	**K3**
CO4	Apply Design for Additive Manufacturing principles using CAD software tools to optimize 3D models	**K4**
CO5	Evaluate the challenges and future trends of 3D printing, including **cost,** speed, sustainability, and AI-driven design**.**	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**				**Hours/Week**			**Credits**	
4	**25UEL44SE02A**		**Skill Enhancement Course - 2:** 3D Printing				**2**			**1**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	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	25UEL44SE02B	**Skill Enhancement Course - 2:** Drone Techniques	2	1

Course Objectives
To understand the fundamentals of drone technology, components and its applications.
To design and develop a drone using various materials and techniques
To understand the electronics and avionics of drones, including flight controllers, sensors, and communication systems.
To learn safe flight operations, emergency procedures, and maintenance techniques.
To explore various drone applications, including aerial photography, surveying, and inspection.

UNIT-I: Introduction to Drone Technology (6 Hours)

Overview of UAV- Historical Evolution and Development - Classification of UAVs (Size, Endurance, Mission) -UAV Applications: Military and Civilian -UAV System Components: Air Vehicle, Control, Payload, and Data Links

UNIT-II: UAV Aerodynamics and Performance (6 Hours)

Basic Principles of Aerodynamics - UAV Stability and Control - Propulsion Systems: Engines, Electric Motors, and Fuel Systems - Performance Parameters: Range, Endurance, and Climbing Flight -Structural Design and Material Consideration.

UNIT-III: Mission Planning and Control Systems (6 Hours)

Mission Planning and UAV Navigatio -Control Stations and Remote Piloting -Autopilot and Flight Control Systems -Sensor Integration for Surveillance and Targeting -Data Links: Communication and Security Aspects

UNIT-IV: UAV Payloads and Applications (6 Hours)

Reconnaissance and Surveillance Payloads - Weaponized UAVs and Combat Operations -Electronic Warfare and Signal Relay Payloads - Environmental and Scientific Monitoring Payload - Radar, Chemical, and Nuclear Detection Sensors

UNIT-V: Launch, Recovery, and Future Trends (6 Hours)

UAV Launch Systems: Catapults, VTOL, and Assisted Launch - Recovery Methods: Conventional Landing, Parachutes, and Net Systems - Trade-offs in Launch and Recovery Techniques - Future UAV Technologies: AI, Autonomy, and Swarm UAVs -Regulatory Challenges and Integration into Civil Airspac

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. "Introduction to UAV Systems" by Paul G. Fahlstrom and Thomas J. Gleason

Unit	Book	Chapter	Sections
I	1	I	All
II	1	II, III	All
III	1	IV	All
IV	1	V	All
V	1	VI, VII	All

Books for Reference:

1. "Building Your Own Drones: A Beginner's Guide to Drones, UAVs, and ROVs" by John Baichtal
2. "Drone Technology: Fundamentals and Applications" by Sachi Nandan Mohanty and Alireza Khotanzad
3. "Programming Drones with Python" by Jose M. Garrido
4. "Drones for Dummies" by Mark LaFay
5. "Drone Law and Policy: Global Development, Risks, and Regulation" by Anthony A. Tarr

Websites and eLearning Sources:

1. https://www.uavnavigation.com/
2. https://dronekit.io/
3. https://evelta.com/blog/stepbystep-guide-how-to-build-a-drone-for-beginners

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
CO1	Explain the basic principles of drone technology and its components.	**K1**
CO2	Analyze the design and working of drones.	**K2**
CO3	Apply knowledge to program and operate drones for specific tasks	**K3**
CO4	Evaluate the applications of drones in various fields such as agriculture, surveillance, and delivery.	**K4**
CO5	Design and develop a basic drone prototype for a specific application.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours/Week**		**Credits**
4	**25UEL44SE02A**			**Skill Enhancement Course – 2:** Drone Techniques					**2**		**1**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	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	25UEL44SL03A	**Self-learning:** Sound Engineering	-	2

Course Objectives
To define the Fundamentals concepts of Sound and Measurement
To compare the Acoustic Environment
To classify the Audio Electronic devices
To analyze various audio systems technology
To recommend the sound systems for the need

UNIT I: FUNDAMENTALS OF SOUND AND MEASUREMENT

Audio Principles - Physics of Sound - Wavelength - Periodic and Aperiodic Signals - Sound and the Ear - Level and Loudness - Frequency Discrimination - Frequency Response and Linearity - Sine Wave - Root Mean Square Measurements – Decibel - Audio Level Metering - Measurement - Concepts Underlying the Decibel and its use in Sound Systems - Measuring Electrical Power - Expressing Power as an Audio Level - The Decibel in Acoustics - LP, LW, and LI - Acoustic Intensity Level (LI) - Acoustic Power Level (LW) - Acoustic Pressure Level (LP)

UNIT II: ACOUSTIC ENVIRONMENT

Acoustic Environment - Inverse Square Law - Atmospheric Absorption - Velocity of Sound - Temperature - Dependent Velocity - Effect of Altitude on the Velocity of Sound in Air - Typical Wavelengths - Doppler Effect - Reflection and Refraction - Effect of a Space Heater on Flutter Echo – Absorption - Classifying Sound Fields - Acoustic Environment Indoors.

UNIT III: AUDIO ELECTRONICS

Building Block Component - Power Supply Design - High Power Systems - Music Power - Influence of Signal Type on Power Supply Design - High Current Power Supply Systems - Over current Protection- Battery Supplies - Preamplifiers and Amplifiers - Introduction to Audio Amplification - Preamplifiers and Input Signals - Noise Levels - Audibility of Distortion- General Design Considerations- Controls.

UNIT IV: MICROPHONE AND LOUDSPEAKERS TECHNOLOGY

Microphone Sensitivity - Microphone Selection - Nature of Response and Directional Characteristics - Wireless Microphones - Microphone Connectors – Cables - Phantom Power - Measurement Microphones – Loudspeakers - Characteristic Impedance - Radiation Impedance - Sound Pressure Produced at Distance r - Diaphragm/Suspension Assembly - Diaphragm Size- Diaphragm Profile – Straight - Sided Cones - Moving Coil Loudspeaker - Loudspeaker Enclosures

UNIT V: SOUND REPRODUCTION SYSTEMS

Recording Consoles - Standard Levels and Level Meters - Standard Operating Levels and Line -Up Tones - Digital Line-Up - Sound Mixer Architecture and Circuit Blocks - Audio Mixer Circuitry - Mixer Automation - Digital Consoles - Embedded Digital Audio in the Digital Video Interface - Room Acoustics - Noise Control - Studio and Control Room Acoustics - Audio Test and Measurement - Fundamentals and Instruments - Instrument Types.

Books for Study:

1. Douglas Self Richard Brice Ben Duncan John Linsley Hood Ian Sinclair Andrew Singmin Don Davis Eugene Patronis John Watkinson, *Audio Engineering*, 1st Edition, Elsevier, 2009.

Unit	Book	Chapter	Sections
I	1	1,2	1.1-1.4, 1.8-1.13, 2.1-2.6
II	1	3	3.1 -3.13
III	1	4,5,6,7	4.1,5.1-5.5,5.10,5.13,6,7,7.11,7.16-7.18
IV	1	22,23,24	22.1-22.6, 23.1-23.3,23.6, 23.8-23.11,23.16,24.1,24.2
V	1	26,27,28,29,30	26.1-26.8, 27.2. 28.9,29.1-29.3,30.1

Book for Reference:

1. Douglas Self, *Audio Engineering Explained Professional Audio Recordings*, 1st Edition, Elsevier, 2010.
2. John Linsleyhood, *Audio Electronics*, 2nd Edition, Newnes Publishers, 1995.
3. Bob Cordell, *Designing Audio Power Amplifiers*, 1st Edition, McGraw Hill Professional, 2011.

Websites and eLearning Sources:

1. https://en.wikipedia.org/wiki/Audio_engineer
2. https://www.thehighereducationreview.com/news/what-is-sound-engineering-scope-and-career-opportunities-nid-956.html
3. https://www.avanse.com/blog/all-you-need-to-know-about-sound-engineering/

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
CO1	Define the Fundamentals concepts of Sound and Measurement	**K1**
CO2	Compare the Acoustic Environment	**K2**
CO3	Classify the Audio Electronic devices	**K3**
CO4	Analyze various audio systems technology	**K4**
CO5	Recommend the sound systems for the need	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UEL44SL03A**			**Self learning:** Sound Engineering						**-**	**2**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	
CO-1	2	2	2	3	2	2	3	3	2	2	2.3
CO-2	3	2	2	2	2	3	2	2	2	2	2.2
CO-3	2	3	3	2	2	2	2	3	2	2	2.3
CO-4	3	2	2	2	3	3	3	2	2	2	2.4
CO-5	2	2	3	3	2	3	2	2	2	2	2.3
										Mean Overall Score	2.3
											HIGH

Semester	Course Code	Title of the Course	Hours / Week	Credits
4	25UEL44SL03B	**Self-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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Kraig Mitzner (2009), *Complete PCB Design Using or CAD Capture and PCB Editor* (1st Edition), Newnes.

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 RS. (2017), *Printed Circuit Board* (1st Edition), Tata McGraw Hill Education Pvt Ltd., New Delhi.
2. Mehta S D. (2011), *Electronic Product Design Volume-I* (1st Edition), S Chand Publications.

3. Gregory B.A. (1985), *An Introduction to Electrical Instrumentation and Measurement Systems* (1st Edition), 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

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
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**
4	**25UEL44SL03B**			**Self learning:** PCB Design and Fabrication						**-**	**2**
Course Outcomes↓	**Programme Outcomes (PO)**					**Programme Specific Outcomes (PSO)**					**Mean Scores of COs**
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PSO-1**	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	
CO-1	2	2	2	2	2	2	2	2	3	3	2.2
CO-2	3	2	3	3	2	2	3	3	3	2	2.6
CO-3	2	3	2	2	2	2	3	3	3	3	2.5
CO-4	2	2	3	2	3	3	2	2	2	2	2.3
CO-5	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	25UEL53CC07	**Core Course - 7:** Microprocessors and Applications	6	4

Course Objectives
To understand the architecture, instruction set and operational aspects of the Intel 8085 microprocessor.
To develop assembly language programming skills for the Intel 8085 microprocessor.
To understand the working and interfacing of various peripheral devices with the Intel 8085 microprocessor.
To explore the architecture, operational modes and interrupt mechanisms of the Intel 8086 microprocessor.
To study the architecture, configuration and performance aspects of Intel Core i5 processors.

UNIT-I: INTEL 8085 **(18 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 **(18 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 **(18 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 **(18 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 **(18 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 – I5 vs I7 vs I9

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Ram B. (2003), *Fundamentals of Microprocessors and Microcomputers*, (5th Edition Reprint), Dhanpat Rai Publications, New Delhi.
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. Gaonkar Ramesh S. (2013), *Microprocessor Architecture, Programming and Application with the 8085*, (6th Edition), Penram International Publishing, Mumbai.

2. Vijayendran V. (2009), *Fundamentals of Microprocessor-8085*, (1st Edition), S. Viswanathan Publishers, Chennai.

3. Brey Barry B. (2008), *the Intel Microprocessors: 8086 --- Core2 … - Architecture Programming and Interfacing*, (8th Edition), Pearson Education India.

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/

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Explain the internal structure, pin configuration, instruction execution, and timing diagrams of the Intel 8085 microprocessor.	**K1**
CO2	Write and execute programs for arithmetic operations, array manipulations, BCD conversions, and implement subroutines and interrupts	**K2**
CO3	Interface and program devices such as PPI 8255, UART 8251, timers, DMA controllers and keyboard/display controllers for real-time applications.	**K3**
CO4	Analyze the functional aspects of the 8086 microprocessor, compare different processor generations and develop simple assembly language programs.	**K4**
CO5	Explain multi-core processing, power and thermal management, cache memory, PCI controllers and compare Intel Core i5, i7, and i9 processors.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours/Week**			**Credits**
5	**25UEL53CC07**			**Core Course - 7:** Microprocessors and Applications				**6**			**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL53CC08	**Core Course - 8:** Sensors and Electronic Instrumentation	6	4

Course Objectives
To understand the working principles, classifications and characteristics of various sensors and actuators.
To study the functions, characteristics and error analysis of measurement and instrumentation systems.
To understand the principles, working and error reduction techniques of AC and DC bridge circuits.
To explore different electronic measuring instruments and signal interpretation techniques.
To study the principles, construction and applications of analytical instruments used in scientific and industrial measurements.

UNIT-I: Sensors (18 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 (18 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 (18 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 (18 Hours)

Electronic Voltmeters - Advantage of Electronic Voltmeters - Transistors Voltmeters (TVM) - Permanent Magnet Moving Coil (PMMC) - Multi Range DC Voltmeter – Ohmmeter - Multimeter – Ammeter – single phase and three phase energy meter – DSO – logic analyser - Resonant Wave Analyzers - Heterodyne Wave Analyzer -Distortion Meters - Basic Spectrum Analyzer - Spectral Displays - Spectra of Different Signals.

UNIT-V: Various Analytical Instruments (18 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. M.J. Usher and D. A. Keating (1996), *Sensors and Transducer Characteristics*, Applications, Instrumentation, Interfacing, (2ndEdition), MACMILLAN Press Ltd.
2. Jon S. Wilson (2005), *Sensor Technology Handbook*, (Har/Cdr Edition), Newness is an imprint of Elsevier, Elsevier Inc.
3. Larry D. Jones (2007), *Electronic Instruments and Measurements*, (2nd edition), Prentice-Hall International Editions.
4. R.S. Khandpur (2006), *Handbook of Analytical Instrumentation*, (2nd Edition), McGraw-Hill Education Private Limited.
5. A.K. Sawhney (2015), *A course in Electrical and Electronic Measurements and Instrumentation*, (4th edition), 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. B. A. Gregory (1981), *An introduction to electrical instrumentation and measurement systems*, (2ndEdition), A Halsted Press book.
2. Sonal Sapra and J P Navani (2014), *Sensors and Instrumentation*, (1st Edition), S. Chand Publishing.
3. Dominique Placko (2007), *Fundamentals of Instrumentation and Measurement*, (1st Edition), Wiley.

Websites and eLearning Sources:

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

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
CO1	Explain different types of sensors, including resistive, capacitive, inductive, and piezoelectric sensors and their applications in real-world systems.	**K1**
CO2	Analyze measurement errors, understand the selection and use of instruments and evaluate the static and dynamic characteristics of instrumentation systems.	**K2**
CO3	Explain the working of Wheatstone, Kelvin, Maxwell, Hay's, Schering, and De Sauty's bridges and apply error reduction techniques for accurate measurements.	**K3**
CO4	Describe the working of electronic voltmeters, ammeters, digital storage oscilloscopes (DSO), logic analyzers, wave analyzers and spectrum analyzers.	**K4**
CO5	Explain the working principles of spectrophotometers, chromatography techniques, NMR spectrometers, thermo-analytical instruments, pH meters, and pollution monitoring instruments.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**				**Hours/Week**				**Credits**
5	**25UEL53CC08**		**Core Course - 8:** Sensors and Electronic Instrumentation				**6**				**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL53CP05	**Core Practical - 5:** Microprocessors, C and Python	6	3

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

Books for Study:
1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UEL53ES01A	**Discipline Specific Elective - 1:** Computer Hardware and Networks	4	3

Course Objectives
To understand the different types of motherboards, processors, and memory technologies, along with installation and maintenance techniques.
To explore power supply units, cooling methods, and troubleshooting techniques for computer hardware components.
To understand the installation and servicing of operating systems, input/output devices, and troubleshooting techniques.
To introduce fundamental networking concepts, network topologies, network models, and communication protocols.
To study network troubleshooting tools, transmission media, networking devices, and cabling standards.

UNIT-I: Motherboards (12 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 (12 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 (12 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 (12 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 (12 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Jean Andrews (2002), *A+ Guide to Hardware*, Managing, Maintaining and Troubleshooting (6th Edition), Course Technology Inc.
2. Mueller Scott (2015), *Upgrading and Repairing PCs (22nd Edition)*, QUE.
3. Tanenbaum Andrew S. and Wetheral David J. (2013), *Computer Networks (5th Edition)*, 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. Irv Englander and Wilson Wong (2021), *The Architecture of Computer Hardware, Systems Software and Networking* (6th Edition), Wiley.

2. Ajit Mittal and Ajay Rana (2014), *Mastering PC Hardware and Networking* (1st Edition), Khanna Book Publishing Company.

3.Chandra Mohan I. (2019), *Fundamentals of Computer Networks* (1st Edition), 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

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
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 networks and troubleshooting skills and to become an entrepreneur	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**				**Hours/Week**				**Credits**
5	**25UEL53ES01A**		**Discipline Specfic Elective - 1:** Computer Hardware and Networks				**4**				**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	2	2	3	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	25UEL53ES01B	**Discipline Specific Elective - 1:** Medical Electronics	4	3

Course Objectives
To understand the principles and applications of electrodes and transducers used in biomedical instrumentation.
To study the design, working and noise considerations of biomedical recording systems.
To explore various techniques for measuring and analyzing blood parameters.
To understand the principles and functioning of modern biomedical imaging techniques.
To study the working principles and applications of advanced biomedical devices.

UNIT-I: Electrodes and Transducers (12 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 (12 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 (12 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 (12 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 (12 Hours)

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

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1.Leslie Cromwell (2007), *Biomedical Instrumentation and Measurement* (2nd Edition), Prentice Hall of India, New Delhi.

2. Aurmugan Dr. M. (2003), *Biomedical Instrumentation* (2nd Edition), 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 Edition), Tata McGraw-Hill, New Delhi.

2. Myer Kutz (2003), *Standard Handbook of Biomedical Engineering and Design* (1st Edition), McGraw Hill Publisher.

3. Joseph J. Carr and John M. Brown (2004), *Introduction to Biomedical Equipment Technology* (4th Edition), 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/

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
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/Week**				**Credits**
5	**25UEL53ES01B**		**Discipline Specfic Elective - 1:** Medical Electronics				**4**				**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL53ES02A	**Discipline Specific Elective - 2:** C and Embedded C	4	3

Course Objectives
To define syntax and structure of C and its functions
To understand C and embedded C programming techniques
To apply the logical steps and functions of C and embedded C to solve the realtime problems by writing the programs
To analyse the flow of C and embedded C
To test C and embedded C programs for various applications.

UNIT-I: Data Types, Operators and Expressions (12 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 (12 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 (12 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: Embedded C basics (12 Hours)

Introduction-Installing the Keil software and loading the project Configuring the simulator Building the target Running the simulation Dissecting the program Reading switches Example: Reading and writing bytes Example: Reading and writing bits The need for pull-up resistors Dealing with switch bounce Object-oriented programming with C The Project Header (MAIN.H) The Port Header Meeting real-time constraints Generating a precise 50 ms delay The need for 'timeout' mechanisms Creating loop timeouts Testing a hardware timeout

UNIT-V: Embedded C applications (12 Hours)

Creating an embedded operating system The basis of a simple embedded OS Introducing sEOS Important design considerations when using sEOS Implementing a Multi-State (Timed) system Controller for a washing machine The basic RS-232 protoco Using the on-chip UART for RS-232 communications Remote-control robot

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Balagurusamy E. (2019), *Programming in ANSI C (8thEdition)*, McGraw Hill Education (India) Private Limited, New Delhi.
2. Michael J. Pont (2002), *Embedded C*, Addison-Wesley- An imprint of Pearson Education

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	3, 4, 5, 6	3.1-3.6, 4.1- 4.7, 5.1- 5.4, 6.1- 6.11
V	2	7, 8, 9	7.1- 7.7, 8.1- 8.6, 9.4 - 9.13

Books for Reference:

1. Schaum's Outlines: Gottfried Byron S. (2018), *Programming with C (4th Edition)*, Tata McGraw Hill Pub. Co Ltd., New Delhi.
2. Yashvant Kanetkar (1998), *Programming with C (2ndEdition)*, Tata McGraw Hill, New Delhi.
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
4. https://22323006-Embedded-c-Tutorial-8051.pdf

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Explain C language syntax, use various operators and expressions apply type conversions, and solve simple programming problems.	**K1**
CO2	Use formatted input/output functions and implement decision-making and looping constructs to control program flow.	**K2**
CO3	Declare, initialize, and manipulate arrays and strings, use built-in and user-defined functions and apply storage class specifiers in solving problems.	**K3**
CO4	Install and configure Keil software, simulate embedded programs, handle input/output operations and implement real-time constraints such as delays and timeouts.	**K4**
CO5	Develop simple embedded operating systems, implement RS-232 communication and design embedded controllers for applications such as washing machines and remote-control robots.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**					**Hours/Week**		**Credits**	
5	**25UEL53ES02A**		**Discipline Specfic Elective - 2:** C and Embedded C					**4**		**3**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	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	25UEL53ES02B	**Discipline Specific Elective - 2:** Mobile Communication	4	3

Course Objectives
To understand the fundamental principles of wireless communication, including signal propagation, multiplexing, modulation techniques and cellular systems.
To study the architecture, protocols and functionalities of telecommunication systems, including GSM, DECT, TETRA, and UMTS.
To explore satellite communication systems, digital broadcasting and their integration with mobile networks.
To understand the architecture, protocols, and technologies of wireless LANs, including IEEE 802.11, HIPERLAN and Bluetooth.
To study the evolution of mobile communication technologies from 1G to 5G, including system architecture, operation and advancements.

UNIT-I: Wireless Communication (12 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 (12 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 (12 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 (12 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 (12 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Jochen Schiller (2003), *Mobile Communications*, (2nd Edition), Pearson Education limited.

2. Christopher Cox (2014), *An Introduction to LTE*, LTE–Advanced, SAE VoLTE and 4G Mobile Communication, (2nd Edition), Wiley.

3. Jonathan Rodriguez (2015), *Fundamentals of 5G Mobile Networks*, (1st Edition), Wiley.

4. T.S. Rappaport (2012), *Wireless Communications: Principles and Practice*, (2ndEdition), 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. Asif (2019), *5G mobile communications*, CRC Press.
2. Jochen Schiller (2014), *Mobile Communications*, (2nd Edition), Pearson Education.
3. Brijesh Verma (2013), *Mobile Communications*, (Reprint Edition), S. K. Kataria 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

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Explain signal propagation effects, analyze different multiplexing and modulation techniques and understand the working of cellular systems.	**K1**
CO2	Describe the system architecture, radio interfaces, localization, handover mechanisms and security aspects of modern telecommunication systems.	**K2**
CO3	Differentiate between GEO, LEO, and MEO satellites, analyze routing and handover mechanisms and explain the convergence of broadcasting and mobile communication.	**K3**
CO4	Explain the differences between infra-red and radio transmission, analyze the structure of wireless LANs and describe MAC management techniques in IEEE 802.11 networks.	**K4**
CO5	Trace the development from 1G to 5G, explain LTE and LTE-Advanced principles and understand VoLTE and the architecture of 5G communication systems.	**K5**

Relationship Matrix

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	**25UEL53ES02B**	**Discipline Specfic Elective - 2:** Mobile Communication	**4**	**3**

Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL54OE01A	**Open Elective - 1 (WS):** Lab Equipment Maintenance and Servicing	4	2

Course Objectives
To use the lab equipment to experiment the electronic signals
To analyze the maintenance and the safety measures of lab equipment
To inspect and service lab equipment.

UNIT-I: Passive and Active Components (12 Hours)

Resistors – Types – Color-code – Wattage – Tolerance – Capacitors – Types – Inductors – Transformer – Step-up and Step Down – Uses – Diode – Operation – Transistor – NPN and PNP – Switching – Amplifier – Diode and Transistor Testing – MOSFET – Types –Testing.

UNIT-II: Power Supply (12 Hours)

AC Power Supply – Parameters – DC Power Supply Design – Regulated Power Supplies – Single – Dual – Variable Voltage – Switched Mode Power Supply – Transformer Less Power Supply Design– Design of Fuses – Testing and Troubleshooting.

UNIT-III: Analog Equipment (12 Hours)

Variable Resistance Box – Variable Capacitance Box – Variable Inductance Box – Cathode Ray Oscilloscope – Block Diagram – Frequency Measurement – Function Generator – Range of Frequencies – Amplitude – Types of Waves -Meters – Ammeter – Voltmeter - Testing and Trouble Shooting.

UNIT-IV: Digital Equipment (12 Hours)

LED – Current Limiting Concept – Switches – Types - Logic Module – Circuit Diagram – Concept of Common Ground – Pulse Generator – Circuit Diagram – Active Low and Active High Pulses – Logic Modules Interfacing Boards – Kits – Testing and Troubleshooting Methods.

UNIT-V: Common Chemistry Lab Equipment (12 Hours)

Digital Balance – Block Diagram – Load Cell Sensors – pH Meter – Electrode Specifications –Stirrer – Centrifuge – Rotation Per Minute Measurement – Magnetic Stirrer with Paddle – Block Diagram – Oven Heating Elements

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation, Practical
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Material prepared by the department

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

Books for Reference:

1. Philip Kiameh (2004), *Electrical Equipment Handbook: Troubleshooting and Maintenance* (2nd Edition), McGraw Hill.

Websites and eLearning Sources:

1. https://www.mynewlab.com/blog/laboratory-equipment-maintenance-101/
2. https://conductscience.com/laboratory-equipment-care-and-maintenance/
3. https://www.labmate-online.com/news/laboratory-products/3/breaking-news/5-tips-forlaboratory-equipment-maintenance/30637

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
CO1	Use lab equipment to analyze the electronic signals	**K3**
CO2	Maintain and follow the safety measures of lab equipment	**K4**
CO3	Inspect and service lab equipment.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours/Week**		**Credits**	
5	**25UEL54OE01A**			**Open Elective - 1 (WS):** Lab Equipment Maintenance and Servicing				**4**		**2**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	1	2	2	2	2	3	2	2	1.9
CO2	1	2	2	3	3	3	3	3	3	3	2.6
CO3	2	2	2	1	2	3	2	2	2	3	2.1
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UEL54OE01B	**Open Elective - 1 (WS):** PC Assembling and Servicing	4	2

Course Objectives
To classify and use the suitable configuration to assemble a PC
To categorize the peripherals for a PC
To assemble PC, evaluate the performance of hardware and software and to do maintenance service if PC

UNIT-I: PC Organization (12 Hours)

Introduction to Computer Hardware – Processors - Components of Mother Boards – Connectors Types: Onboard - Front Panel – Back Panel – Ports - Slots - Add on Cards – Graphics Cards – BIOS.

UNIT-II: Power Supply (12 Hours)

Power Supply Unit - SMPS Outputs - Voltage Measurements - CPU Connector and Device Connectors - Cabinet Types – AT- ATX- BTX- SFF- ITX - Form Factor - Types of Cases: Tower Case – Desktop Case - Portable Case.

UNIT-III: Memories (12 Hours)

Semiconductor Memory – ROM– PROM– EPROM – DDR RAM– Virtual Memory - Cache Memory - Linear and Physical Memory - Video Memory - Secondary Memories: HDD – SSD – M.2 SSD – M.2 NVME SSD - CD Rom - CD-RW-DVD.

UNIT-IV: Input and Output Devices (12 Hours)

Input Devices – Keyboard – Mouse - Types of Mouses - DIN/PS2 Port - Serial Port – Parallel Ports – USB Ports – Scanner - Output Devices - Monitor- Printer.

UNIT-V: Assembling and Installation (12 Hours)

PC Assembling – Bios Setting - Booting Sequence Setting - Installation Menu Selection– Partitioning-Formatting– OS Installation - Device Driver Installation – Network Setup.

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Study material prepared by the Department.

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

Books for Reference:

1. Scott Mueller (2010), *Upgrading and Repairing PCs* (19th edition), Pearson education Inc.
2. Stephen Bigelow (2017), *Troubleshooting, Maintaining and Repairing PCs* (5th Edition), McGraw Hill Education.
3. Craig Zacker (2017), *PC Hardware: The Complete Reference* (1st Edition), McGraw Hill Education.

Websites and eLearning Sources:

1. https://khalisuraj.wordpress.com/pc-troubleshooting-i-pc-assembly-hardwareconfiguration-servicing/
2. http://www.aarscomputers.com/computer-assembling-services/
3. https://www.instructables.com/How-To-Assemble-A-Basic-Desktop-PC/

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Classify and use the suitable configuration to assemble a PC	**K3**
CO2	Identify and categorize the peripherals for a PC	**K4**
CO3	ASSEMBLE, install the software, maintain and service the PC	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours/Week**		**Credits**	
5	**25UEL54OE01B**			**Open Elective - 1 (WS):** PC Assembling and Servicing				**4**		**2**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	1	2	2	2	2	3	2	2	1.9
CO2	1	2	2	3	3	3	3	3	3	3	2.6
CO3	2	2	2	1	2	3	2	2	2	3	2.1
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UEL54SL04A	**Certificate Course:** Python and MicroPython	-	2

Course Objectives
To apply the python codes to activate hardware
To analyse the flow of Python programs
To test Python programs in an application

UNIT-I: Basics of Python

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

UNIT-II: Higher-Order Functions

Tuples - Ranges - Lists and Mutability - Functions as Objects– Strings - Extrapolation – Numpy - Scipy – Classes and Object-Oriented Programming.

UNIT III: Micropython hardware

ESP8266 and ESP32: hardware – GPIO - Input and Sensing – Accelerometers – Gestures - Compasses - Sound, Light, and Temperature — Networking – Robots.

UNIT IV: MicroPython IDE

MicroPython Genesis - Thony IDE – Programs.

UNIT V: Circuitpython

Features – library bundles – workflow - environment variables – supported ports – simple programs.

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Text prepared by the department

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

Books for Reference:

1. Guttag John V (2021), *Introduction to Computation and Programming Using Python (3rdEdition)*, Prentice Hall of India.
2. Nicholas H. Tollervey (2017), *Programming with MicroPython: Embedded Programming with Microcontrollers and Python, O'Reilly*
3. *CircuitPython Documentation Release 9.2.4*

Websites and eLearning Sources:

1. https://www.w3schools.com/python/python_intro.asp
2. https://www.geeksforgeeks.org/python-basics/
3. https://micropython.org/
4. https://www.raspberrypi.com/documentation/microcontrollers/micropython.html
5. https://circuitpython.org/

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Apply the python codes to with hardware	**K3**
CO2	Analyse the flow of MicrPython and CircuitPython programs	**K4**
CO3	Test and validate MicroPython and CircuitPython programs in an application	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**					**Hours/Week**		**Credits**	
5	**25UEL54SL04A**		**Certificate Course:** Python and MicroPython					**-**		**2**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	1	1	2	2	2	2	3	2	2	1.9
CO2	1	2	2	3	3	3	3	3	3	3	2.6
CO3	2	2	2	1	2	3	2	2	2	3	2.1
Mean Overall Score											**2.3 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
5	25UEL54SL04B	**Certificate Course:** Fuzzy logic	-	2

Course Objectives
To analyze various applications of fuzzy theory, particularly in artificial intelligence, expert systems, decision-making, and real-world uncertainty modeling.
To study the principles and design characteristics of fuzzy control systems**,** focusing on their fault tolerance, real-world implementations, and applications in both technical and social sciences
To examine the development and potential of fuzzy computers, understanding their structure, advantages, and future implications in computational intelligence.

UNIT-I: Evolution of Fuzzy theory

Human-Beings Originally Ambiguous - Digital versus Analog - Logic for Computer - Human Beings Forced to Think Suitably for Computer - Contemporary Rationalism Due to Descartes - Modern Rationalism at a Deadlock - Information and Ambiguity - Requirement of Ambiguity - Aspect of Ambiguity - Terminologies Concerning Fuzziness - Fuzzy Theory

UNIT-II: Fuzzy Theory

Invention of Fuzzy theory- Fuzzy theory for subjective reasoning- case study- Define middle age- notation- Representation of subjectivity-operations-Concept of speed and fuzzy theory- consistency of fuzzy sets- Difference between fuzzy and probability theory- Quantifying Uncertainity.

UNIT-III: Applications of Fuzzy theory

Uncertainty not Accepted in Inference Based on Binary Logic- Daily Inference - Fuzzy Inference - Formalization of Fuzzy Inference- Artificial Intelligence and Uncertainty- How to Make Computers Think - Expert System -The Frontier of Artificial Intelligence-Uncertainty and Organizations

UNIT-IV: Fuzzy control systems

Fuzzy Expert Systems - Using the Fuzzy Expert System to Drive a Car - The First Successful Example — Fuzzy Control- The Principle of Fuzzy Control - Design Characteristics of Fuzzy Control- Fault Tolerance Characteristic of Fuzzy Control - Real Example of Fuzzy Control - Application in Social Science — Academic Uncertainty- Fuzzy Survey - Fuzzy Similarity - Difficulty with Conventional Data Bases - Fuzzy Database- Real Applications

UNIT-V: Fuzzy Computer

Demonstration of a Fuzzy Computer- Development Work on the Fuzzy Computer-Control Target of the Demonstration- Structure of a Fuzzy Computer - Dream of a Fuzzy Computer - Advantages of Fuzzy Theory- Conclusions.

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Masao Mukaidono (2024), “Fuzzy logic for Beginners” World scientific publishers

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

Books for Reference:

1. Zadeh Auth., Ronald R. Yager, Lotfi A. Zadeh Eds (2021). An Introduction to Fuzzy Logic Applications In Intelligent Systems.
2. GEORGE J. KLIR AND BO YUAN, (1995) “FUZZY SETS AND FUZZY LOGICTheory and Applications” Prentice Hall, NJ, USA.

Websites and eLearning Sources:

1. https://www.spiceworks.com/tech/devops/articles/fuzzy-logic/
2. https://www.maths.tcd.ie/~ormondca/notes/Fuzzy%20Logic%20Notes.pdf

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Analyze real-world applications of fuzzy theory, including artificial intelligence, expert systems, and uncertainty modeling in various domains.	**K3**
CO2	Design and evaluate fuzzy control systems, understanding their principles, fault tolerance, and effectiveness in technical and social science applications.	**K4**
CO3	Assess the development and future potential of fuzzy computers, recognizing their structure, advantages, and impact on computational intelligence.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours/Week**		**Credits**
5	**25UEL54SL04B**			**Certificate Course:** Fuzzy logic					**-**		**2**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	**3**	**3**	**3**	**2**	**2**	**3**	**2**	**3**	**2**	**2**	**2.5**
CO2	**3**	**3**	**2**	**2**	**2**	**3**	**3**	**2**	**2**	**2**	**2.4**
CO3	**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
5	25UEL54SL04C	**Certificate Course:** Deep learning	-	2

Course Objectives
To explore the practical applications of deep learning in image processing, speech recognition, text analysis, and reinforcement learning.
To analyze various applications of deep learning.
To examine the development and potential of deep learning

UNIT-I: Machine Learning

Artificial intelligence - Learning from data – basic function regression - under and overfitting – categories of models – GPUs, - TPUs – batches - Tensors

UNIT-II: Training

Losses – autoregressive models – gradient descent – backpropagation – the value of depth – training protocols – benefits of scale

UNIT-III: Deep Models

Notation of layer – linear layer – activation function – pooling – dropout – normalizing layer – skip connections – attention layers – token embedding – positional encoding

UNIT-IV: Architectures

Multilayer perceptrons – convolutional networks – attention models

UNIT-V: Applications

Image denoising – image classification – object detection -semantic segmentation – speech recognition – text-image representations – reinforcement learning – text generation – image generation

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. François Fleuret (2023), *The Little Book of Deep Learning*, University of Geneva, Switzerland

Unit	Book	Chapter	Sections
I	1	1 ,2	All
II	1	3	All
III	1	4	All
IV	1	5	All
V	1	6,7	All

Books for Reference:

1. Francois Chollet (2018), *Deep Learning with python*, Manning Publications Co.
2. Subba Rao Polamuri, Makhan kumbhkar and Dr. D. Arul Pon Daniel (2022), *Introduction to Deep Learning*, AG PH Books, India.

Websites and eLearning Sources:

1. https://www.ibm.com/think/topics/deep-learning
2. https://www.deeplearning.ai/
3. https://www.geeksforgeeks.org/introduction-deep-learning/
4. https://aws.amazon.com/what-is/deep-learning/
5. https://www.mathworks.com/discovery/deep-learning.html
6. https://www.cloudflare.com/learning/ai/what-is-deep-learning/

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Design deep learning models using layers, dropout, skip connections, attention layers, and embedding techniques for various applications.	K3
CO2	Compare and implement different neural network architectures, including MLPs, CNNs, and attention models, for solving complex tasks.	K4
CO3	Apply deep learning techniques to image classification, object detection, text-image representations, and reinforcement learning scenarios.	K5

Relationship Matrix											
Semester	Course Code			Title of the Course				Hours/Week			Credits
5	25UEL54SL04C			**Certificate Course:** Deep learning				-			2
Course Outcomes (COs)	Programme Outcomes (POs)					Programme Specific Outcomes (PSOs)					Mean Score of COs
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	3	3	3	2	2	3	2	3	2	2	2.5
CO2	3	3	2	2	2	3	3	2	2	2	2.4
CO3	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
6	25UEL63CC09	**Core Course - 9:** Microcontroller and Embedded System	6	4

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 (18 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 (18 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 (18 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 (18 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 (18 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Muhammad Ali Mazidi, Mazidi J.G. and McKinlay R.D. (2006), *the 8051 Microcontroller and Embedded Systems: Using Assembly and C* (2nd edition), Pearson education.
2. RajKamal (2008), *Embedded Systems- Architecture, Programming and Design* (2nd Edition), Tata McGraw Hill.
3. Jonathan W. Valvano (2017), *Realtime Operating systems For Arm Cortex-M Microcontrollers Volume 3* (4thEdition), 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. Kai Qian, *David Den Haring, Li Cao* (2009), Embedded Software Development with C (1st Edition), Springer.
2. David Calcutt, *Frederick Cowan, and G. Hassan Parchizadeh* (2003), 8051 Microcontrollers: an Applications Based Introduction (1st Edition), Newness.
3. Kenneth Ayala (2007), *The 8051 Micro controller* (3rdEdition), 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/

CO. No.	CO - Statements	Cognitive Level (K- level)
	On successful completion of this course, students will be able to	
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	Assess, 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/Week**		**Credits**
6	**25UEL63CC09**		**Core Course - 9:** Microcontroller and Embedded System						**6**		**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	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	25UEL63CC10	**Core Course - 10:** Power Electronics	6	4

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: Power Electronic Switches and Systems (18 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 (18 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 (18 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 (18 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 (18 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Issa Batarseh and Ahmad Harb (2018), *Power Electronics Circuit Analysis and Design* (2nd Edition), Springer.
2. Bimbhra Dr. P. S. (2002), *Power Electronics* (3rd Edition), Khanna Publishers.
3. Ned Mohan Tore. M Undeland and William P Robbins (2007), *Power Electronics Converters, Applications, and Design* (3rd Edition), 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. Dokić and Branko Blanuša (2015), *Power Electronics Converters and Regulators* (3rd Edition), Springer.
2. Keith H. Sueker (2005), *Power Electronics Design A Practitioners Guide* (1st Edition), Newnes.

3. Muhammad H. Rashid (2017), *Power Electronics* (4th Edition), 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

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
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 circuits	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**				**Hours/Week**				**Credits**
6	**25UEL63CC10**		**Core Course - 10:** Power Electronics				**6**				**4**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL63CP06	**Core Practical - 6:** Microcontroller and Power Devices	6	3

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 microcontroller.
8. Study of Counters in 8051 microcontroller.
9. Study of interrupts in 8051 microcontroller.
10. Study of serial communication in 8051 microcontroller.
11. Interfacing ADC with 8051 microcontroller.
12. Interfacing LCD with 8051 microcontroller.
13. Interfacing GSM with 8051 microcontroller
14. Interfacing printer with 8051 microcontroller.
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 microcontroller (L293 motor driver)
22. Interfacing stepper motor with 8051 microcontroller
23. Interfacing LED dot matrix display with 8051 microcontroller
24. Interfacing seven segment display with 8051 microcontroller
25. Study of charge controller for solar panel
26. DHT11 sensor interfacing with 8051 microcontroller (temperature and humidity sensor)
27. Ultrasonic sensor interfacing with 8051 microcontroller
28. RTC interfacing with 8051 microcontroller
29. Interfacing Relay with 8051 microcontroller
30. AC voltage controller using TRIAC with UJT triggering.
31. MSP430 Programs
32. Arduino Programs
33. Lamp dimmer using TRIAC and Diac

Books for Study:
1. Practical manual by the Department

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UEL63ES03A	**Discipline Specific Elective - 3:** Control System	4	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 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 (12 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 (12 Hours)

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

UNIT-III: Time Response Analysis (12 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-IV: Frequency Response Analysis (12 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.

UNIT-V: Concepts of Stability and Root Locus (12 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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Nagoor Kani 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. and RameshBabu P. (2010), *Control Systems Engineering* (2nd Edition), SciTech Publications.
2. Gopal M. (2012), *Control System Principles and Design* (4th Edition), McGraw Hill Education.
3. Stamatios Menesis, *George Nikolakopoulos* (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

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Describe various types and concepts control system	**K1**
CO2	Explain and examine the mathematical models of control systems 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/Week**			**Credits**
6	**25UEL63ES03A**			**Discipline Specific Elective - 3:** Control System				**4**			**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL63ES03B	**Discipline Specific Elective - 3:** RF, Microwave and Optical Electronics	4	3

Course Objectives
To acquire 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 (12 Hours)

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 (12 Hours)

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 (12 Hours)

Block Diagram of Optical Communication System - Advantages of Fiber 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 (12 Hours)

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 (12 Hours)

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, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Mike Golio and Janet Golio (2008), *RF and Microwave Circuits, Measurements, and Modeling* (2nd Edition), CRC Press.
2. Gerd Keiser (2007), *Optical Fiber Communications* (3rd Edition), McGraw Hill Education.
3. Giovanni Ghione and Politecnico di Torino (2009), *Semiconductor Devices for High-Speed Optoelectronics* (1st Edition), Cambridge University Press, Italy.

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. Liao Samuel Y. (2003), *Microwave Devices and Circuits* (3rd Edition), Pearson Education.
2. Kulkarni M (2012), *Microwave and Radar Engineering* (4th Edition), Umesh Publications.
3. Collin Robert E. (2012), *Foundation of Microwave Engineering* (2nd Edition), 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-engineering/research/communicationtechnologies/applied-electromagnetics-devices/microwave-optic/

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (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/Week**				**Credits**
6	**25UEL63ES03B**		**Discipline Specific Elective - 3:** RF, Microwave and Optical Electronics				**4**				**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	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
6	25UEL63ES04A	**Discipline Specific Elective - 4:** Robotics and Industry 4.0	4	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 basics of Industry 4.0 concepts and technologies for the social needs

UNIT-I: Robotics (12 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. **(12 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 (12 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: PLC (12 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

UNIT-V: Industry 4.0 (12 Hours)

Introduction- Industry 4.0 - Definition of industry 4.0 - What is Industry 4.0? - Key paradigm of Industry 4.0 - Industry 4.0 conception - framework of Industry 4.0: conception and technologies - Nine pillars of technological advancement: Big data and analytics - Autonomous robots – Simulation - Horizontal and vertical Integration - Industrial IoT- Cyber security – The cloud - Additive manufacturing - Augmented reality- Macro perspective of industry 4.0 - Micro perspective of industry 4.0 - Industry 4.0 components - Industry 4.0 design principles - Impact of industry 4.0 – The way forward - RAMI 4.0 – Servitization - Product service system (PSS) – definition of PSS- Features of PSS.

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Gupta A. K, *Arora S.K. and Jean Riescher Westcott* (2017), Industrial Automation and Robotics (1st Edition), Mercury Learning Information. Boston, New Delhi.

2. John. W. Webb, *Renoald A. Rein* (2002), Programmable Logic Controller Principles and Application (5th Edition), Prentice Hall India.
3. Diego Galar Pascual, Pasquale Daponte, Uday Kumar, "Handbook of Industry 4.0 and SMART Systems", CRC Press Taylor & Francis Group, 2020.

Unit	Book	Chapter	Sections
I	1	13	Relevant sections
II	1	15,16	Relevant sections
III	1	1,3	Relevant sections
IV	2	1,2,3	1.1 - 1.3, 2.2 - 2.6, 3.1 - 3.9
V	3	1	1.1- 1.5

Books for Reference:

1. Jaganathan P. (2013), *Robotics (Industrial Robotics)* (1st Edition), Lakshmi Publications.
2. Stamatios Menesis, *George Nikolakopoulos* (2018), Introduction to Industrial Automation (1st Edition), CRC Press.
3. Rajput R K (2008), *Robotics and Industrial Automation* (1st Edition), S Chand.
4. Jean - Glaude Andre, *Industry 4.0*, Wiley-ISTE, 2019.

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
4. https://api.pageplace.de/preview/DT0400.9780429849688_A39912589/preview-9780429849688_A39912589.pdf

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (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 construction of the basic industry 4.0 and their techniques	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**				**Hours/Week**		**Credits**	
6	**25UEL63ES04A**			**Discipline Specific Elective - 4:** Robotics and Industry 4.0				**4**		**3**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	25UEL63ES04B	**Discipline Specific Elective - 4:** e-Security Systems	4	3

Course Objectives
To Learn to analyze the E-security of in-built cryptosystems
To Know the fundamental concepts related to authentication and digital signature.
To Develop cryptographic techniques for accuracy of biometric techniques
To Comprehend the various types of E-Security Applications
To Understand cyber crimes and cyber security.

UNIT-I: Introduction to eSecurity (12 Hours)

Computer Security Concepts – The OSI Security Architecture – Security Attacks – Security Services and Mechanisms – A Model for Network Security – Classical encryption techniques: Substitution techniques, Transposition techniques, Steganography – Foundations of modern cryptography: Perfect security – Information Theory – Product Cryptosystem – Cryptanalysis.

UNIT-II: Authentication and Digital Signature (12 Hours)

Introduction- Weak authentication schemes (Password-based and PIN-based authentication)- Strong authentication schemes- Attacks on authentication- Digital signature frameworks- Hash functions- Authentication applications- Authentication network services (IP authentication header protocol- Authentication in wireless networks)

UNIT-III: E-System and Network Security Tools (12 Hours)

Public key infrastructure (PKI) systems- Biometric-based security systems- Biometrics techniques- Accuracy of biometric techniques- Issues and challenges- Trust management in communication networks

UNIT-IV: E-Security Applications (12 Hours)

. E-services security- E-service basic concepts and roles - Basic technologies for e-services - Technical challenges and security. E-government security- E-government: concepts and practices- Authentication, Privacy in e-government- E-voting security- Engineering secured e-government- Monitoring e-government security- E-commerce security- Wireless LANs security

UNIT V: Cyber Crimes and Cyber Security (12 Hours)

Cyber Crime and Information Security – classifications of Cyber Crimes – Tools and Methods – Password Cracking, Keyloggers, Spywares, SQL Injection – Network Access Control – Cloud Security – Web Security – Wireless Security- Protecting against malware

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1.William Stallings, "Cryptography and Network Security - Principles and Practice", Seventh Edition, Pearson Education, 2017.

2. Security of e-Systems and Computer Networks - Cambridge University Press -Mohammad S. Obaidat and Moureddine A. Boudriga

3. Nina Godbole, Sunit Belapure, “Cyber Security: Understanding Cybercrimes, Computer Forensics and Legal Perspectives”, First Edition, Wiley India, 2011.

Unit	Book	Chapter	Sections
I	1and 2	1 and 2	All
II	2	**3**	All
III	2	4, 5 and 6	All
IV	2	7, 8 ,9 and 10	All
V	3	1	All

Books for Reference:

1. Behrouz A. Ferouzan, Debdeep Mukhopadhyay, "Cryptography and Network Security", 3rd Edition, Tata Mc Graw Hill, 2015.
2. 2. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies, "Security in Computing", Fifth Edition, Prentice Hall, New Delhi, 2015

Websites and eLearning Sources:

1. https://www.geeksforgeeks.org/cyber-security-tutorial/
2. https://www.cambridge.org/core/books/security-of-esystems-and-computer-networks/introduction-to-esecurity/D843F46307EC9B5A426EB762539EC802
3. https://www.tutorialspoint.com/e_commerce/e_commerce_security.htm
4. https://www.w3schools.com/cybersecurity/

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Understand the fundamentals of security, networks security architecture, threats and vulnerabilities	**K1**
CO2	Understand the fundamentals Authentication And Digital Signature	**K2**
CO3	Apply The Different Operations Of E-System And Network Security Tools	**K3**
CO4	Apply the various Authentication schemes to simulate different E-Security applications	**K4**
CO5	Understand various cybercrimes and cyber security	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**				**Hours/Week**				**Credits**
6	**25UEL63ES04B**		**Discipline Specific Elective - 4:** e-Security Systems				**4**				**3**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	3	3	2	2	2	3	2	3	2	**2.4**
CO2	3	2	2	3	3	2	3	2	3	3	**2.6**
CO3	2	3	3	2	2	3	3	3	2	2	**2.5**
CO4	3	2	3	2	2	2	3	3	3	3	**2.6**
CO5	3	2	3	2	3	2	3	3	3	3	**2.7**
										Mean Overall Score	**(2.56)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	**25UEL63EL01A**	Project Work and Viva Voce	**-**	**1**

Individual Project - Inhouse or Industry
Other than Class Hours

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	**25UEL63EL01B**	Industrial Visit	**-**	**1**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	**25UEL63EL01C**	Field Visit	**-**	**1**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UEL63CE01	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: Microprocessor, Microcontroller and Embedded System

UNIT-V: Power Electronics

Books for Study:
Respective course books

Books for Reference:
Respective course books

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UEL64OE02A	**Open Elective – 2:** CCTV and Smart Security Systems	4	2

Course Objectives
To outline CCTV and Smart Security Systems
To compose an end-to-end technical knowledge to execute CCTV installation.
To install and maintain CCTV and smart security systems
To synthesize technical and troubleshooting skills
To recommend Smart Security System in real time and to become Entrepreneurs

UNIT-I: Hardware Basics (12 Hours)

CCTV Camera - Cables - Network Cables Colour Coding - Connectors - Convertors - Splitters - Monitors - Storage Devices - Power Supply – DVR Camera Connections.

UNIT-II: Recorders (12 Hours)

DVR (DIGITAL VIDEO RECORDER) and NVR (Network Video Recorder) systems - Types - Function and Operation of DVR and NVR - Configuration of DVR and NVR systems - Troubleshooting Basic DVR and NVR Problems - Application Software - Difference between DVR and NVR - Ports of DVR and NVR

UNIT-III: CCTV Installation and Troubleshooting (12 Hours)

CCTV Installation - Camera, DVR, NVR and Monitor -Installation of IP Camera -Connect Single and Multi-Camera-Multiple DVR Adding with Networking -Network Cables Colour Coding - LAN Network Setup - Network Cables Colour Coding - WAN Setup - Modem Configuration for DVR and NVR- IP Camera - Installation of IP Camera - Mobile Phone Application for DVR and NVR- Remote Video Surveillance

UNIT-IV: Smart Security System (12 Hours)

Smart Homes – Controlling Smart Devices – Connectivity for Devices – Day in the Life of a Smart Home – Security Issues - Digital Voice Assistants – Functionality – Using IFTTT – Digital Voice Assistant Types- Google Assistants and Google Home: Setting Up -Device Setting – Using and Creating Routines – Linking Smart Home Devices – Managing Home Devices - Smart Lighting - Smart Security- AI camera

UNIT-V: Smart Home Automation Security (12 Hours)

The Concept of Security – Challenges in Home Automation Security – Various Home Automation Methodologies – Central Controller Based HAS – Bluetooth Based HAS – GSM Based HAS – SMS Based HAS – GBRS Based HAS – Internet Based HAS.

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Study Material Prepared by the Department.

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

Books for Reference:

1. Herman Kruegle (2007), *CCTV Surveillance* (2nd edition), Elsevier.
2. Thomas Hill (2019), *CCTV Handbook* (3rd Edition), Thomas Hill.
3. CCTV *Technology Handbook*, National Urban Security Technology Laboratory, New York.
4. Nick Vandome, *Smart Homes*, In Easy Steps Limited.

Websites and eLearning Sources:

1. https://www.safewise.com/home-security-faq/how-do-security-systems-work/
2. https://supremealarm.com/5-benefits-home-security-cameras/
3. https://en.wikipedia.org/wiki/Home_security

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	Outline and explain CCTV and Smart Security System	**K1**
CO2	Compose an end-to-end technical knowledge to execute CCTV installation.	**K2**
CO3	Install and maintain CCTV and smart security systems	**K3**
CO4	Synthesize technical and troubleshooting skills	**K4**
CO5	Design Smart Security System in real time and become entrepreneurs who can work with confidence	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours/Week**		**Credits**
6	**25UEL63OE02A**		**Open Elective – 2:** CCTV and Smart Security Systems						**4**		**2**
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	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	3	3	2	2	2	3	3	3	2	2	2.5
CO5	3	3	2	2	2	3	2	3	2	2	2.4
Mean Overall Score											**2.48 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
6	25UEL64OE02B	**Open Elective – 2:** Entrepreneurial Electronics	4	2

Course Objectives
To state the basics of electrical technology.
To explain the working principle of measuring instruments
To use electronics to become an entrepreneur
To distinguish passive and active components
To investigate and rate the use of electronics by the society

UNIT-I: Electrical Technology (12 Hours)

Introduction to Electricity – Alternating Current Based System - Single Phase - 3 Phases - DC Signal - DC Source – Fundamentals: Voltage, Current and Power - Power Factor – Passive Components.

UNIT-II: Measuring Instruments (12 Hours)

Introduction to Multimeter– Analog Multimeter– Digital Multimeter– Voltage Measurement – Current Measurement – Resistance Measurement – Cathode Ray Oscilloscope – Frequency Calculation - Function Generator – Calibration.

UNIT-III: Passive and Active Components (12 Hours)

Resistors – Types – Colour Code – Wattage – Tolerance – Capacitors – Types – Inductors – Transformer – Step-up and Step-down – Diode – Ratings – Operation – Transistor – NPN and PNP – Switching – Amplifier – Diode and Transistor Testing – MOSFET – Types – Testing MOSFET.

UNIT-IV: Servicing and Trouble Shooting (12 Hours)

Trouble Shooting Techniques – Soldering and De-Soldering Techniques – Pretreatment - Precautions during Soldering and De-soldering- DC Power Supply Troubleshooting - Single – Dual - Variable Voltage - Printed Circuit Board - Layout Drawing.

UNIT-V: Hobby Circuits (12 Hours)

Electronic Street Light Switch – Smart Emergency Light – Battery Charger with Automatic Switch-OFF-Relay Based Circuits – Opto-Coupler Based Circuits - 5V Regulated Power Supply

Teaching Methodology	Demo Videos, Review, PPT, Exercises, circuit simulation
Assessment method	Circuit design, written assignment, MCQ test, Open book test, snap test

Books for Study:

1. Study Material Prepared by the department

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

Books for Reference:

1. Robert D. Hisrich Veland Ramadani (2017), *Effective Entrepreneurial Management* (1st Edition), Springer.
2. Dhruv Nath and Sushanto Mitra (2020), *Funding Your Startup* (1st Edition), Penguin Portfolio.
3. Harpreet Grover and Vibhore Goyal (2020), *Let's Build a Company* (1st Edition), Penguin.

Websites and eLearning Sources:

1. https://www.engineersgarage.com/egblog/tips-and-business-ideas-for-electronicengineers-who-aspire-to-become-entrepreneurs/

2. https://www.ecs.soton.ac.uk/entrepreneurship
3. https://www.entrepreneur.com/article/269493

CO. No.	CO - Statements On successful completion of this course, students will be able to	Cognitive Level (K- level)
CO1	List the basics of electrical technology.	**K1**
CO2	Explain the working principle of measuring instruments	**K2**
CO3	Distinguish passive and active components	**K3**
CO4	Investigate and rate the use of electronics by the society	**K4**
CO5	Analyze and design hobby circuit and simple projects.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**					**Hours/Week**		**Credits**	
6	**25UEL64OE02B**		**Open Elective – 2:** Entrepreneurial Electronics					**4**		**2**	
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	2	2	3	3	2	2	2	2.4
CO2	3	3	2	2	2	3	3	2	2	2	2.4
CO3	3	3	2	2	2	3	3	2	2	2	2.4
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											**2.4 (High)**