B Sc COMPUTER SCIENCE

LOCF SYLLABUS 2025

Department of Computer Science

School of Computing Sciences

St. Joseph's College (Autonomous)

Tiruchirappalli - 620002, Tamil Nadu, India

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

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

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

The overarching objectives of these five schools are as follows:

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

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

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

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

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

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

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

Credit system

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

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

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

OUTCOME-BASED EDUCATION (OBE)

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

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

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

Here are some key aspects of Outcome-Based Education:

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

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

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

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

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

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

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

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

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

Some Important Terminologies

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Course Coding

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

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

Course Specific Initials

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

EVALUATION PATTERN
Continuous Internal Assessment

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

Passing minimum: 40 marks

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

Question Paper Blueprint for Mid and End Semester Tests

<table>
<tr><td colspan="4">Duration: 2 Hours</td><td colspan="4">Maximum Marks: 60</td></tr>
<tr><td colspan="2" rowspan="2">Section</td><td colspan="4">K levels</td><td rowspan="2">Marks</td></tr>
<tr><td>K1</td><td>K2</td><td>K3</td><td>K4</td><td>K5</td><td>K6</td></tr>
<tr><td colspan="2">A (compulsory)</td><td>7</td><td></td><td></td><td></td><td></td><td></td><td>7 × 1 = 7</td></tr>
<tr><td colspan="2">B (compulsory)</td><td></td><td>5</td><td></td><td></td><td></td><td></td><td>5 × 3 = 15</td></tr>
<tr><td colspan="2">C (either…or type)</td><td></td><td></td><td>3</td><td></td><td></td><td></td><td>3 × 6 = 18</td></tr>
<tr><td rowspan="4">D (2 out of 3)</td><td>For courses with K5 as the highest cognitive level, one K4 and one K5 question is compulsory.
(Note: two questions on K4 and one question on K5)</td><td></td><td></td><td></td><td>1</td><td>1*</td><td></td><td rowspan="4">2 × 10 = 20</td></tr>
<tr><td rowspan="3">For courses with K6 as the highest cognitive level: Mid Sem: two questions on K4 and one question on K5; End Sem: two questions on K5 and one question on K6)</td><td></td><td></td><td></td><td colspan="2">Mid Sem</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td colspan="2">End Sem</td></tr>
<tr><td></td><td></td><td></td><td>1</td><td>1</td><td>1*</td></tr>
<tr><td colspan="6"></td><td>Total</td><td>60</td></tr>
</table>

***** *Compulsory*

Question Paper Blueprint for Semester Examination

<table>
<tr><td colspan="3">Duration: 3 Hours</td><td colspan="3">Maximum Marks: 100</td></tr>
<tr><td rowspan="2">UNIT</td><td>Section A
(Compulsory)</td><td>Section B
(Compulsory)</td><td>Section C
(Either…or type)</td><td colspan="2">Section D
(3 out of 5)</td></tr>
<tr><td>K1</td><td>K2</td><td>K3</td><td>K4</td><td>K5</td></tr>
<tr><td>UNIT I</td><td>2</td><td>2</td><td>2</td><td rowspan="5">3*</td><td rowspan="5">2*</td></tr>
<tr><td>UNIT II</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>UNIT III</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>UNIT IV</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>UNIT V</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>Marks</td><td>10 × 1 = 10</td><td>10 × 3 = 30</td><td>5 × 6 = 30</td><td colspan="2">3 × 10 = 30</td></tr>
</table>

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

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

Title of the Course	CIA	Semester Examination	Total Marks
• One credit Core Course (Sem 1) • Skill Enhancement Course (NCC and Department Specific)	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
• Open Elective	100	100 *(CoE)*	100
• Project / Industrial Visit / Field Visit	100	-	100

Grading System

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

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

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

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

Where,

Ci - credit earned for the Course i

Gpi - Grade Point obtained for the Course i

Mi - Marks obtained for the Course i

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

WAM - Weighted Average Marks

Classification of Final Results

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

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

Table - 1: Grading of the Courses

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

Table - 2: Grading of the Final Performance

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

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

Vision

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

Mission

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

Programme Educational Objectives (PEOs)

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

Programme Outcomes (POs)

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

Programme Specific Objectives (PSOs)

After completing the BSc Computer Science Programme, the graduates will

6. acquire the required knowledge in the Hardware and Software aspects of Computer Science domain and the art of programming.
7. understand the development methodologies of software systems and the ability to analyse, design and develop computer applications for real life problems.
8. knowledge and skills to collaborate and communicate with peers for performance enhancement in IT / ITES industries.
9. ability to understand, adjust and adapt with the dynamic technical environment for the growth of IT industry.
10. capacity to transfer the skills gained, to provide innovative and novel solutions by maintaining ethical norms for the betterment of humane society.

B.Sc. Computer Science					
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	14	58	39
	1 - 6	Core Practical	7	21	14
	1 & 2	Allied Course	2	12	8
	1 & 2	Allied Practical	-	-	-
	3 & 4	Allied Optional	2	8	6
	3 & 4	Allied Optional Practical	1	4	2
	5 & 6	Discipline Specific Elective	4	16	12
	5	Internship	1	-	1
	6	Project	1	3	2
	6	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	**61**	**180**	**137 (15)**

B.Sc. COMPUTER SCIENCE 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	25UCS13CC01	**CC Major**	**Core Course - 1:** Problem Solving using C	5	4	100	100	100
		25UCS13CC02		**Core Course - 2:** Digital Computer Fundamentals	5	3	100	100	100
		25UCS13CP01		**Core Practical - 1:** Programming with C	3	2	100	100	100
		25UCS13AC01	**AC Minor**	**Allied Course – 1:** Numerical Methods	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	25UCS23CC03	**CC Major**	**Core Course - 3:** Python Programming	4	3	100	100	100
		25UCS23CC04		**Core Course - 4:** Data Structures and Algorithms	4	3	100	100	100
		25UCS23CP02		**Core Practical - 2:** Python Programming and Data Structures	3	2	100	100	100
		25UCS23AC02	**AC Minor**	**Allied Course - 2** Statistical Methods	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
		25UCS24SL01	**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	25UCS33CC05 (SSC/Q0501)	**CC Major**	**Core Course – 5:** Managing Work Environment	4	3	100	100	100
		25UCS33CC06		**Core Course – 6:** Relational Database Management Systems (Internship Embedded Course)	4	3	100	100	100
		25UCS33CP03		**Core Practical - 3:** Relational Database Management Systems	3	2	100	100	100
		25UCS33AO01A	**AO Minor**	**Allied Optional - 1**: Applied Physics - 1	4	3	100	100	100
		25UCS33AO01B		**Allied Optional - 1:** Principles of Electronics					
		@		**Allied Optional Practical:** Applied Physics	2	-	-	-	-
		@		**Allied Optional Practical:** Electronics					
	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 Ecnhancement 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 - Scientific Tamil (அறிவியல் தமிழ்)	4	3	100	100	100
		25UFR41GL04		Language French – 4					
		25UHI41GL04		Language Hindi – 4					
		25USA41GL04		Language Sanskrit - 4					
	II	25UEN42GE04B	**GE**	General English – 4: English for Science - 2	5	3	100	100	100
	III	25UCS43CC07	**CC Major**	**Core Course - 7:** Java Programming	4	3	100	100	100
		25UCS43CC08		**Core Course - 8:** Discrete Mathematics	4	3	100	100	100
		25UCS43CP04		**Core Practical - 4:** Java Programming	3	2	100	100	100
		25UCS43AO02A	**AO**	**Allied Optional - 2:** Applied Physics - 2	4	3	100	100	100

		25UCS43AO02B	**Minor**	**Allied Optional - 2:** Communication Electronics					
		25UCS43OP01A		**Allied Optional Practical:** Applied Physics	2	2	100	100	100
		25UCS43OP01B		**Allied Optional Practical:** Electronics					
	IV	25UHE44VE04A	**VE**	**Value Education – 4:** Social Ethics – 2*	2	1	50	50	50
		25UHE44VE04B		**Value Education – 4:** Religious Doctrine – 2*					
		25UNC44SE02 / 25UCS44SE02	**SEC**	**Skill Enhancement Course – 2:** NCC (Special Subject) / **Skill Ecnhancement Course – 2:** E-Services	2	1	100	-	100
		25UCS44SL03	**SL**	**Self Learning:** Web Ethics*	0	2	50	50	50
				Extra Credit Course	0	(3)			
				Total	**30**	**23 (3)**			
5	III	25UCS53CC09	**CC Major**	**Core Course - 9:** Operations Research	4	3	100	100	100
		25UCS53CC10		**Core Course - 10:** Web Application Development	4	2	100	100	100
		25UCS53CC11		**Core Course - 11:** Computer Architecture and Microprocessor (Internship Embedded Course)	4	2	100	100	100
		25UCS53CP05		**Core Practical - 5:** Web Application Development	3	2	100	100	100
		25UCS53CP06		**Core Practical - 6:** Hardware Lab	3	2	100	100	100
		25UCS53ES01A	**DSE**	**Discipline Specific Elective - 1:** Computer Networks	4	3	100	100	100
		25UCS53ES01B		**Discipline Specific Elective - 1:** Digital Marketing					
		25UCS53ES02A	**DSE**	**Discipline Specific Elective - 2:** Recent Trends in Computer Science	4	3	100	100	100
		25UCS53ES02B		**Discipline Specific Elective - 2:** Object-Oriented Modeling and Design with UML					
		25UCS53IS01	**IS**	Internship	0	1	100	-	100
	IV	25UCS54OE01	**OE**	**Open Elective - 1 (WS):** Web User Interface Design	4	2	100	100	100
		25UCS54SL04A	**SL**	**Certificate Course:** Data Analysis using Python and Spreadsheet	0	2	100	-	100
		25UCS54SL04B		**Certificate Course:** Data Analysis using Python					
		25UCS54SL04C		**Certificate Course:** Data Visualization Tools					
		25UCS54SL04D		**Certificate Course:** Programming Using XML					
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
6	III	25UCS63CC12	**CC Major**	**Core Course - 12:** Mobile Application Development using Android	4	3	100	100	100
		25UCS63CC13		**Core Course - 13:** Software Engineering	4	2	100	100	100
		25UCS63CC14		**Core Course - 14:** Operating Systems	4	2	100	100	100
		25UCS63CP07		**Core Practical - 7:** Mobile Application Development using Android	3	2	100	100	100
		25UCS63ES03A	**DSE**	**Discipline Specific Elective- 3:** Fundamentals of Data Science	4	3	100	100	100
		25UCS63ES03B		**Discipline Specific Elective- 3:** Cloud Computing					
		25UCS63ES04A	**DSE**	**Discipline Specific Elective - 4:** Internet of Things	4	3	100	100	100
		25UCS63ES04B		**Discipline Specific Elective - 4:** Big Data Analytics					
		25UCS63PW01	**PW**	Project Work and Viva Voce	3	2	100	100	100
		25UCS63EL01A	**EL**	Project / Industrial Visit / **Field Visit**	0	1	100	-	100
		25UCS63EL01B							
		25UCS63EL01C							
		25UCS63CE01	**CE**	Comprehensive Examination*	0	2	50	50	50
	IV	25UCS64OE02	**OE**	**Open Elective – 2:** Design Thinking	4	2	100	100	100
				Extra Credit Course	0	(3)			
				Total	**30**	**22 (3)**			
2-6	V	25UCW65OR01 25UCW65EC01	**OR** **EC**	Outreach Programme Co - Curricular & Extra Curricular Activities	-	4 1			
1-6				**TOTAL (6 semesters)**	**180**	**137 (15)**			

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

Open Elective - 1 (WS): 5th Semester

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

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

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

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

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

அலகு-1 **(12 மணி நேரம்)**

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

அலகு-2 **(12 மணி நேரம்)**

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

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

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

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

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

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

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

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

பாடநூல்:

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

Websites and eLearning Sources:

- https://www.tamilvu.org/library/nationalized/pdf/35-subbureddiyar/452-panjalisabatham.pdf
- https://www.annacentenarylibrary.org - https://shorturl.at/KWZx5

- *https://eluthu.com/kavithai*
- *https://www.tamilvu.org/courses/degree/p103/p1032/html/p1032614.htm*
- *https://kavithaivaasal.blogspot.com/2017/11/blog-post.html*

Course Outcomes

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and e-learning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and e-Learning Sources:

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

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

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

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	**25USA11GL01**	Language Sanskrit - I	**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 - I						**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 /Weeks	Credits
1	25UCS13CC01	**Core Course - 1:** Problem Solving using C	5	4

Course Objectives
To understand the basics of algorithms and flowchart techniques used in problem-solving
To learn to write, compile, and debug C programs effectively
To develop critical thinking on arrays, strings and problem-solving skills through functions programming exercises.
To implement programs using pointers and function pointers.
To explore multiple approaches to solving a single problem, comparing their advantages and disadvantages.

UNIT I: Algorithms and Flowcharts (15 Hours)

Algorithms - Flow charts - Developing algorithms and flowcharts for solving simple problems using sequential - selection and iterative programming Structures.

UNIT II: Basics of C (15 Hours)

History of C and its importance - Structure of a C program - Data Types - Constants and Variables - Operators and Expressions - Decision Making and Branching - Decision Making and Looping.

UNIT III: Arrays, Strings and Functions (15 Hours)

Arrays: One-Dimensional Arrays - Declaration of One-dimensional Arrays - Initialization of One-dimensional Arrays - Two- Dimensional Arrays - Initializing Two-Dimensional Arrays - Multi-Dimensional Arrays. Character Arrays and Strings: Declaring and Initializing String - Variables - Reading Strings from Terminal - Writing Strings to Screen - Arithmetic Operations on Characters - String- Handling Functions – User defined functions.

UNIT IV: Pointers (15 Hours)

Pointers: Pointer Expressions - Chain of Pointers -Pointers and Arrays - Array of Pointers - Pointers as function arguments - Functions returning Pointers - Pointers to Functions - Function pointer - Pointers and Structures.

UNIT V: Structures, Union and Files (15 Hours)

Structures: Defining a structure - Declaration of structure - Accessing Structures members - Array of Structures - Structures within structures - Structures and functions - Structures and Pointers - Union. Files: Opening and closing files - Operations on files.

Teaching Methodology	Lecture with Demonstration, Hands-on Coding Session, Problem-Solving, Case Study and Flipped Classroom.
Assessment Methods	Objective Test, Online Quiz, Coding Exercise and Assignment

Books for Study:

1. Jaiswal, S. (2009). *Information Technology Today*, (4th Ed.). Galgotia Publications.
   Unit I: *Chapter 20 (Pages CL-3* to *CL-26)*
2. Balagurusamy, E. (2016). *Programming in ANSI C*, (7th Ed.). Tata McGraw Hill.
   Unit II: *Chapter 1 (Sec: 1. 1-1.2, 1.8), Chapter 2 (Sec: 2.5 -2.7), Chapter 3, Chapter 5 and Chapter 6*
   Unit III: *Chapter 7, Chapter 8 (Sec: 8.2 - 8.8) and Chapter 9*
   Unit IV: *Chapter11*
   Unit V: *Chapter 10 and Chapter 12 (Sec: 12.1 - 12.4)*

Books for Reference:

1. Brian W. Kernighan and Dennis M. Ritchie (2023). *The C Programming Language.* PHI.
2. YashavantKanetkar (2010). *Let us C.* (10th Ed.). BPB Publications.
3. Karthikeyan, E (2008). *A Textbook on C Fundamentals, Data Structures and Problem Solving*. PHI.

Websites and eLearning Sources:

1. https://computersciencementor.com/algorithm-and-flowchart/
2. https://nios.ac.in/media/documents/vocational/cca/cca18.pdf
3. https://www.programiz.com/c-programming

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall basic concepts and definitions of C.	**K1**
CO2	Summarize the basic knowledge to develop C programs.	**K2**
CO3	Experiment with the modular programming and code reusability.	**K3**
CO4	Examine and explore the programming skills, enabling them to develop efficient and structured C programs.	**K4**
CO5	Apply and implement programs for solving real world problems.	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
1	**25UCS13CC01**		**Core Course - 1:** Problem Solving using C						**5**		**4**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	1	2	1	3	3	2	3	1	**2.1**
CO2	3	3	3	1	1	3	2	3	2	2	**2.3**
CO3	3	3	2	3	2	2	2	3	2	1	**2.3**
CO4	3	2	2	3	2	1	2	2	3	3	**2.3**
CO5	2	2	3	3	2	1	3	3	3	2	**2.4**
									Mean Overall Score		**2.28 (High)**

Semester	Course Code	Title of the Course	Hours / Weeks	Credits
1	25UCS13CC02	**Core Course - 2:** Digital Computer Fundamentals	5	3

Course Objectives
To learn about number systems, the Vedic number system and Complements
To focus on Boolean algebra, De Morgan's theorems, Karnaugh maps, and designing of Boolean expressions.
To acquire a comprehensive understanding of combinational logic Circuits
To understand the different types of latches and Flip flops
To know the fundamental concepts of memory and storage

UNIT I: Digital Principles and Number Systems codes: Digital Logic-Digital Operations Binary Number systems - Binary –to-decimal Conversion-Decimal-to-binary Conversion- Octal Numbers-Hexadecimal Numbers-The ASCII Code-The Excess-3 Code-The Gray code- Vedic binary number systems. Arithmetic Circuits: Binary addition, Binary subtraction- Unsigned Binary Numbers- Sign magnitude numbers – 2's complements Representations.

UNIT II: Digital Logic and Combinational Logic Circuit: The Basic Gates-NOT, OR, AND – Universal Logic Gates –NOR, NAND. Boolean Laws and Theorems - Sum – of - products Method – Truth Table to Karnaugh Map-Pairs – Quads – Octets - Karnaugh Simplifications - Don't-care Conditions - Product-of-sums Method – Product – of - sums Simplification.

UNIT III: Data Processing Circuits: Multiplexer –Demultiplexers -1-of- 16 Decoder-BCD- to-decimal Decoders-Encoders-Parity Generators and Checkers-Magnitude Comparator - Programmable Array Logic-Programmable Logic Array.

UNIT IV: Flip Flops, Registers and Counters: RS Flip Flop-D Flip flop – JK Flip Flop- JK Master slave Flip Flop. Registers: Type of Registers-Serial In Serial Out-Serial In Parallel Out- Parallel In Serial Out-Parallel in Parallel Out. Counters: Asynchronous
Counters-Synchronous Counters.

UNIT V: Memory: Basic Terms and Ideas - Magnetic Memory- Optical Memory - Memory Addressing – ROM – ROM - EPROM's – RAM – Sequential Programmable Logic Devices - Content Addressable Memory.

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

Books for Study:

1. Donald P Leach, Albert Paul Malvino and Gautam Saha, "**Digital Principles and Applications", seventh Edition.**

Unit I: *Chapter1[1.3,1.5]*
Chapter 5[5.1,5.2,5.3,5.4,5.5,5.6,5.7,5.8,]
Chapter 6[6.1,6.2,6.3,6.4,6.5]
Unit II: *Chapter 2[2.1,2.2]*
Chapter 3[3.1,3.2,3.3,3.4,3.5,3.6,3.7,3.8]
Unit III: *Chapter 4[4.1,4.2,4.3,4.4,4.6,4.8,4.9,4.11,4.12]*
Unit IV: *Chapter 8[8.1,8.3,8.4,8.5,8.8]*
Chapter 9[9.1-9.5]
Chapter 10[10.1,10.3]
Unit V: *Chapter 13[13.1-13.8]*

Books for Reference:

1. Malvino, Paul Albert and Leach, Donald P, "Digital Principles and Applications", 4 th Edition, TMH, 2000.
2. Malvino, Paul Albert and Leach, Donald P, "Digital Computer Fundamentals", 3 rd Edition, TMH, 1995.
3. Bartee, Thomas C, "Digital Computer Fundamentals", 6th Edition, TMH, 1995.

Websites and eLearning Sources:

1. https://byjus.com/maths/addition/
2. nstavm.org/wp-content/uploads/2021/05/M14.pdf
3. www.newsbharathi.com

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the fundamentals of combinational circuits, number systems, Boolean algebra, digital circuits, and memory systems.	**K1**
CO2	Understand the working principles of Boolean algebra, digital circuits and memory systems.	**K2**
CO3	Apply the concept of logic gates to combinational circuits, registers and digital circuits.	**K3**
CO4	Analyze the logic of different digital circuits and memory systems	**K4**
CO5	Evaluate the operations of logic gates, registers within memory systems.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
1	**25UCS13CC02**			**Core Course - 2:** Digital Computer Fundamentals					**5**	**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	1	2	1	2	1	2	2	2	2	3	**2**
CO2	2	3	2	2	2	2	1	2	2	2	**2.1**
CO3	3	2	2	2	2	1	1	1	1	2	**2**
CO4	3	2	2	3	3	3	3	3	3	3	**2.8**
CO5	2	3	2	2	2	3	3	3	2	2	**2.4**
Mean Overall Score											**2.26 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
1	25UCS13CP01	**Core Practical - 1:** Programming with C	3	2

List of Exercises

1. Simple Programs using Operators
2. Branching structures
3. Looping structures
4. Arrays
5. Strings
6. Functions
7. Pointers
8. Structures and Union
9. File operations
10. Sequential File and Random Access File

Semester	Course Code	Title of the Course	Hours/Week	Credits
1	25UCS13AC01	**Allied Course - 1:** Numerical Methods	6	4

Course Objectives
To introduce the various topics in Numerical methods.
To make understand the fundamentals of algebraic equations
To apply interpolation and approximation on examples
To solve problems using numerical differentiation and integration
To solve linear systems, numerical solution of ordinary differential equations

UNIT I **(18 Hours)**

Solution of algebraic and transcendental equations-Bisection method - Method of successive Approximations or iteration method -The method of False Position- Newton Raphson

UNIT II **(18 Hours)**

Simultaneous linear algebraic equations - Gauss elimination method - Gauss Jordan method Iterative methods - Gauss Jacobi method - Gauss Seidel method.

UNIT III **(18 Hours)**

Interpolation with equal intervals - Newton's forward and backward difference formulae - Approximation of derivatives using interpolation polynomials- Interpolation with unequal intervals - Divided differences- Newton's divided interpolation formula for unequal intervals - Lagrange's interpolation.

UNIT IV **(18 Hours)**

Numerical integration - Trapezoidal rule - Romberg's Method - Simpson's 1/3 -Single step methods - Taylor's series method

UNIT V **(18 Hours)**

Euler's method - Modified Euler's method – Runge Kutta method for solving equations - Milne's Predictor Corrector formulae.

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

Books for Study:

1. Venkataraman, M. K. (2000). *Numerical Methods in Science and Engineering*, (5th Ed.). National Publishing Company.
   Unit I: Chapter 3 (Sec: 2, 3,4,5)
   Unit II: Chapter 4 (Sec: 2, 6)
   Unit III: Chapter 6 (Sec: 3, 4), Chapter 8 (Sec:1,3, 4)
   Unit IV: Chapter 9 (Sec: 7, 8, 9, 10), Chapter 11 (Sec 6)
   Unit V: Chapter 11 (Sec 10, 12, 13,20)

Books for Reference:

1. Singaravelu, A. (1992). Numerical methods. Meenakshi Publications
2. Kandasamy, P., Thilagavathy, K., & Gunavathi, K. (2008). Numerical methods. S. Chand & Company Ltd.
3. Jain, M. K., Iyengar, S. R. K., & Jain, R. K. (2007). Numerical methods for scientific and engineering computation. New Age Pvt. Publishers.

Websites and eLearning Sources:

1. https://onlinecourses.nptel.ac.in/noc23_ma94/preview

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Acquire the knowledge on various problems on numerical methods	**K1**
CO2	Understand to solve numerical related problems.	**K2**
CO3	Apply appropriate numerical methods to solve the given problems and evaluate their solutions	**K3**
CO4	Analyze the best approximated value of the root of the given function using various numerical methods.	**K4**
CO5	Evaluate various numerical problems using of ordinary differential equations and integration	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
1	**25UCS13AC01**		**Allied Course - 1:** Numerical Methods							**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

Book for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

அலகு-1 **(12 மணி நேரம்)**

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

அலகு-2 **(12 மணி நேரம்)**

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

அலகு-3 **(12 மணி நேரம்)**

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

அலகு-4 **(12 மணி நேரம்)**

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

அலகு-5 **(12 மணி நேரம்)**

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

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

பாடநூல்கள்:

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

Websites and eLearning Sources:

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

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

Course Outcomes

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and e-Learning Sources:

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

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

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

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

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

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

UNIT I **(12 Hours)**

Asmathi usmath tat kim (MFN) sarva naama sabdaha

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

Lang lakaarah Kriyapadaani Prayoga Vivaranam

UNIT IV **(12 Hours)**

Raguvamsaha Pratama sargaha (1 –15 slokas)

UNIT V **(12 Hours)**

Suvacanani Vakya Prayoga Vivaranam

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

Books for Study:

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

Books for Reference:

1. Paindrapuram Ashram, Srirangam – 620 006 Gopalavimshanthi 2021
2. R.S. Vadhyar & Sons book – Seller and Publishers, Kalpathi, Palghat – 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**	**2**
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/Weeks	Credits
2	25UCS23CC03	**Core Course - 3:** Python Programming	4	3

Course Objectives
To introduce the fundamentals of Python programming, including syntax, data types, operators, expressions, and control structures.
To develop problem-solving skills using arrays, functions, recursion, and string operations.
To understand and implement data structures such as lists, tuples, sets, and dictionaries in Python.
To gain proficiency in file handling and object-oriented programming concepts like classes, objects, and encapsulation.
To explore the concepts such as inheritance, polymorphism, and operator overloading for efficient code development.

UNIT I: Fundamentals of Python (12 Hours)

Basics of Python Programming: History of Python - Features of Python - Literal - Constants - Variables - Identifiers - Keywords - Built - in Data Types - Statements - Input Statements - Comments - Indentation - Operators - Expressions - Type conversions. Python Arrays: Defining and Processing Arrays - Array methods. Control Statements: Selection/Conditional Branching statements - Iterative Statements - Jump Statements.

UNIT II: Functions, Strings and Modules in Python (12 Hours)

Functions: Function Definition - Function Call - Variable Scope and its Lifetime - Return Statement. Function Arguments: Required Arguments - Keyword Arguments - Default Arguments, and Variable Length Arguments - Recursion. Python Strings: String operations - Immutable Strings - Built-in String Methods and Functions - String Comparison. Modules: import statement - The Python module – dir () function - Modules and Namespace - Defining modules.

UNIT III: Data Structures in Python (12 Hours)

Lists: Creating a list - Access values in Lists - Updating values in Lists - Nested lists - Basic list operations - List Methods. Tuples: Creating - Accessing - Updating and Deleting Elements in a tuple - Nested tuples - Difference between lists and tuples. Sets: Creating a Set - Set Comprehension. Dictionaries: Creating - Accessing - Updating and Deleting Elements in a Dictionary - Dictionary Functions and Methods - Difference between Lists and Dictionaries.

UNIT IV: File Handling & Classes and Objects (12 Hours)

Files: Types of files in Python - Opening and closing files - Reading and Writing files: write () and write lines () methods, read () and read lines () methods - with keyword. Classes and Objects: Defining Classes - Creating Objects - Data Abstraction and hiding through Classes -in it method -del method - public and private data and methods.

UNIT V: Inheritance & Polymorphism (12 Hours)

Inheriting classes in Python - Types of Inheritance- Operator overloading - Concepts - Implementation - Overriding in operator.

Teaching Methodology	Lecture with Demonstrations, Hands-on Coding Sessions, Problem-Solving, Case Studies, Group Activities, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Quiz, Coding Exercise, Assignment and Worksheet.

Books for Study:

1. Thareja, R. (2017). *Python programming using problem solving approach*, (1st Ed.). Oxford University Press.
   Unit I -*Chapter 3 and Chapter 4*
   Unit II-*Chapter 5 and Chapter 6*
   Unit III-*Chapter 8*
   Unit IV-*Chapter 7 and Chapter 9*
   Unit V-*Chapter 10 and Chapter 11*

Books for Reference:

1. Kurama, V. (2018). *Python programming: A modern approach.* Pearson Education.
2. Lambert, K. A. (2017). *Fundamentals of Python - First programs.* Cengage Publication.
3. Rao, N. R. (2017). *Core Python programming,* (1st Ed.). Dream tech Publishers.

Websites and eLearning Sources:

1. **Python Tutorial (OER)**: https://www.w3schools.com/python/
2. **Python.org - Official Python Documentation (OER)**: https://docs.python.org/3/tutorial/index.html
3. **Kaggle- Python Course (OER)**: https://www.kaggle.com/learn/python
4. **Coursera- Python for Everybody**: https://www.coursera.org/specializations/python
5. **GeeksforGeeks- Python Programming**: https://www.geeksforgeeks.org/python-programming-language/
6. **edX- Introduction to Python Programming**: https://www.edx.org/course/introduction-to-python-programming

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall fundamental programming concepts and write simple Python programs.	**K1**
CO2	Recognize key programming concepts and implement them using Python.	**K2**
CO3	Apply different programming constructs to handle data and perform various operations.	**K3**
CO4	Analyze modular and reusable code by implementing functions and object-oriented principles.	**K4**
CO5	Develop problem-solving skills by designing and optimizing programs for real-world applications.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UCS23CC03**			**Core Course - 3:** Python Programming						**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	1	3	3	3	2	3	2	3	**2.5**
CO2	3	2	1	3	3	3	3	2	3	2	**2.5**
CO3	3	2	2	3	2	2	2	2	3	3	**2.4**
CO4	2	2	3	1	3	2	3	2	3	2	**2.3**
CO5	2	3	2	2	2	3	2	3	2	3	**2.4**
Mean Overall Score											**2.42 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
2	25UCS23CC04	**Core Course - 4:** Data Structures and Algorithms	4	3

Course Objectives
To understand the fundamentals of Arrays and linked lists
To explore and the practical implementation of Stack and Queue structures
To learn basic terminology and Traversal techniques of a Tree
To explore and manipulate various sorting and searching techniques
To learn the algorithm design principles and problem solving strategies

UNIT I: Arrays and Linked Lists (12 Hours)

Arrays: Definition - Terminology - One dimensional array - Multi dimensional arrays. Linked lists: Definition - Circular linked lists - Double linked lists - Circular double linked lists.

UNIT II: Stacks and Queues (12 Hours)

Stacks: Definition - Representation of a Stack - operations on Stacks - Evaluation of Arithmetic expressions. Queues: Definition -Representation of Queues - Various Queue structures.

UNIT III: Tree (12 Hours)

Trees: Basic terminologies - Definition and concepts - Representation of Binary tree - Binary tree traversals.

UNIT IV: Sorting and Searching (12 Hours)

Computer Sorting: Terminologies -Techniques -Bubble sort -Insertion sort - Quick sort - Radix sort - Searching -Terminologies - Linear search with arrays -Binary Search.

UNIT V: Algorithm Design Methods (12 Hours)

Algorithms - Basic Steps. Algorithm Design Methods: Sub goals - Hill Climbing - Working Backward - Heuristics - Backtrack Programming - Recursion.

Teaching Methodology	Lecture with Demonstration, Problem-Solving, Case Study, Group Activity, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Quiz, Coding Exercise, Assignment and real-time project

Books for Study:

1. Samanta, D. (2019). *Classic Data Structures*. (2nd Ed.). PHI Learning.
   Unit I -*Chapter 2, Chapter 3*
   Unit II-*Chapter 4, Chapter 5*
   Unit III -*Chapter 7*
   Unit IV-*Chapter 10, Chapter 11*
2. Goodman, S.E., & Hedetniemi, S.T. (2017). *Introduction to the Design and Analysis of Algorithms*. McGraw-Hill, International edition.
   Unit V-*Chapter 1, Chapter 3, Chapter 5*

Books for Reference:

1. Robert Sedgewick and Kevin Wayne. (2011) *Algorithms*, Addison-Wesley Professional.
2. Horowitz. E. & Sahni, S. (2008) *Fundamentals of Data Structures*. Galgotia Publications.
3. Steven S. Skiena (2008). *The Algorithm Design Manual*, Springer.

Websites and eLearning Sources:

1. https://www.geeksforgeeks.org/data-structures/
2. https://www.codechef.com/certification/data-structures-and-algorithms/prepare
3. https://github.com/tayllan/awesome-algorithms

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K- Level)**
	On successful completion of this course, students will be able to	
CO1	Recall basic concepts of data structures, algorithms and their applications.	**K1**
CO2	Understand the operations of various data structures such as arrays, linked lists, stacks and queues.	**K2**
CO3	Apply suitable data structures and algorithms to solve real world computational problems.	**K3**
CO4	Analyze the types of data structures and complexity of algorithms for optimization.	**K4**
CO5	Evaluate and compare different searching, sorting algorithms to determine the most suitable solution.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
2	**25UCS23CC04**			**Core Course - 4:** Data Structures and Algorithms					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	2	3	3	2	1	2	**2.2**
CO2	3	3	2	2	2	3	3	3	2	2	**2.5**
CO3	2	3	3	2	2	2	3	3	2	2	**2.4**
CO4	3	3	3	1	3	3	3	3	1	2	**2.5**
CO5	2	3	3	2	2	3	3	3	3	1	**2.5**
										Mean Overall Score	**2.42(High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
2	**25UCS23CP02**	**Core Practical - 2:** Python Programming and Data Structures	**3**	**2**

List of Exercises

Python Programming

1. Basics of Python: Variables, Constants, I/O Statements, Operators
2. Control Flow: Conditional Statements, Loops and Jump Statements
3. Functions and Modular Programming: Functions and Recursion, Modules
4. Data Structures in Python: Lists, Tuples, Dictionaries, Sets, Strings, Arrays
5. File Handling: Reading and Writing Files, Managing File Operations
6. OOPs Concepts: Class, Objects, Abstraction, Inheritance, Polymorphism

Data Structures

7. Stack
8. Queue
9. Linked List
10. Binary Tree

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
2	25UCS23AC02	**Allied Course - 2:** Statistical Methods	6	4

Course Objectives
To make students understand the concepts of probability, statistical measures and theoretical Distributions.
To apply probability and statistical measures concepts in real life problems.
To impart knowledge on coefficient of skewness and coefficient of correlation.
To interpret the relationship between variables.
To apply the theoretical distributions and discuss the expected results in real life problems.

UNIT I: Measures of Central Tendency (average) (18 Hours)

Arithmetic mean: Discrete series, Continuous series - Open end classes - Median: Discrete series, Continuous series - Quartiles - Mode: Discrete series, Continuous series

UNIT II: Dispersion and skewness (18 Hours)

Concept of Variation - Methods of Measuring Dispersion: Range, Inter quartile range, Mean deviation, Standard deviation - Mean deviation: Individual series, Discrete series, Continuous series – Standard deviation: Individual series, Discrete series, Continuous series - Coefficient of variation - Skewness - Relative measure of skewness: Karl Pearson's coefficient of skewness

UNIT III: Correlation and regression (18 Hours)

Correlation - Properties of coefficient of correlation - Karl Pearson's coefficient of correlation – Rank correlation coefficient - Regression: Regression of Y on X - Deviation taken from arithmetic mean of X on Y - Deviation Taken from assumed mean.

UNIT IV: Probability (18 Hours)

Mathematical Preliminaries - Permutation and Combination - Measurement of Probability – Bayes Theorem.

UNIT V: Theoretical distribution (18 Hours)

Binominal distribution: Properties of Binominal distribution - Fitting a Binominal distribution - Poisson distribution: Fitting a Poisson distribution - Normal distribution.

Note: No derivations problems only.

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

Books for Study:

1. Pillai, R. S. N. & Bagavathi. (2009). Statistics Theory and Practice. (7th Ed.). S. Chand and Company Ltd.
   Unit I: Chapter 9 (Pages 125-134,136-139,145-154,156-159, 166-172).
   Unit II: Chapter 10 (Pages 241-268, 278-290), Chapter 11 (Pages 338-347)
   Unit III: Chapter 12 (Pages 396-410,415-420), Chapter 13 (Pages 465-472,479-480)
   Unit IV: Chapter 18 (Pages 726-759)
   Unit V: Chapter 19 (Pages 769-800)

Books for Reference:

1. 1. Gupta, S. C. & Kapoor, V. K. (2002). Fundamentals of Mathematical Statistics. (11th Ed.). Sultan Chand & Sons.
2. Gupta, S. P. (2005). Statistical method. (33rd Ed.). Sultan Chand & Sons.
3. Vittal, P. R. (2004). Mathematical Statistics. Margham Publications.
4. Kapur, J. N. & Saxena, H. C. (2010). Mathematical Statistics., (20th Ed.). S. Chand & Co Ltd.

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire knowledge of probability and statistical methods, theoretical distributions.	**K1**
CO2	Understand the fundamental concepts of measures of central tendency, dispersion, correlation and theoretical distributions	**K2**
CO3	Construct appropriate mathematical model to solve a variety of practical problems.	**K3**
CO4	Accurate and efficient use of different methods such as measures of central tendency, dispersion, correlation and theoretical distributions	**K4**
CO5	Demonstrate the competency in solving problems related to probability and statistics.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
2	**25UCS23AC02**			**Allied Course - 2:** Statistical Methods						**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	2	2	1	3	3	2	2	3	**2.2**
CO2	2	3	2	1	2	3	3	2	2	3	**2.3**
CO3	1	2	3	3	3	2	3	2	3	2	**2.3**
CO4	1	2	2	2	1	2	3	2	2	3	**2.1**
CO5	1	2	2	2	3	1	3	2	2	3	**2.1**
										Mean Overall Score	**2.2 (High)**

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

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

UNIT I: Introduction to Environmental Studies (6 Hours)

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

UNIT II: Natural Resources (6 Hours)

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

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

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

UNIT IV: Environmental Pollution (6 Hours)

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

UNIT V: Environmental Organizations and Treatise (6 Hours)

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources

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

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

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

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

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

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

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

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

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

UNIT III: India and Human Rights (6 Hours)

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

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

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

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

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

அலகு – 1 : **(12 மணி நேரம்)**

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

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

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

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

அலகு – 2 : **(12 மணி நேரம்)**

சிறுபாணாற்றுப்படை

இலக்கணம் - யாப்பு

அலகு – 3 : **(12 மணி நேரம்)**

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

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

இலக்கிய வரலாறு: சங்க இலக்கியங்கள், சங்க இலக்கியங்களின் தனித்தன்மைகள்

அலகு – 4 : **(12 மணி நேரம்)**

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

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

இலக்கிய வரலாறு: பதினெண்கீழ்க்கணக்கு நூல்கள்

அலகு – 5 : **(12 மணி நேரம்)**

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

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

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

இலக்கணம் - அணி

நாடகம் - விந்தனின் வாழப்பிறந்தவன்

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

பாடநூல்:

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

பார்வை நூல்கள்:

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

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT – I **(12 Hours)**

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

UNIT – II **(12 Hours)**

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

UNIT – III **(12 Hours)**

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

UNIT – IV **(12 Hours)**

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

UNIT – V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(12 Hours)**

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

UNIT II **(12 Hours)**

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

UNIT III **(12 Hours)**

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

UNIT IV **(12 Hours)**

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

UNIT V **(12 Hours)**

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

1. https://www.hindwi.org/poets/jaishankar-prasad/all
2. https://youtu.be/e9wK-pYfVPc
3. https://www.amarujala.com/kavya/sahitya/sumitranandan-pant-best-hindi-poems

4. https://mycoaching.in/samuchchay-bodhak-kya-hai
5. https://www.subhshiv.in/2021/06/avikari-shabd.html

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

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

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

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

UNIT I **(12 Hours)**

Ramodantam, Balakandam (1-15 verses)

UNIT II **(12 Hours)**

Ramodantam, Balakandam (15-30 verses)

UNIT III **(12 Hours)**

Vedas – Vedangas vivaranam

UNIT IV **(12 Hours)**

Asta dasha Purana and Dashopanishads

UNIT V **(12 Hours)**

Upasargas and Bhavishyat Kaalah Vakya Prayoga

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

Books for Study:

1. VEDIC LITERATURE
2. RAMODANTAM

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

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

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

UNIT II: Life After Death (15 Hours)

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

UNIT III: In Communion with Nature (15 Hours)

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

UNIT IV: Mystery of Venus (15 Hours)

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

UNIT V: Think Before You Trash (15 Hours)

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

* Speaking Components are meant only for internal tests

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

Books for Study:

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

Books for Reference:

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

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

Websites and eLearning Sources:

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

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

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

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
3	25UCS33CC05 (SSC/Q0501)	**Core Course – 5:** Managing Work Environment	4	3

Course Objectives
To understand the elements of the business environment and their impact on organizations.
To explore the foundations of organizational behaviour
To examine learning theories and motivation concepts that influence workplace behaviour.
To analyse leadership, organizational culture, work stress, change, and development.
To develop strategic thinking through strategic intent, vision, mission, goals, and SWOT analysis.

UNIT I: Business Environment (12 Hours)

Elements of Business Environment: Nature and factors in business environment – Elements of economic environment – Political and legal environment – Socio-cultural environment.

UNIT II: Foundations of Organizational Behaviour (12 Hours)

Nature and functions of organizational behaviour – Individual dimensions: Nature of human behaviour – Personality: Meaning and theories – Values, attitudes, and job satisfaction – Perception process.

UNIT III: Learning and Motivation (12 Hours)

Foundations of learning: Learning process – Theories of learning. Motivation: Content theories of motivation (brief discussion) – Process theories of motivation.

UNIT IV: Organizational Dimensions (12 Hours)

Leadership – Organizational culture – Work stress – Organizational change – Organizational development.

UNIT V: SWOT Analysis and Strategic Intent (12 Hours)

Hierarchy of strategic intent: Strategic intent, vision, mission, business definition, goals, and objectives – SWOT analysis: Environmental appraisal and organizational appraisal.

Teaching Methodology	Lecture with Demonstrations, Problem–Solving, Group Activities, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Quiz, Problem Solving and Assignment

Books for Reference:

1. McShane, S., Glinow, M.A.V., &Rai, H., (2023) *Organizational Behavior*, (9th Ed). Tata McGraw-Hill.
2. Prasad L.M., (2010). *Organisational Behaviour*, (1st Ed). Himalaya Publishing House.

Websites and eLearning Sources:

1. https://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/swot-analysis/main
2. https://hbr.org/topic/subject/leadership
3. https://ebooks.inflibnet.ac.in/mgmtp13/chapter/learning-concept-and-theories/

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K–Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the impact of business environment factors on organizations.	**K1**
CO2	Understand theories of learning and motivation in practical settings	**K2**
CO3	Apply learning and motivation theories to improve performance.	**K3**
CO4	Analyse leadership, culture, stress, and organizational change.	**K4**
CO5	Evaluate appraisal and develop strategic plans.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UCS33CC05 (SSC/Q0501)**			**Core Course – 5:** Managing Work Environment						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	2	3	3	2	1	2	**2.2**
CO2	3	3	2	2	2	2	3	2	2	2	**2.3**
CO3	2	3	3	2	2	2	2	3	2	2	**2.3**
CO4	3	2	3	1	3	3	3	3	1	2	**2.4**
CO5	2	3	3	2	2	3	3	3	3	1	**2.5**
Mean Overall Score											**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
3	**25UCS33CC06**	**Core Course – 6:** Relational Database Management Systems (Internship Embedded Course)	**4**	**3**

Course Objectives
To understand the concepts of Database systems and their Models.
To improve the database design by applying normalization concepts
To impart knowledge of SQL and T-SQL concepts.
To develop simple PL/SQL programs.
To familiarize with concurrency and security features

UNIT I: Database System and Data Models (12 Hours)

Flat File - Database System - Database - Actionable for DBA. The Entity-Relationship Model: The Entity Relationship Model. Data Models: Relational Approach.

UNIT II: Normalization (12 Hours)

Normalization - Definition of Functional Dependence (FD) - Normal Forms: 1NF - 2NF - 3NF and BCNF- 4NF- 5NF.

UNIT III: Structured Query Language (12 Hours)

Structured Query Language: Features of SQL - Select SQL Operations - Grouping the Output of the Query - Querying from Multiple Tables - Retrieval Using Set operators - Nested Queries. T-SQL.

UNIT IV: PL/SQL (12 Hours)

Procedural Language-SQL: PL/SQL Block Structure - PL/SQL Tables. Cursor Management and Advanced PL/SQL: Opening and Closing a Cursor - Processing Explicit Cursor - Implicit Cursor - Exception Handlers - Sub Programs - Functions - Precaution While Using PL/SQL Functions - Stored Procedure - DB Triggers.

UNIT V: Concurrency Control and Security (12 Hours)

Concurrency Control and Automatic Recovery: Row Level Locks - Automatic Recovery and Backup - Backup Techniques - Advance Backup Techniques. Security Features Built in RDBMS: Accessing Database Server - Accessing Database and Defining Roles - Fixed Roles - User Defined Database Role - Granting, Revoking and Denying Permissions - Grant Access on Columns - Creating a User-Defined Role - Adding and Removing Passwords from a Role - Defining and Changing Mutual Exclusivity of Roles - Defining and Changing a Role Hierarchy.

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

Books for Study:

1.Narang, N. (2010). *Database Management Systems*, (2nd Ed.). PHI Learning.
UNIT I-*Chapter* 1, *Chapter* 2 and *Chapter* 3 (Pages: 39-41)
UNIT II-*Chapter* 7(Pages: 92-114)
UNIT III-*Chapter* 8(Pages: 115-147), *Chapter* 9(Pages: 148-177)
UNIT IV-*Chapter* 10(Pages: 178-190), *Chapter 1*1 (Pages: 191-222)
UNIT V-*Chapter* 18 (Pages: 338-345), *Chapter* 19(Pages: 351-357), *Chapter* 20(Pages: 367-369)

Books for Reference:

1. Prof. Sachin (2019). *Principles of Database Management System*. Book Bazooka Publications.
2. Silberschatz, A., Korth, H.F., &Sudharshan, S. (2019). *Database System Concepts*, (6th Ed.). McGraw Hill International.
3. Date, C. J. (2000). *An Introduction to Database Systems*. Addison Wesley.

Websites and eLearning Sources:

1. https://onlinecourses.nptel.ac.in/noc22_cs91/preview
2. https://www.coursera.org/courses?query=database%20management
1. https://en.wikipedia.org/wiki/Database

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall fundamental database concepts, data models, normalization techniques, SQL commands, PL/SQL concepts, concurrency control mechanisms and security features.	**K1**
CO2	Demonstrate an understanding of relational database design, query execution in SQL, functional elements of PL/SQL, transaction management, and database principles.	**K2**
CO3	Implement structured queries, PL/SQL programs, database normalization techniques and security policies to manage and optimize relational databases.	**K3**
CO4	Examine database structures, transaction control strategies and security mechanisms to identify potential improvements in data management and integrity.	**K4**
CO5	Assess the efficiency of database design, SQL based applications, transaction control measures and security protocols to enhance overall performance of the database systems	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
3	**25UCS33CC06**			**Core Course – 6:** Relational Database Management Systems (Internship Embedded Course)					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	1	3	3	2	3	2	**2.6**
CO2	3	2	3	3	2	2	3	2	3	2	**2.5**
CO3	3	3	3	3	1	3	3	3	2	1	**2.5**
CO4	3	2	3	3	1	2	2	3	3	1	**2.3**
CO5	3	3	3	2	1	3	3	2	2	1	**2.3**
Mean Overall Score											**2.44 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
3	**25UCS33CP03**	**Core Practical - 3:** Relational Database Management Systems	**3**	**2**

List of Exercises

SQL

1. DDL commands
2. DML commands
3. SQL Functions: Single Row Functions & Group Functions
4. Set operations, Join operations
5. Nested Queries
6. Creation and manipulation of Views.

PL/SQL

7. PL/SQL- block
8. Cursors
9. Functions & Procedures
10. Triggers and Packages

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UCS33AO01A	**Allied Optional - 1:** Applied Physics - 1	4	3

Course Objectives
To recall the basic concepts of electrostatics, electromagnetic induction, laser and fiber Optic communication.
To understand the importance of coulomb's law and its application in electrostatics.
To explore the concept of electromagnetic induction using Faraday's and Lenz's laws.
To compare the different types of magnetic materials and their properties.
To categorize the different types of LASER and Optical Fibres used for various applications.

UNIT I: Electrostatics (12 Hours)

Electric charge: Its elemental unit, its quantization and conservation - point charges and charges at rest - charge distributions - Coulomb's law - Electric Field - Electric dipole: Dipole moment - Electric field due to a dipole - Lines of force - lines of force of the electric field of a point charge - current - direction of a current - current density - equation of continuity - electromotive force - resistance - Ohm's law - electrical resistivity - combination of resistances - star delta transformation - Definition of electrostatic potential - potential difference - potential due to a point charge - Potentiometer - uses of potentiometer.

UNIT II: Electromagnetic Induction (12 Hours)

Biot and Savart law and its application - field on the axis of the coil - magnetic field due to a solenoid - characteristics of the magnetic field of a solenoid - force on a moving charged particle in a magnetic field definition of B - Lorentz force - magnetic field intensity - Hall effect - Electromagnetic induction - faraday's law - Lenz's law - Fleming right hand rule - induced current and charge - self-induction of a long straight solenoid - mutual inductance.

UNIT III: Magnetic Properties and Magnetic Circuits (12 Hours)

Magnetization - Magnetic susceptibility and relative permeability - classification of magnetic materials - properties - energy loss due to hysteresis - magnetomotive force - the value of the reluctance - comparison of electric and magnetic circuits - Applications of the concepts of magnetic circuits.

UNIT IV: Lasers and Holography (12 Hours)

Properties - Induced absorption, spontaneous emission and stimulated emission - Principle of Laser -pumping - Ruby Laser - He-Ne Laser- Semiconductor Laser - Carbon di oxide Laser - Free electron Laser - Applications of Laser - Holography - Principle - Applications of Holography.

UNIT V: Fibre Optics (12 Hours)

Fibre construction - light propagation in fibre - Communication system - advantages - Graded index fibre - single mode fibres - fibre optic sensor - fibre materials - single mode fibres - multimode step index fibres - multimode graded index fibre - comparison - plastic clad fibres - all plastic fibres - Optical fibres as an optical wave guide - propagation modes in single mode fibres - monomode and multimode step index fibres - attenuation on optical fibres - Analog and Digital fibre communication system.

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

Books for Study:

1. Sehgal, D.L., Chopra, K.L., & Sehgal N.K. (2004). *Electricity and Magnetism,* (6th Ed.). Sultan Chand & Sons.
2. Murugeshan, R., & Sivaprasath, K., (2016). *Optics and Spectroscopy,* (9th Ed.). S. Chand & Company Ltd.

Books for Reference:

1. Tewari, K.K. (2003). *Electricity and magnetism*. S. Chand & Co Ltd.
2. Griffiths, D.J. *Introduction to electrodynamics,* (3rd Ed.). Prentice Hall of India Pvt. Ltd.
3. Halliday, D., Resnick, R., & Walker, J. (2015). *Fundamentals of Physics*, (10th Ed.). Wiley.

Websites and eLearning Sources:

1. https://nptel.ac.in/courses/122/101/122101002/
2. https://nptel.ac.in/courses/108/104/108104087/
3. https://physics.iitd.ac.in/assets/uploads/teaching-labs/Study_of_EMI.pdf
4. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cy13/
5. https://nptel.ac.in/courses/108/106/108106167/

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

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K - Level)**
	On successful completion of this course, students will be able to	
CO1	Acquire Basic knowledge in the concepts of Electrostatics, Electromagnetic induction, Magnetic properties, LASER and Optical fiber.	**K1**
CO2	Understand the problems on Electrostatics and Electromagnetic induction with moderate complexity by adopting the basic concepts	**K2**
CO3	Apply the principle of electromagnetic induction in various suitable problems.	**K3**
CO4	Analyze and explain the importance of LASER and Optical Fibre in society especially on technological applications.	**K4**
CO5	Categorize the concepts and methods of laser, Holography and fibre optic communication.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UCS33AO01A**			**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	2	3	1	3	3	3	2	1	2.3
CO2	3	3	2	2	1	3	3	2	2	1	2.2
CO3	3	3	2	2	1	3	3	3	2	1	2.3
CO4	3	3	2	2	1	3	3	3	2	1	2.3
CO5	3	2	2	2	1	3	3	3	2	1	2.2
Mean Overall Score											**2.26 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
3	25UCS33AO01B	**Allied Optional - 1:** Principles of Electronics	4	3

Course Objectives
Understand the working principles of semiconductor devices, including diodes, BJTs, FETs, MOSFETs, and optoelectronic components such as laser diodes and photodiodes.
Analyze electronic circuits, including linear power supplies, voltage regulators, relays, switch-mode power supplies (SMPS), and UPS systems.
Explore different types of sensors and transducers, including resistive, capacitive, and inductive transducers, and their applications in measuring humidity, flow rate, pH, pressure, and thermal conductivity.
Gain knowledge of integrated sensors and their interfacing techniques, including temperature sensors (LM35), Hall effect sensors, opto-isolators, magnetic field sensors, and wearable sensors.
Simulate analog circuits using PSPICE, covering circuit analysis, worst-case design, DC sweep, transfer function analysis, and controlled sources for practical circuit evaluation.

UNIT I: SEMICONDUCTOR DEVICES (12 Hours)

Introduction to semiconductor devices-diode-Bipolar Junction Transistor- Field Effect Transistor-Applications-Metal oxide Semiconductor - Enhancement mode- Depletion mode-MOSFET -Silicon controlled Rectifier- Laser diode- Photo diode-Optocoupler-Applications.

UNIT II: Electronic Circuits (12 Hours)

Introduction to Linear Power supply- Voltage regulators - Relays-types-switching applications using relay-solid state relay - Opto-SCR and Opto-triac based switching for high power applications-Switch mode power supply-Block diagram-Applications- UPS - Capacitive power supply.

UNIT III: Sensors (12 Hours)

Sensors and Transducers - Transducers-Resistive transducers-capacitive transducers- Inductive transducers- LVDT principle and applications. Measurement of non electrical quantity: humidity-flow rate-pH pressure-thermal conductivity.

UNIT IV: Integrated Sensors (12 Hours)

Basic sensor signal conditioning networks for interfacing with PC- Integrated sensors overview-temperature module based on LM35-Hall effect sensor module-TSOP17 photo module-MOC 3042 opto-isolator module-kmz51 magnetic field module- ICM105A VGA CMOS sensor-MPXV5004G pressure sensor- 3 axis accelerometer module: MPU 6050 IMU sensor-wearable sensors.

UNIT V: PSPICE Simulation for Analog Circuits (12 Hours)

Introduction to PSPICE-small circuit simulation-circuit examples for worst case design-DC sweep - plotting output-Sources and polynomially controlled sources- Transfer function analysis (one example).

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

Book for Study:

1. Malvino, A., Bates, D., & Hoppe, P. (2015). *Electronic Principles,* (9th Ed.).
2. Mathivanan, N. (2007). *PC- Based Instrumentation: Concepts and Practice.*
3. Tuinenga, P.W. (2015). *A guide to circuit simulation and Analysis using PSPICE.*

Material Prepared by the Department

Unit	Book	Chapter	Sections
I	1	3,5,6,12	3.1,6.1,6.2,6.3,12.1,12.3,12.4,13.2,5.9
II	1,4	22	22.1,22.7
III	2	3	3.1.3,3.2.2,3.3,3.4,3.5
IV	2,4	3,4	3.1.4, Material prepared by the department
V	3,4	1,2,3,5,6	1.1,1.2.2.1-2.4,3.3,5.1,5.6,5.7

Books for Reference:

1. Mottershead, A. (1979). *Electronic Devices and Circuits.*
2. Sinclair, I. (2000). *Sensors and Transducers.*
3. Rahid. (2005). *Introduction to PSPICE using ORCAD for Circuits and Electronics.*

Websites and eLearning Sources:

1. https://onlinecourses.nptel.ac.in/noc23_ma94/preview

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Classify and interpret the semiconductor devices	**K1**
CO2	Demonstrate and analyze the functionalities of various electronic circuits	**K2**
CO3	Distinguish and evaluate various sensors	**K3**
CO4	Compare and estimate the operations of integrated sensors	**K4**
CO5	Design and develop electronic circuits for different applications	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
3	**25UCS33AO01B**			**Allied Optional - 1:** Principles of Electronics						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	1	2	2	2	3	3	2	2	**2.1**
CO2	3	3	2	3	2	3	3	3	2	2	**2.6**
CO3	2	3	2	2	2	3	2	3	2	3	**2.4**
CO4	3	3	2	3	2	3	3	2	2	3	**2.6**
CO5	3	3	2	3	2	3	3	2	2	3	**2.6**
Mean Overall Score											**2.5 (High)**

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

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

UNIT I: Introduction to Social Ethics (6 Hours)

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

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

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

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

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

UNIT IV: Cyber Crime (6 Hours)

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

UNIT V: Social Integration (6 Hours)

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

UNIT I **(6 Hours)**

God of salvation

UNIT **(6 Hours)**

Life & Mission of Jesus Christ

UNIT III **(6 Hours)**

The Holy Spirit

UNIT IV **(6 Hours)**

Gospel Values

UNIT V **(6 Hours)**

Mary, the mother of God

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

Books for Study:

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

Books for Reference:

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

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

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

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

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

UNIT I Communication Skills (6 Hours)

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

UNIT II Resume Writing & Interview Skills (6 Hours)

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

UNIT III Personal Effectiveness (6 Hours)

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

UNIT IV Numerical Ability (6 Hours)

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

UNIT V (6 Hours)

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

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

Books for Study:

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

Books for Reference:

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

Websites and eLearning Sources:

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

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

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

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

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

அலகு - 1 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: வியக்க வைக்கும் தமிழரின் அறிவியல்

பயன்முறை கற்றல்: வலைப்பூக்கள் உருவாக்கம்- அறிவியல்கலைச்சொல்லாக்கம்

அலகு - 2 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: தமிழர்களின் மருத்துவ அறிவியல்

புதினம்: இரா. நடராசன் : சர்க்கஸ்.காம்

அலகு - 3 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: தமிழ் இலக்கியங்களில் வெளிப்படும் நீர் மேலாண்மையியல்

பயன்முறை கற்றல்: நூல் – திறனாய்வு

அலகு - 4 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: தமிழில் அறிவியல் புனைவுகள்

பயன்முறை கற்றல்: திரைப்படத் திறனாய்வு- ஆவணப் படத்திறனாய்வு

அலகு - 5 **(12 மணி நேரம்)**

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

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

உரைநடைக்கட்டுரை: அறிவியல் தமிழின் வளர்ச்சி நிலைகள்;

பயன்முறை கற்றல்: பழமொழிகளில் அறிவியல், மூலிகைகளைக் கண்டறிதல்

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

பாட நூல்கள்:

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

பார்வை நூல்கள்:

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

Websites and eLearning Sources:

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

Course Outcomes

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

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	**K2**
CO4	Appreciate ancient Sanskrit dramas	**K3**
CO5	Create new conversational sentences and to Improve self-character (Personality Development)	**K4**

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:

2. 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, K2**
CO2	Use interactive skills	**K3**
CO3	Develop the Listening and Reading Skills of the learners through teacher-led reading practice	**K6**
CO4	Improve their General Writing Skills such as Note-Taking, Note- Making Précis Writing, Paragraph Writing, and Writing Short Essays on Current	**K6**
CO5	Develop their Creative and Critical Thinking and Speaking Skills	**K6**

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/Weeks	Credits
4	25UCS43CC07	**Core Course - 7:** Java Programming	4	3

Course Objectives
To understand the basic concepts in Java Programming.
To make familiar in Classes and Inheritance concept.
To impart knowledge on Interfaces, Packages and Exceptions.
To study the features of Multithreading and Stream Classes
To implement JavaFX features such as 2D shapes, event handling, and UI components.

UNIT I: The Java Language Overview (12 Hours)

The Java Language: Impact of Java on the Internet. Overview of Java: The Three OOP Principles - A first Simple Program - The Java Keywords - The Java Class Libraries - Operators - Control Statements.

UNIT II: Classes and Inheritance (12 Hours)

Classes: Class Fundamentals-Declaring Objects - Methods-Constructors-The 'this' Keyword. Overloading Methods-Overloading Constructors-Using Nested and Inner Class - Recursion-Arrays Revisited-Using Command Line Arguments. Inheritance: Inheritance Basics- Using Super- Creating a Multilevel Hierarchy – Method Over riding - Using Abstract Class – Using 'final' with Inheritance.

UNIT III: Packages, Interfaces and Handling Exceptions (12 Hours)

Packages and Interfaces: Packages -Defining a Package - Packages and member Access - Importing Packages - Interface: Defining an Interface - Implementing Interfaces - Nested Interfaces- Exception Handling- Exception Handling Fundamentals - Exception Types - Using Try and Catch - Uncaught Exceptions - Multiple - Multiple catch Statements -throw - finally - Using Exceptions.

UNIT IV: Multithreading and Streams (12 Hours)

Multithreading: The Java Thread Model - The Mail Thread-Creating a Thread - Creating Multiple Threads - Using is Alive () and Join () - Thread Priorities - Synchronization - Thread Priorities - Suspending, Resuming and Stopping Threads using Multithreading. Input/Output: File -The Stream Classes - The Byte Streams - The Character Streams.

UNIT V: Java Graphics and JavaFX (12 Hours)

A Brief History of Java Graphics -JavaFX: An Overview - 2D Graphics: The Smiley Face Class - Event - Handling in JavaFX: The Changing Face Class - Some More 2D Shapes - An Interactive Graphics Class - A Graphical User Interface (GUI) for the Oblong Class - Containers and Layouts: More About HBox and VBox- Grid Pane -Stack Pane-Flow Pane and Border Pane- Borders, Fonts, and Colours: Borders - Fonts - Colours - Number Formatting - A Metric Converter.

Teaching Methodology	Demonstrations, Flipped Classroom, Project - Based Learning (PBL), Hands-on Learning and Discussion Method
Assessment Methods	Interactive Quiz, Presentation, Seminar, Online Coding Test, Debugging and Code Optimization Task

Books for Study:

1. Schildt, H. (2017). *Java: The Complete Reference,* (10th Ed.). McGraw-Hill Education.
   Unit I-*Chapter* 1, *Chapter*2, *Chapter* 4 and *Chapter* 5
   Unit II-*Chapter* 6 and *Chapter8*
   Unit III-*Chapter* 9 and *Chapter* 10
   Unit IV-*Chapter* 11 and *Chapter* 21
2. Charatan, Q., & Kans, A. (2019). *Java in Two Semesters, Featuring JavaFX* (4th Ed.). Springer Nature Switzerland AG.
   Unit V -*Chapter* 10 *(Sec.10.2 to 10.12)*

Books for Reference:

1. Balagurusamy, E. (2019). *Programming with JAVA.* Tata McGraw Hill.
2. Farrell, J. (2019). *Java Programming* (9th Ed.). Cengage Learning.

3. Schildt, H. (2019). *Java: A Beginner's Guide* (8thEd.). McGraw-Hill Education.
4. Herong, Y. (2020). *JavaFX Tutorials - Programming with JavaFX*. HerongYang.com.

Websites and eLearning Sources:

1. https://www.geeksforgeeks.org/introduction-to-java/
2. https://www.w3schools.com/java/java_interface.asp
3. https://www.javatpoint.com/java-awt
4. https://www.geeksforgeeks.org/javafx-tutorial/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the core concepts of Java, including object-oriented principles, control structures, and operators.	**K1**
CO2	Understand the principles of classes, inheritance, packages, interfaces, and exception handling in Java.	**K2**
CO3	Develop Java applications using multithreading, input/output streams, and GUI frameworks like JavaFX.	**K3**
CO4	Analyze Java code, identify errors, and debug Java and JavaFX applications effectively.	**K4**
CO5	Assess and compare Java technologies, tools, and frameworks, including JavaFX, for building efficient, scalable, and maintainable applications	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UCS43CC07**			**Core Course - 7:** Java Programming						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	1	3	3	2	3	3	**2.3**
CO2	3	3	3	2	2	3	3	3	1	2	**2.5**
CO3	3	2	2	2	3	2	3	2	3	1	**2.3**
CO4	3	2	2	3	2	2	1	3	2	2	**2.2**
CO5	2	3	3	3	1	2	3	3	2	3	**2.5**
									Mean Overall Score		**2.36 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
4	25UCS43CC08	**Core Course - 8:** Discrete Mathematics	4	3

Course Objectives
To gain proficiency in set theory and its operations.
To explore algebraic structures such as lattices and Boolean algebra.
To understand logical connectives, duality law and normal forms in logic.
To use graph theory for solving problems.
To impart knowledge on Trees and Graph Theoretic algorithms.

UNIT I: Set Theory (12 Hours)

Basic concepts of set theory – notation – inclusion and equality – power set – operations – Venn Diagrams – identifiers – Cartesian products – relations and ordering – functions – composition – inverse– binary and n–ary operations.

UNIT II: Lattices and Boolean Algebra (12 Hours)

Lattices as partially ordered sets: Definition – properties – special lattices: complete–complemented–distributive lattices – Boolean Algebra– properties of Boolean algebra.

UNIT III: Mathematical Logic (12 Hours)

Statements and notation – connectives – Well–formed formulas – tautologies – equivalence of formulas – duality law – Normal Forms: Disjunctive Normal Forms – Conjunctive Normal Forms– Principal Disjunctive–Principal Conjunctive Normal Forms.

UNIT IV: Graph Theory (12 Hours)

Basic concept of graph – paths and circuits – isomorphism – sub graphs– connectedness – Euler graph – operations – Hamiltonian paths and circuits – Traveling Salesman Problem.

UNIT V: Trees (12 Hours)

Basic concept of trees – properties of trees – distance and centers – rooted and binary tree – spanning tree– matrix representations of graph: Incidence matrix – adjacency matrix – graph theoretic algorithms – shortest path between two vertices – shortest path between all pairs.

Teaching Methodology	Lecture with Demonstrations, Problem–Solving, Group Activities, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Quiz, Problem Solving and Assignment

Books for Study:

1. Tremblay, J.P. &Manohar, R. (2008). *Discrete Mathematical Structure with Applications to Computer Science* (35th Reprint). McGraw–Hill.
   Unit I: *Chapter*s: 2.1.1 – 2.1.6, 2.1.8, 2.1.9, 2.3.1 – 2.3.7, 2.4.1 – 2.4.4
   Unit II: *Chapter*s: 4.1.1, 4.1.2, 4.1.5, 4.2.1
   Unit III*: Chapters: 1.1, 1–.2.1 – 1–2.4, 1.2.6 – 1.2.10, 1–3.1–1–3.4.*
2. NarsingDeo (2013). *Graph Theory with Applications to Engineering and Computer Science*. Prentice Hall.
   Unit IV and Unit V: *Chapter*s 1,2, 3.1–3.7, 7.1, 7.9, 9.1, 9.2, 11.5
   (Only definition and applications are expected, and proof for theorems are not preferred)

Books for Reference:

1. Chandrasekaran, N. &Umaparvathi, M. (2015). *Discrete Mathematics* (2nd Ed.). PHI.
2. Kenneth H. Rosen (2012). *Discrete Mathematics and Its Applications* (7th Ed.) Tata McGraw–Hill publishing Company.
3. Lipschutz, S. and Lipson, M. (1999). *Discrete Mathematics* (3rd Ed.). Tata McGraw–Hill publishing Company.

Websites and eLearning Sources:

1. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_sets.htm

2. https://cse.poriyaan.in/topic/boolean–algebra–50670/
3. https://www.tutorialspoint.com/discrete_mathematics/discrete_mathematics_propositional_logic.htm
4. https://ggc–discrete–math.github.io/graph_theory.html
5. https://www.tpointtech.com/discrete–mathematics–dijkstras–algorithm

Course Outcomes		
CO No.	**CO–Statements**	**Cognitive Levels (K–Level)**
	On successful completion of this course, students will be able to	
CO1	Define various basic terms in graph theory and discrete mathematical structure	**K1**
CO2	Summarize the different theories in graph theory and discrete mathematical structure	**K2**
CO3	Solve simple problems in graph theory and discrete mathematical structure	**K3**
CO4	Analyze and compare various methods in graph theory and discrete mathematical structure	**K4**
CO5	Explain and solve problems related to graph theory, mathematical logic, set theory and Boolean Algebra	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
4	**25UCS43CC08**			**Core Course - 8:** Discrete Mathematics					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	3	3	1	3	3	2	3	2	**2.6**
CO2	3	2	3	3	2	2	3	2	3	2	**2.5**
CO3	3	3	3	3	1	3	3	3	2	1	**2.5**
CO4	3	2	3	3	1	2	2	3	3	1	**2.3**
CO5	3	3	3	2	1	3	3	2	2	1	**2.3**
									Mean Overall Score		**2.46 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
4	25UCS43CP04	**Core Practical - 4:** Java Programming	3	2

List of Exercises

1. Classes and Objects
2. Constructors and Inheritance
3. Method Overloading and Method Overriding
4. Interfaces
5. Packages
6. Exception Handling
7. Multithreading
8. Input / Output streams
9. Creating a Smiley Face Application
10. Interactive Shape Drawer

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UCS43AO02A	**Allied Optional - 2:** Applied Physics - 2	4	3

Course Objectives
To know the basic concepts of diodes, transistors, amplifiers, oscillators and Microprocessors.
To understand the functioning of operational amplifiers and modulation and demodulation.
To explore the transistors actions, types of oscillatory circuit, properties of amplifiers.
To compare and contrast between various types of operational amplifiers and learn different instructions set used in Intel 8085.
To construct and experiment the transistor connections, Hartley and Colpitts oscillators.

UNIT I: Diode and Transistor (12 Hours)

PN junction - properties - VI characteristics - Zener diode - Equivalent circuit of Zener diode -Voltage stabilizer - Transistor - transistor action - symbols - transistor connections (CB, CE) -Comparison of transistor connections.

UNIT II: Amplifiers and Oscillators (12 Hours)

Transistor as an amplifier in CE arrangement - transistor load line analysis - operating point - performance of transistor amplifier - cut off and saturation points - Sinusoidal oscillator - types - oscillatory circuit - Barkhausen criterion - Hartley and Colpitt's oscillator - transistor crystal oscillator.

UNIT III: Operational Amplifier (12 Hours)

Operational amplifier - basic circuit of differential amplifier - operation - CMRR - Properties of operational amplifier - Inverting amplifier - non-inverting amplifier - voltage follower - summing amplifiers - integrator - differentiator.

UNIT IV: Modulation and Demodulation (12 Hours)

Radio Broadcasting, Transmission and Reception - Modulation - types - Amplitude modulation - modulation factor - analysis of Amplitude modulated wave - transistor AM Modulator - power and limitations in AM - Frequency modulation - theory - comparison - Demodulation - essentials - AM Diode detector - AM Radio receivers - types - FM receiver.

UNIT V: Microprocessor Intel 8085 (12 Hours)

Microprocessor Architecture: Intel 8085 - Block Diagram - ALU - Registers - Buses - Pin Configuration Instruction Word Size - Instruction cycle - Timing Diagram - Addressing Modes - Stack & Subroutines - Interrupts of 8085 - Assembly Language Programs (ALP): Addition & subtraction of 8-bit data, multiplication and division program.

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

Books for Study:

1. Mehta, M.R.V.K. (2021). *Principles of Electronics*, (12th Ed.). S. Chand & company.
2. Ram, B. (2010). *Fundamentals of Microprocessor and Microcomputers*, (7th Ed.). Dhanapat Rai Publications.

Unit	Book	Chapter	Section
I	1	3,4& 6	3.19, 3.20, 3.23, 4.27, 4.28, 4.29, 4.30, 6.1, 6.4, 6.6, 6.8, 6.9, 6.10, 6.11, 6.15
II	1	6, 12	6.17, 6.18, 6.19, 6.22, 6.23, 12.1, 12.2, 12.3, 12.7, 12.11, 12.12, 12.21
III	1	23	23.1, 23.3, 23.4, 23.8, 23.15, 23.24, 23.26, 23.27, 23.32, 23.35, 23.37
IV	1	16	16.1-16.22
V	2	3,4,5,6 & 7	3.1, 3.1.1-3.1.4, 3.1.8, 3.2-3.3.5, 4.3, 4.3.1-4.3.5, 5.5-5.6, 7.5, 6.3, 6.4, 6.29, 6.30.

Books for Reference:

1. Bhargava, N.N., Kulshreshtha, D.C., & Gupta, S.C. (2013). *Basic electronics and linear circuits*, (2nd Ed.). Tata McGraw Hill Publishing Company Limited.
2. Gaonkar, R. S. (2002), *Microprocessor Architecture, Programming, and Applications with the 8085*, (5th Ed.). Prentice Hall.
3. Routt, W.A. (2006), *Microprocessor Architecture, Programming, and Systems featuring the 8085*, (1st Ed.). Thomson Delmar Learning.

Websites and eLearning Sources:

1. https://nptel.ac.in/courses/117/103/117103063/
2. https://nptel.ac.in/courses/115/102/115102014/
3. https://ict.iitk.ac.in/courses/working-with-op-amps/
4. https://nptel.ac.in/content/storage2/courses/106105080/pdf/M2L5.pdf
5. https://nptel.ac.in/courses/108/107/108107029/

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

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, student will be able to	**Cognitive Levels (K - Level)**
CO1	Acquire knowledge and conceptual understanding of fundamental electronics.	**K1**
CO2	Apply the knowledge of microprocessor to write assembly language program for simple applications.	**K2**
CO3	Implement the knowledge of s/w, h/w structures of microprocessor and principles of electronics to develop technologies with IT tools to benefit the real world.	**K3**
CO4	Describe and understand the basics of modulation and applications of electronic devices in radio communication.	**K4**
CO5	Take part in mini projects based on electronic devices.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours/Week**	**Credits**
4	**25UCS43AO02A**			**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	3	2	3	2	3	2	2	2	1	**2.3**
CO2	3	3	2	2	1	3	2	3	2	1	**2.2**
CO3	3	2	3	2	1	3	3	1	2	1	**2.2**
CO4	3	2	3	2	1	3	2	2	2	2	**2.3**
CO5	3	2	2	2	2	2	3	3	2	1	**2.2**
										Mean Overall Score	**2.24 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UCS43AO02B	**Allied Optional - 2:** Communication Electronics	4	3

Course Objectives
Understand digital communication fundamentals and work with serial (UART, USART) and parallel ports for data transfer
Analyze optical communication principles, including fiber optics, waveguides, and photodetectors.
Explore wireless communication technologies, including cellular networks (3G, 4G, 5G), WLAN, Bluetooth, and PAN.
Develop IoT applications using ESP32, focusing on Wi-Fi networking, cloud integration, and AI-based edge computing.
Implement basic networking with ESP8266, including web server setup, data posting to cloud platforms

UNIT I: Serial and Parallel Port Communication (12 Hours)

Basics of digital communication- Parallel port interfacing for simple I/O operations - Serial communication-UART-USART-Data transfer using serial port- USB port specifications-HID device USB for data transfer applications-Communication protocols-SPI-IIC-Applications.

UNIT II: Optical Communication (12 Hours)

Basics of optical communication-Block diagram of Optical fibre communication-advantages, disadvantages, and applications of optical fiber communication, optical fiber waveguides, Ray theory, single mode fiber, cutoff wave length, fiber alignment and joint loss, single mode fiber joints, fiber splices, fiber connectors and fiber couplers. Photo detectors -LM393 light sensor module TCS3200 color sensor module.

UNIT III: Wireless Communication (12 Hours)

Types of Wireless communication System, Comparison of Common wireless system, Trend in Cellular radio and personal communication-Third generation Cellular Networks- Fourth Generation, fifth generation wireless networks- Wireless Local Loop (WLL)-Wireless Local Area network (WLAN)- Bluetooth and Personal Area Networks.

UNIT IV: Basic Networking with ESP32 (12 Hours)

Overview of ESP32 architecture and features - Introduction to IoT concepts and applications - Setting up MicroPython and Thonny IDE for ESP32 -Flashing firmware and writing basic scripts - Wi-Fi connectivity: Connecting ESP32 to a network - Data encryption & security in IoT – Cloud and Edge computing and AI in IoT

UNIT V: Basic Networking with ESP8266 (12 Hours)

Introduction to ESP8266 Wi-Fi Module- Wi-Fi library-Web server- installation - configuration - Posting sensor(s) data to web server-Thing Speak API and MQTT.

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

Book for Study:

1. Mathivanan, N. (2007). *PC- Based Instrumentation: Concepts and Practice.*
2. Senior, J.M. (2002). *Optical Fiber Communications,* (2nd Ed.). PHI.
3. Thakur, M.R. *Node MCU ESP8266 Communication Methods and Protocols Programming with Arduino IDE.*
4. *Material Prepared by the Department*

Unit	Book	Chapter	Sections
I	1	6	6.1,6.2,9.2,9.3,9.4,9.5
II	2	1,2,3,5	1.2,1.3,2.1,2.2,3.6,5.3
III	2	7,8	7.2,8.1.8.3,8.5,8.6,8.8
IV	4		Material prepared by the department.
V	3	4,5,21	4.1,4.2,4.3,5.2,21.1-21.3

Books for Reference:

1. Axelson, J. (2012). *USB Complete: The Developer's Guide, (4th Ed.).*
2. Gehlot, A., Singh, R., Malik, P.K., Gupta, L.R., Singh, B. (2020). *Internet of things with 8051 and EPS8266.*
3. Websites and eLearning Source
4. https://onlinecourses.nptel.ac.in/noc23_ma94/preview

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, the students will be able to	
CO1	Understand serial and parallel Communication	**K1**
CO2	Infer and Elaborate Optical Communication	**K2**
CO3	Experiment and Perceive various optical sources and detectors	**K3**
CO4	Appraise various Wireless Networks	**K4**
CO5	Apply and Analyze wireless networking using ESP 8266	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
4	**25UCS43AO02B**			**Allied Optional - 2:** Communication Electronics						**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	3	2	1	2	3	3	2	2	**2.2**
CO2	3	3	2	2	2	3	3	2	2	3	**2.5**
CO3	3	3	2	3	2	2	3	3	2	2	**2.5**
CO4	3	3	3	3	2	2	3	3	3	2	**2.7**
CO5	3	3	3	3	2	3	3	3	3	3	**2.9**
										Mean Overall Score	**2.6 (High)**

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UCS43OP01A	**Allied Optional Practical:** Applied Physics	2	2

Any 16 Experiments

1. Junction diode - V I characteristics
2. Zener diode - V I characteristics
3. Transistor characteristics - CE mode
4. FET characteristics
5. Single stage R-C coupled amplifier - Frequency response
6. Operational amplifier - Basic circuits
7. Basic Logic Gates - Using IC's
8. Logic Gates Using IC's -The study of universal gates & De Morgan's Theorem
9. Encoders using Diodes
10. Encoders using OR gates.
11. Shift register using IC7495.
12. R-S, J-K, D, T Flip-flops using Logic gates IC's
13. Potentiometer - Calibration of Ammeter
14. Potentiometer - Calibration of low range Voltmeter
15. Field along the axis of a coil
16. Resistance of a Thermistor- Multimeter
17. EMF of a Thermocouple - Multimeter
18. Bridge Rectifier - pi filter circuit
19. Hartley / Colpitts's Oscillator
20. Hysteresis
21. Microprocessor I (Data Transfer)
22. Microprocessor II (8bit-addition, subtraction, multiplication & division)

Semester	Course Code	Title of the Course	Hours/Week	Credits
4	25UCS43OP01B	**Allied Optional Practical:** Electronics	2	2

Any 16 Experiments

1. Study of Opto-coupler characteristics and application.
2. Study of Photodiode and phototransistor characteristics
3. Study of Transducers for temperature measurements.
4. Study of MOSFET characteristics.
5. Study on Integrated sensors
6. Construction and study of Linear power supply
7. Construction of voltage regulators.
8. Pspice simulation of basic circuits with resistors and node voltage and branch current calculation.
9. Study on magnetic and solid state relay.
10. Study of SCR characteristics
11. DC to DC switching circuits using MOSFET
12. Pspice simulation of active devices.
13. Configuring ESP8266 based Web-server for data acquisition applications.
14. Digitizing temperature sensor data and uploading in thingspeak API.
15. Study of USB communication (HID device).
16. Study of software serial communication in ESP8266.
17. Study of fibre optic communication.
18. Hall effect sensor for current measurement
19. ESP 8266 I/O operations
20. ESP 32 I/O operations using python
21. ESP 32 /8266 interface with opencv operations using python
22. ESP 32 interface with sensors
23. Interfacing RFID module using Arduino.
24. Interfacing IIC memory module using Arduino.
25. Interfacing HC-05 bluetooth module with arduino
26. Study of Parallel port for I/O operations
27. Study of Serial port data transfer to hyper-terminal.
28. Study of Colour sensing using TCS3200.

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	Course Code	Title of the Course	Hours/Weeks	Credits
4	25UCS44SE02	**Skill Enhancemnt Course – 2:** E-Services	2	1

List of Exercises

1. Blog creation
2. Web site creation
3. Railway ticket reservation
4. E-Mailing to the Agency/official Business people
5. Purchase products through online
6. Online Passport Registration
7. Online Fund transfer
8. Electricity Bill Payment
9. Create and display advertisement through online

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
4	25UCS44SL03	**Self Learning:** Web Ethics	0	2

Course Objectives
To introduce students to the fundamental principles of cyber ethics and its significance in the digital world.
To understand the ethical considerations and legal aspects governing cyberspace and cyber laws.
To explore the importance of international conventions and agreements in regulating cyber activities.
To analyze different types of cybercrimes, their impact on individuals and society, and the role of cybersecurity.
To study cyberbullying, its psychological effects, and preventive measures for child protection and online safety.

UNIT I: Basics of Cyber Ethics

Ethics in Cyber Society: Core Values and Virtues: Definitions - Specificities of Cyberspace - Dimensions of Cyber Ethics in Cyber Society - Core Values and Virtues - Cyber Ethics by norms - Laws and Relations - Artificial Intelligence Ethics - Cyber Ethics as Business Ethics.

UNIT II: Cyber Law

Importance of Cyber Law - The Significance of Cyber Ethics - Cyber Crime is Unethical and Illegal - The need for Cyber Regulation-The Nine P's of Ethics in Information Society.

UNIT III: International Convention for Cyber Space

The Significance of International Cyber Ethics - Bilateral Agreements - From Bilateral to International Convention - Fast Growing Cybercrime - International Cyber Legal Treaty - Republican Net Neutrality: The Relevance of the Net and its Neutrality - Two sets of values underlying - Republican Net Neutrality.

UNIT IV: Cyber Crime

Cybercrime offences - Computer Related Offences - Content Related offences - Government Efforts in Cybersecurity-Cybersecurity in the Academic world. Critical Thinking of Citizens: Ethics in Digital Age - Acting Responsibly in the Digital World - Three Dilemmas: Ethical Intelligence in Practice

UNIT V: Cyber Bullying

Cyber Bullying - People in Cyber Bullying - Signs of Cyber Bullying - Suicidal Tendencies - Role of Children and Duty of parents- Limiting Access of Technology - Child Bullying. Child Protection Online: Prevention through Education for Digital Literacy and Safety - Recommendations of Priority Inventions - Cyber Ethics Research Centers and Networks.

Teaching Methodology	Online Tutorials through LMS (JosTEL)
Assessment Methods	Online assessment

Books for Study:

1. Stuckelberger, C., &Duggal, P. (2018). *Cyber Ethics 4.0, Serving Humanity with Values*. Prentice Glob ethics. net.
   Unit I: *Chapter* 1
   Unit II: *Chapter* 2 and *Chapter* 3
   Unit III: *Chapter 1*6 and *Chapter* 17
   Unit IV: *Chapter* 19 and *Chapter* 20
   Unit V: *Chapter* 23 and *Chapter* 24

Books for Reference:

1. Kizza, J. M. (2015). *Ethical and Social Issues in the Information Age*, (5thEd.). Springer
2. Diane, B. (2008). *Cyber Citizenship and Cyber Safety: Cyber Ethics*. The Rosen Publishing group.
3. Bynum, T. W., &Rogerson, S. (2004). *Computer Ethics & Professional Responsibility*. Introductory Text & Readings, Blackwell.

Websites and eLearning Sources:

1. Ethical Hacking Tutorial - A Complete Beginners Guide

2. https://www.unicef.org/end-violence/how-to-stop-cyberbullying
3. https://www.stopbullying.gov/
4. https://www.unodc.org/unodc/en/cybercrime/

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53CC09	**Core Course - 9:** Operations Research	4	3

Course Objectives
To understand the methodology of OR problem solving and formulate a linear programming problem
To apply duality method for solving LPP and explain the primal-dual relationship
To develop formulation skills in transportation models and finding solutions
To know how project management techniques help in planning and scheduling a project
To familiarize students with the concept of inventory management, and its functional role in different organizations

Unit I: Linear Programming (12 Hours)

Linear Programming - General formulation of the LP Model and its Graphical solution. The Simplex Method - Computational Procedure. Artificial Variable Techniques - the Two Phase Technique - Special cases in Simplex Method.

Unit II: Duality (12 Hours)

Duality in Linear Programming - The Dual Problems - Primal Dual Relationships - Primal Dual Computations - Dual Simplex Method.

Unit III: Transportation Problems (12 Hours)

Transportation Problems - Transportation Model - Determining the starting solution of Transportation Model, North - West Corner Rule - Least Cost Method - Vogel's Approximation Method. Determining the optimum solution of Transportation Problems - Assignment Problems and its solution by Hungarian method.

Unit IV: Scheduling (12 Hours)

Project Scheduling by PERT-CPM - Network diagram representations - Critical path calculations - Probability considerations in Project Scheduling.

Unit V: Inventory Management (12 Hours)

Inventory Management: Inventory Control - ABC analysis - Economic Lot size Problems - EOQ with uniform Demand and shortages - Limitations of inventories - Buffer stock - Determination of Buffer stocks. (Note: Stress may be on the working of numerical problems)

Teaching Methodology	Lecture with Demonstration, Problem-Solving, Group Activities, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Quiz, Problem Solving and Assignment

Book for Study:

1. Swarup, K., Guptha, P.K. &Manmohan. (2015). *Operations Research*. Sultan Chand & Sons.
   Unit I: *Chapter* 1 (Sec: 1.1, 1:2, 1:10), *Chapter* 2, *Chapter* 3(Sec: 3:1-3:5), *Chapter* 4(Sec: 4:1, 4:3, 4:4(only Two-Phase Method), 4:5)
   Unit II: *Chapter* 10 (Sec: 10:1, 10:5-10:6, 10:8-10:10, 10:12-10:13, 10:15), *Chapter* 11 (Sec 11:1-11:2, 11:3(Pages:298-307)
   Unit III: *Chapter 1*2 (Sec 12:1-12:6)
   Unit IV: *Chapter* 17 (Sec: 17:1-17:7)
   Unit V: *Chapter* 25 (Sec 25:1-25:8)

Books for Reference:

1. Kalavathy, S. (2013). *Operations Research*. Vikas Publications.
2. Selvam, R.P. (2010). *Operations Research*, (2nd Ed.). PHI.
3. Rathindra P. Sen (2010). *Operations Research Algorithms and Applications*. PHI.

Websites and eLearning Sources:

1. http://www.universalteacherpublications.com/univ/ebooks/or/Ch3/simplexintro.htm
2. https://www.sjctni.edu/Department/cs/eLecture/CMR_Graphical%20Method%20-Special%20cases.pdf

3. https://www.geeksforgeeks.org/transportation-problem-set-1-introduction/
4. http://ecoursesonline.iasri.res.in/mod/resource/view.php?id=90044http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/mathematics/14._operations_research/02._linear_programming_problem__simplex_method_for_solving_lpp_and_big-m_method/et/9219_et_et.pdf
5. https://www.sjctni.edu/Department/cs/eLecture/CMR_Transportation%20Problem.pdf
6. https://sjctni.edu/Department/cs/eLecture/CMR_Assignment%20Problem.pdf

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Understand the basics of LPP, TP, AP, inventory management and project Scheduling	**K1**
CO2	Compare the concepts of LPP, TP, AP, inventory management and project Scheduling	**K2**
CO3	Solve the problems of LPP, TP, AP, inventory management and project Scheduling	**K3**
CO4	Examine LPP, TP, AP, inventory management and project Scheduling problems	**K4**
CO5	Evaluate LPP, TP, AP, inventory management and project Scheduling	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**							**Hours**	**Credits**
5	**25UCS53CC09**		**Core Course - 9:** Operations Research							**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	3	2	3	3	2	2	3	**2.6**
CO2	3	1	3	2	2	2	2	2	2	2	**2.1**
CO3	2	3	2	3	2	3	3	3	3	2	**2.6**
CO4	3	3	2	2	3	2	2	2	2	3	**2.4**
CO5	3	2	2	3	2	3	2	3	2	1	**2.3**
										Mean Overall Score	**2.4 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53CC10	**Core Course - 10:** Web Application Development	4	2

Course Objectives
To define the elements of web applications
To understand the web application development environment
To apply various Graphical User Interfaces on web applications
To examine and use the different components in web applications
To analyze and evaluate the development of web applications with disconnected data access technologies

UNIT I: Client Server Computing and .NET Framework (12 Hours)

Client server computing: clients - server - networks - Distributed Systems: Distributed applications - Distributed Processing -web technology - Understanding the .NET Framework: Benefits of the .NET Framework- Elements of the .NET Framework.

UNIT II: Basics of ASP.NET (12 Hours)

Getting Started with ASP.NET: .NET Framework - ASP.NET-Setting up the Development Environment- Creating an ASP.NET Application- Deploying an ASP.NET Web Application.

UNIT III: Building web forms with Controls and Events (12 Hours)

Building Forms with Web Controls: ASP.NET Web Forms- Creating Web Forms Application Projects - Using Web Controls- Working with Events.

UNIT IV: Using Rich Web Controls, Validation and Custom Controls (12 Hours)

Using Rich Web Controls: Using the Ad Rotator Control- Using the Calendar Control- Using the Tree View Control- Validating User Input - Understanding Validation Controls - Custom Controls- Basic Structure of Web Forms Controls- Creating Custom Controls- Creating a user control.

UNIT V: ADO.NET Programming (12 Hours)

ASP.NET Database Programming: ADO.NET Basics- ADO.NET Object Model- Managed allied

Teaching Methodology	Lecture-based Learning, Case Study-Based Learning, Flipped Classroom and Problem-Based Learning
Assessment Methods	Viva-Voce, Code Debugging Challenge and Group Web Application Development Sprint

Books for Study:

1. Rajesh., & Kumar, E. (2002). *Computer Networks, Fundamentals and Applications*. Vikas Publishing House.
   Unit I *Chapter* 10 (Sec:10.1, 10.2, 10.3), *Chapter* 11 (Sec:11.1, 11.2).
2. Parihar, M. (2002). *ASP.NET Bible.* Hungry Minds Inc.
   Unit I *Chapter* 1
   Unit II *Chapter* 2
   Unit III *Chapter* 3
   Unit IV *Chapter* 4, *Chapter* 5
   Unit V *Chapter* 8

Books for Reference:

1. Macdonald, M., & Szpuszta, M. (2007). *ProASP.NET 3.5 in C# 2008*, (2nd Ed.). A press.
2. Evjen, B. (2006). *Professional ASP.NET 2.0*. Wiley.
3. Walther, S. (2006). *ASP.NET 2.0 Unleashed*, (2nd Ed.). Sams Publications.

Websites and eLearning Sources:

1. https://www.tutorialspoint.com/asp.net/index.htm
2. https://www.javatpoint.com/asp-net-tutorial
3. https://www.w3schools.com/asp/default.ASP

4. https://dotnet.microsoft.com/en-us/learn/aspnet
5. https://learn.microsoft.com/en-us/aspnet/tutorials

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Define the elements of web applications	**K1**
CO2	Understand the web application development environment	**K2**
CO3	Apply various Graphical user Interfaces on web applications	**K3**
CO4	Examine and use the different components in web applications	**K4**
CO5	Analyze and evaluate the development of web applications with disconnected data access technologies	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UCS53CC10**			**Core Course - 10:** Web Application Development						**4**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	3	3	1	3	3	2	2	2	**2.4**
CO2	3	2	2	3	2	2	2	3	3	2	**2.4**
CO3	2	3	2	3	2	3	3	3	2	2	**2.5**
CO4	3	2	2	2	1	3	2	2	3	1	**2.1**
CO5	3	2	3	2	1	3	2	3	2	1	**2.2**
										Mean Overall Score	**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53CC11	**Core Course - 11:** Computer Architecture and Microprocessor (Internship Embedded Course)	4	2

Course Objectives
To understand different instructions, uses of computer registers and narrate the design of the accumulator with its functionalities
To identify and evaluate the instruction formats, structure of registers, addressing modes and envision the working process of RISC.
To learn about the architecture of the Intel 8085 microprocessor, its instruction cycle, addressing modes, and commonly used instructions.
To acquire assembly language programming skills for the Intel 8085 microprocessor.
To gain a comprehensive understanding of various peripheral devices and their interface

UNIT I: Basic Computer Organization and Design (12 Hours)

Instruction codes - Computer Registers - Computer Instructions - Timing and Control - Instruction Cycle - Memory Reference Instructions -Input/output & Interrupt - Complete Computer Description - Design of Basic Computer - Design of Accumulator Logic.

UNIT II: CPU Organisation (12 Hours)

General Register Organisation - Stack Organisation - Instruction Formats - Addressing Modes - Data Transfer and Manipulation - Program Control - RISC.

UNIT III: Microprocessor Architecture (12 Hours)

Microprocessor Architecture: Intel 8085 - Instruction Cycle - Timing diagram - Instruction Format - Addressing modes - Intel 8085 Instructions.

UNIT IV: Programming using 8085 (12 Hours)

Programming using 8085: Simple examples - 8 - bit addition and subtraction - 16-bit addition - 8-bit decimal subtraction - complements of 8 -bit and 16 - bit number - shifting bits - finding largest of two numbers - finding largest and smallest in an array - sum of series of numbers - 8-bit multiplication and division.

UNIT V: Peripheral Devices and Their Interfacing (12 Hours)

8255A Programmable Peripheral Interface (PPI): 8255 Operating modes and programming, Synchronous and Asynchronous Serial Transmission - USART 8251- Basic DMA operation - DMA Controlled I/O - The 8237 DMA Controller.

Teaching Methodology	Lecture with Demonstration, PPT, Case Study and Flipped Classroom.
Assessment Methods	MCQ Test, Interactive Quiz, Presentation, Seminar and Written Test

Books for Study:

1. M. Morris Mano (2003). *Computer System Architecture*, (3rd Ed.). PHI.
   Unit I: *Chapter* 5 (Sec 5.1 - 5.10)
   Unit II: *Chapter* 8 (Sec 8.1 - 8.8)
2. Ram, B. (1998). *Fundamentals of Microprocessors and Microcomputers*. Dhanpat Rai Publications.
   Unit III: *Chapter* 3 and *Chapter* 4
   Unit IV: *Chapter* 6
   Unit V: *Chapter* 7

Books for Reference:

1. Smruti Ranjan Sarangi (2014). *Computer Organization and Architecture*, TMH.
2. Rafiquzzaman (2012). *Microprocessors Theory and Applications*, Revised Edition, PHI Learning.
3. Gaonkar, R. S. (1989). *Microprocessor Architecture, Programming and Applications with the 8085/8080A*. Wiley Eastern.

Websites and eLearning Sources:

1. https://www.geeksforgeeks.org/introduction-of-microprocessor/

2. https://www.tutorialspoint.com/microprocessor/microprocessor_io_interfacing_overview.htm
3. https://www.ccbp.in/blog/articles/computer-organization-and-architecture

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the fundamentals of the number system, digital circuits, peripheral devices and interfaces, the 8085microprocessor architecture and its programming	**K1**
CO2	Demonstrate the logics of the number system, logic circuits, peripheral devices and interfaces, the 8085 microprocessor architecture and ALP	**K2**
CO3	Apply the digital logics to simplify the Boolean expressions, the peripheral devices & interfaces and solve the problems using the 8085 microprocessor.	**K3**
CO4	Analyze the technical factors involved in digital circuits, peripheral devices and interfaces, 8085 microprocessor architecture and ALP	**K4**
CO5	Evaluate the applications of digital circuits, peripheral devices and interfaces, 8085 microprocessor and ALP	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**		**Credits**
5	**25UCS53CC11**	**Core Course - 11:** Computer Architecture and Microprocessor (Internship Embedded Course)							**4**		**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	2	2	2	2	2	2	**2**
CO2	2	3	2	2	2	2	2	2	2	3	**2.2**
CO3	2	3	3	2	2	3	3	2	2	3	**2.5**
CO4	2	2	2	2	2	3	3	2	2	3	**2.3**
CO5	2	3	2	2	2	3	3	2	2	3	**2.4**
										Mean Overall Score	**2.28 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	**25UCS53CP05**	**Core Practical - 5:** Web Application Development	**3**	**2**

List of Exercises

1. Simple Webpage creation using HTML
2. HTML form validation using JavaScript
3. Design a Simple Calculator
4. Request and Response Objects
5. Server-side controls.
6. Working with Toolbox Controls
7. Validation Controls
8. AdRotator Control
9. Calendar Control
10. Database Access - ADO.NET

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53CP06	**Core Practical - 6:** Hardware Lab	3	2

List of Experiments

1. Design of Basic Logic Gates using Universal Gates (NAND, NOR)
2. Design of Half and Full Adders and Subtractors
3. Design of Multiplexers, De-Multiplexers, Encoders and Decoders
4. Verify the truth table of one bit and two bit comparators
5. Verify Binary to Gray and Gray to Binary conversion using NAND gates.
6. Design of Flip-Flops
7. 8085 Microprogramming - 1
8. 8085 Microprogramming - 2
9. 8085 Microprogramming - 3
10. IoT Programming using Sensors

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53ES01A	**Discipline Specific Elective - 1:** Computer Networks	4	3

Course Objectives
To understand data science fundamentals and its interdisciplinary applications.
To master data collection, pre-processing, and visualization for quality analysis.
To develop expertise in machine learning principles, predictive modeling, and evaluation.
To impart the theoretical and algorithmic foundations of data science.
To enhance data interpretation and visualization for informed decision-making

UNIT I: Fundamentals of Data Science (12 Hours)

Data Science - Data science Venn diagram - Basic terminology - Data science case studies - Types of data - levels of data - Types of data analytics - Descriptive Analytics - Diagnostic analytics - Predictive analytics - Prescriptive analytics - Five steps of Data science

UNIT II: Mathematical Preliminaries (12 Hours)

Basic Maths - Mathematics as Discipline - Basic Symbols and Terminology - Linear Algebra. Probability: Bayesian vs. Frequentist - Compound Events - Conditional Probability - Rules of Probability.

UNIT III: Visualizing Data (12 Hours)

Exploratory Data Analysis - Developing the Visual Aesthetic - Chart Types - Great Visualizations - Reading Graphs - Interactive Visualizations

UNIT IV: Data Mining and Data Warehousing (12 Hours)

Data Warehousing - Design Consideration of Data Warehouse - Data Loading Process - Data Mining - Data Mining Techniques - Tools and Platforms - Case Study

UNIT V: Recent Trends in Data Science (12 Hours)

Applications of Data Science - Data Analysis Techniques - Various Visualization Techniques - Application development methods used in Data Science.

Teaching Methodology	Lecture-based instruction, Demonstration, Group Discussion, Peer Learning, Problems solving, and Project-based learning.
Assessment Methods	Quiz, Coding Practice, MCQ, Project

Books for Study:

1. Sinan, O. (2016). *Principles of Data Science,* (1st Ed.). Packt Publishing.
   Unit I: *Chapter* 1, *Chapter* 2 and *Chapter* 3
   Unit II: *Chapter* 4, *Chapter* 5
   Unit III: *Chapter* 9, *Chapter* 10, *Chapter* 11
   Unit IV: *Chapter* 12, *Chapter* 13
   Unit V: *Chapter* 14 and *Chapter* 15

Books for Reference:

- Joel, G. (2019). *Data Science from Scratch: First Principles with Python,* (2nd Ed.) O'Reilly.
- Pierson, L. (2021). *Data Science for Dummies,* (3rd Ed.). John Wiley & Sons.
- Blum, A., Hopcroft, J. &Kannan, R. (2020). *Foundations of Data Science,* (1st Ed.). Cambridge University Press.

Websites and eLearning Sources:

- Foundations of Data Science | Coursera/
- Foundations for Data Science | Stanford Online/
- https://www.ibm.com/in-en/topics/data-science
- https://www.mygreatlearning.com/blog/what-is-data-science

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Understand key data science concepts, data types, analytics, and the data science process.	**K1**
CO2	Apply mathematical and probability methods to solve data science problems.	**K2**
CO3	Analyze and interpret data visualizations, selecting appropriate chart types for effective communication.	**K3**
CO4	Develop skills in data exploration, summarization, and statistical analysis.	**K4**
CO5	Integrate data analysis and visualization techniques to build data-driven applications for decision-making.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**								**Hours**	**Credits**
5	**25UCS53ES01A**	**Discipline Specific Elective - 1:** Computer Networks								**4**	**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	3	2	1	3	3	2	3	**2.5**
CO2	2	3	1	2	3	2	3	2	3	3	**2.4**
CO3	2	2	3	2	3	3	2	2	2	3	**2.4**
CO4	3	2	3	1	2	2	3	2	3	2	**2.3**
CO5	3	2	3	2	2	1	2	3	3	2	**2.3**
									Mean Overall Score		**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53ES01B	**Discipline Specific Elective - 1:** Digital Marketing	4	3

Course Objectives
To understand the need and basics of digital marketing
To classify the technology and frameworks used in digital marketing
To identify the key internal analysis elements for applying digital marketing frameworks.
To learn the digital marketing strategies for real-time business applications
To develop a site/portal to promote digital marketing

UNIT I: Digital Marketing and Internet Marketing (12 Hours)

Digital Marketing: Evolution of Digital Marketing - From Traditional to Modern-Marketing - Digital - Digital Marketing: Emergence of Digital Marketing as a Tool - Digital Marketing Applications and Benefits - Internet Marketing: Underlying Technology and Frameworks - Digital Marketing Framework - Critical Success Factors for Digital Marketing.

UNIT II: Models, Consumer Behaviour Model Creation (12 Hours)

Digital Marketing Models Creation: Factors Impacting Digital Marketplace - Value Chain Digitization - Digital Marketing Business Models - Application of Digital Marketing Models. Consumer for Digital Marketing: Consumer Behaviour on the Internet - Attributes of Online Buying Behaviour - Brand Building on the Web - Integrated Marketing Communications (IMC)- Basics of Integrated Marketing Communications - Four Pillars of IMC Construct.

UNIT III: Assessment Phase and Objectives Planning (12 Hours)

Digital Marketing Assessment Phase: Elements of the Assessment Phase - The Assessment Phase Elements - Macro-Micro Environment Analysis - Marketing Situation Analysis - Digital Marketing Objectives Planning - Digital Marketing Objectives Development.

UNIT IV:S trategy Groundwork and Roadmap (12 Hours)

Digital Marketing Strategy: Groundwork - Understanding Digital Business Strategy - Defining the Digital Marketing Mix - Offering Mix for Digital - Digital Pricing Models - Digital Marketing Strategy Roadmap - PLC Concept.

UNIT V: Web Development and Usability for Digital Marketing (12 Hours)

Web Development and Management - Preplanning for Web Development - Website Development Stages - Usability and Service Quality Elements - Understanding Elements of User Experience - Implementation of Interaction Design - Understanding Web Usability and Evaluation.

Teaching Methodology	Lecture with Demonstration, Problem-Solving, Case Study, Group Activities, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Tests, Assignment, Quiz, Oral Presentation and Case Study

Books for Study:

1. Bhatia P. (2019). *Fundamentals of Digital Marketing*, (2nd Ed.). Pearson India Publications.
   Unit I -*Chapter* 1
   Unit II -*Chapter* 2 and *Chapter* 3
   Unit III -*Chapter* 4
   Unit IV -*Chapter* 5
   Unit V -*Chapter* 7

Books for Reference:

1. Kingsnorth, S. (2023). *Digital Marketing Strategy: An Integrated Approach to Online Marketing* (1st Ed.).
2. Brunson, R. (2023). *Traffic Secrets: The Underground Playbook for Filling Your Websites and Funnels with Your Dream Customers* (1st Ed.).
3. Kagan, J., & Singh, S. S. (2020). *Digital Marketing: Strategy & Tactics* (1st Ed.).

4. Visser, M., Sikkenga, B., & Berry, M. (2018). *Digital Marketing Fundamentals: From Strategy to ROI* (1st Ed.).
5. Ahuja, V. (2015). *Digital Marketing* (1st Ed.). Oxford University Press.

Websites and eLearning Sources:

1. https://www.investopedia.com/terms/d/digital-marketing.asp
2. https://en.wikipedia.org/wiki/Digital_marketing
3. https://www.techtarget.com/searchcustomerexperience/definition/digital-marketing
4. https://www.tutorialspoint.com/pinterest_marketing/digital_marketing_introduction.html

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Recall the basic elements and factors of digital marketing	**K1**
CO2	Classify the technology and frameworks in which digital marketing operates	**K2**
CO3	Choose the key internal analysis elements for the relevant applications of underlying Frameworks of digital marketing	**K3**
CO4	Analyse different digital marketing strategies for the real time business applications	**K4**
CO5	Evaluate technical specifications and to develop site / portal to promote digital marketing	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UCS53ES01B**			**Discipline Specific Elective - 1:** Digital Marketing						**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	3	2	2	2	2	2	2	2	**2.1**
CO2	2	2	3	3	2	2	2	2	2	3	**2.3**
CO3	2	2	3	3	2	3	2	2	3	3	**2.5**
CO4	2	2	3	2	2	2	3	2	2	2	**2.2**
CO5	2	2	3	2	3	3	2	3	2	3	**2.5**
									Mean Overall Score		**2.32(High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53ES02A	**Discipline Specific Elective - 2:** Recent Trends in Computer Science	4	3

Course Objectives
To understand the evolution, impact, risks, and challenges of Generative AI in society and businesses.
To explore Edge Computing architecture, devices, networking, and its role in IoT and data analytics.
To examine VR technologies, hardware, features, challenges, and future advancements.
To analyze AR form factors, controllers, adoption trends, and emerging innovations.
To learn Blockchain fundamentals, types, consensus mechanisms, and its future applications.

UNIT I: Generative AI (12 Hours)

Unveiling Generative AI: A New Frontier - Tracing the Evolutionary Blueprint of Generative AI Revolutionizing Societies and Business Ecosystems - Risks and Challenges to Manage - Impact of Generative AI on Jobs.

UNIT II: Edge Computing (12 Hours)

Edge Computing Concept- Edge Computing Architecture, Edge Devices, Edge Server Cluster - Cloud Server - Background Essentials: IoT Devices, Sensors, RFID, actuators- Networking Architecture - Network Management and Control - Edge Computing State-of-the-Art- Interfaces and Devices - Edge Computing Simulators - Edge Data Analytics.

UNIT III: Virtual Reality (12 Hours)

Defining Virtual and Augmented Reality: Looking at Some Other Types of Virtual and Augmented Reality - Taking a Quick History Tour - Evaluating the Technology Hype Cycle - Exploring the Current State of Virtual Reality: Looking at the Available Form Factors - Focusing on Features - Considering Controllers - Recognizing the Current Issues with VR - Assessing Adoption Rates - Consuming Content in Virtual Reality: Exploring Consumer-Grade Virtual Reality - Identifying Near-Future Hardware - Comparing Current and Future Options. .

UNIT IV: Augmented Reality (12 Hours)

Exploring the Current State of Augmented Reality: Looking at the Available Form Factors - Considering Controllers - Recognizing the Current Issues with Augmented Reality - Assessing Adoption Rates - Consuming Content in Augmented Reality: Exploring Consumer-Grade Augmented Reality - Identifying Near-Future Hardware - Comparing Current and Future Options.

UNIT V: Blockchain (12 Hours)

Fundamentals of Blockchain: Origin of Blockchain-Blockchain Solution - Components of Blockchain-Block in a Blockchain- The Technology and the Future. Blockchain Types and Consensus Mechanism: Decentralization and Distribution - Types of Blockchain- Consensus Protocol.

Teaching Methodology	Lectures and Presentations, Hands-on Demonstrations, Flipped classroom method, Case Studies and Industry Examples, Group Discussions, Peer Learning.
Assessment Methods	Written Examinations, Assignments and Reports, Practical Assessments, Presentations and Seminars

Books for Study:

1. Marr, B. (2024). *Generative AI in practice: 100+ amazing ways generative artificial intelligence is changing business and society.* Wiley.
   Unit I: *Chapter 1.*
2. Kumari, M., Anith, K., Sadasivam, G. S., Dharani, D., & Niranjanamurthy. (2021). *Edge computing: Fundamentals, advances, and applications (Advances in Industry 4.0 and machine learning).* Taylor & Francis.
   Unit II: *Chapter 2, Chapter 3(Sec.:3.8, 3.9, 3. 12)*
3. Mealy, P. (2018). *Virtual and augmented realities for dummies.* John Wiley & Sons.
   Unit III: *Chapters 1, Chapter 2, Chapter 4*

Unit IV: *Chapters 3, Chapter 5*.

4. Chandramouli, S., George, A. A., Abhilash, K. A., &Karthikeyan, M. (2021). *Blockchain technology.* University Press.
   Unit V: *Chapter 1, Chapter 2*

Books for Reference:

1. Steven, M. L. (2020). *Virtual Reality*. Cambridge University Press.
2. Russell, S. J., & Norvig, P. (2016). *Artificial Intelligence: A Modern Approach* (3rd Ed.). Pearson Education.
3. Schmalstieg, D., & Hollerer, T. (2016). *Augmented Reality*. Pearson Education.
4. Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Gold feder, S. (2016). *Bitcoin and cryptocurrency technologies: a comprehensive introduction*. Princeton University Press.

Websites and eLearning Sources:

1. **Generative AI:** https://www.ltimindtree.com/wp-Content/uploads/2023/01/DeepPoV-Generative-AI.pdf?pdf=download
2. **Edge Computing Overview :**https://prace-ri.eu/wp-content/uploads/Edge-Computing-An-Overview-of-Framework-and-Applications.pdf
3. **Vitual Reality and Augmented Reality** https://fpf.org/wp-content/uploads/2021/04/FPF-ARVR-Report-4.16.21-Digital.pdf
4. **BlockchainTechnology:**https://blockchain.gov.in/Documents/blockchain_informatics.pdf

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Recall fundamental concepts, terminologies, and principles of Generative AI, Edge Computing, VR, AR, and Blockchain	**K1**
CO2	Explain the evolution, architecture, and working mechanisms of emerging technologies in various domains.	**K2**
CO3	Demonstrate the use of Edge Computing, VR, AR, and Blockchain in real-world applications and industry scenarios	**K3**
CO4	Examine the impact, risks, and challenges of Generative AI and other emerging technologies on businesses and society	**K4**
CO5	Assess the effectiveness, limitations, and future trends of VR, AR, and Blockchain-based solutions	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
5	**25UCS53ES02A**			**Discipline Specific Elective - 2:** Recent Trends in Computer Science						**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	2	2	2	2	**2.2**
CO2	3	2	2	3	2	3	3	2	3	2	**2.5**
CO3	3	2	2	3	2	3	2	3	2	3	**2.5**
CO4	3	3	3	2	2	3	2	2	2	3	**2.5**
CO5	3	2	2	3	3	3	2	2	2	3	**2.5**
									Mean Overall Score		**2.44 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53ES02B	**Discipline Specific Elective - 2:** Object-Oriented Modeling and Design with UML	4	3

Course Objectives
To comprehend the fundamental principles of Object-Oriented Modeling and Development.
To apply class and interaction modeling techniques to represent real-world systems.
To evaluate and compare different modeling techniques for efficient system design.
To assess system design strategies to optimize performance and reusability.
To develop object-oriented solutions through structured modeling.

UNIT I: Object-Oriented Modeling (12 Hours)

Object Orientation - OO Development - OO Themes-Modeling as a Design Technique: Modeling-Abstraction - The Three models - Class Modelling: Objects and Class Concepts- Links and association Concepts- Generalization and Inheritance.

UNIT II: Class and Interaction Modeling (12 Hours)

Advanced Class modelling: Advanced objects and class concepts-Association ends-N-Ary associations-Aggregations-Abstract Class - Inheritance - Constrains - Advanced State Modeling: Nested State Diagrams-Nested states- Relation to Class Models.

UNIT III: Interaction Modeling and Process overview (12 Hours)

Interaction Modeling: Use Case models - Sequence models - Activity model - Process Overview: Development stages - Development Life Cycle.

UNIT IV: Analysis and Design Process (12 Hours)

System Conception: Devising a System Concept, Problem Statements-Application Analysis: Application Class Models- Interaction Models-System Design: Subsystems- Performance Estimation-Reuse Plans-Concurrency.

UNIT V: Class Design and Implementation (12 Hours)

Class Design: Bridging the Gap- Realizing Use Cases - Designing Algorithms- Optimization-Implementation Modeling: Fine-tuning Classes - Associations - Testing Strategies.

Teaching Methodology	Lectures and Presentations, Hands-on Demonstrations, Flipped classroom method
Assessment Methods	Written Examination, Assignment and Report, Practical Assessment, Presentation

Books for Study:

1. Blaha, M. Rumbaugh, J. (2005). *Object -Oriented Modeling and Design with UML* **(**2nd Ed.). Pearson Education.
   Unit I: *Chapter* 1, *Chapter* 2 and *Chapter* 3
   Unit II: *Chapter* 4 and *Chapter* 5
   Unit III: *Chapter* 7 and *Chapter* 10
   Unit IV: *Chapter* 11, *Chapter* 13 and *Chapter* 14
   Unit V: *Chapter* 15 and *Chapter* 17

Books for Reference:

1. McLaughlin, B., Pollice, G. and West, D. (2006). *Head First Object-Oriented Analysis and Design* (1st Ed.). O'Reilly Media
2. Ramnath, S & Dathan, B. *(*2011). *Object-Oriented Analysis and Design***,** (1st Ed.). Springer.
3. Booch, G. (2007). *Object-Oriented Analysis and Design with Applications,* (3rd Ed.). Addison-Wesley.

Websites and eLearning Sources:

1. https://archive.nptel.ac.in/courses/106/105/106105153/

2. Object-Oriented Analysis and Design: Foundations & Concepts | Coursera
3. https://www.udemy.com/course/oo-analysis-design-programming/?srsltid=AfmBOorzAq3_1BbFqvr8OzDdOvco3kTTY3kMyadHd5Pmu4ePhXSs1kIK

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Define key object-oriented modeling concepts like classes, objects, inheritance, and abstraction.	**K1**
CO2	Explain advanced concepts in class and interaction modeling, such as associations and state diagrams.	**K2**
CO3	Use interaction models and process stages to design systems.	**K3**
CO4	Analyze system conception and application models for designing class structures and interactions.	**K4**
CO5	Design and implement systems by creating algorithms, optimizing designs, and applying test strategies.	**K5**

Relationship Matrix											
Semester	**Course Code**	**Title of the Course**							**Hours**	**Credits**	
5	**25UCS53ES02B**	**Discipline Specific Elective - 2:** Object-Oriented Modeling and Design with UML							**4**	**3**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	3	2	1	3	3	2	3	**2.5**
CO2	2	3	1	2	3	2	3	2	3	3	**2.4**
CO3	2	2	3	2	3	3	2	2	2	3	**2.4**
CO4	3	2	3	1	2	2	3	2	3	2	**2.3**
CO5	3	2	3	2	2	1	2	3	3	2	**2.3**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS53IS01	Internship	0	1

Objective: The fourth semester includes a one-month industry internship designed to allow students to apply their theoretical knowledge in a real-world setting. This experience bridges the gap between classroom learning and professional practice, providing a platform for practical application and ensuring a well-rounded education.

Internship Process

1 **Duration**

Summer vacation at the end of the fourth semester is dedicated to a one-month internship in an organization equipped to facilitate B.Sc. internships. The internship will be carried out immediately after the fifth semester examinations.

2. Organization Selection

Students are responsible for choosing an organization and providing the relevant details to their Internship Guide and Class In-charge.

3. Requisition Letter

A requisition letter, endorsed by the HoD, will be sent to the chosen organization, seeking approval for the internship. Students are permitted to send only one requisition letter at a time.

4. Letter of Acceptance

Before commencing the internship, students must secure a formal letter of acceptance from the chosen organization.

5. Approval Criteria

The Internship guide and HoD reserve the right to approve or suggest changes to the selected organization. This might occur if the company lacks the requisite computing infrastructure

6. Commencement of Internship

Students are permitted to leave the College and join their chosen organization only upon receipt of the acceptance letter. The acceptance letter confirms the organization's commitment to facilitate the student's internship.

7. Review and Manuscript Submission

The review is conducted by the respective guides at the end of the internship. Alongside the review, students must submit a report detailing their internship experience in a prescribed format.

9. Viva-Voce Examination

The viva-voce examination for the internship is conducted by both internal and internally external examiners in the date specified by the Head of the Department.

Internship Report Evaluation	
Evaluation	**Marks**
Plan of the Internship	20
Execution of the Plan	40
Individual Initiative	15
Viva-Voce	25
Total	**100**

Candidates scoring less than 40% in the Internship must re-do the internship and defend it at the viva-voce within a month. A maximum of two chances will be given for resubmission and defence.

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
5	25UCS54OE01	**Open Elective - 1 (WS):** Web User Interface Design	4	2

Course Objectives
To study the basic technologies used in Web Development.
To give knowledge of some basic HTML Tags to Design Web Pages.
To explore tables and forms in real time applications.
To develop interactive web pages using JavaScript.
To impart knowledge on browser objects andevent handling.

Unit I: Web Technologies (12 Hours)

Core Web technologies - web browsers -Markup Languages - Style Sheet technologies - Images - Sound - Video - Programming Technologies - Client-side Programming - Server-Side Technologies - Network and Related protocols - Static, Dynamic and Active web pages.

Unit II: Basics of HTML (12 Hours)

HTML - Commonly used HTML Commands - Titles and Footers - Text Formatting - Emphasizing material in a web page - Text Styles - Text effects - Spacing. Lists: Types of Lists. Adding graphics to HTML documents: Using width and height attribute - Using align attribute - Using alt attribute.

Unit III: HTML Tables and Frames (12 Hours)

Tables: Header rows - data rows - Caption Tag - Using the width and border attribute - Using the Cellpadding attribute -Cell spacing attribute - BGCOLOR attribute -Colspan and Rowspan attributes. Linking documents: External document references - internal document references. Images as Hyperlink: Image Maps and HREF - Frames - Form and its elements.

Unit IV: Basics of JavaScript (12 Hours)

JavaScript in web pages - writing JavaScript with HTML - Basic programming techniques - operators and expressions - conditional checking - loops - functions - user defined functions - dialog boxes.

Unit V: JavaScript Document Object Model (12 Hours)

JavaScript DOM: JSSS DOM - understanding objects in HTML - browser objects - web page object hierarchy - handling events - The form object - built-in objects - user defined objects - cookies - setting a cookie.

Teaching Methodology	Lecture with Demonstration, Problem-Solving, Group Activities, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Quiz, Problem Solving and Assignment

Book for Study:

1. Powell, T. A. (2003). *Web Design - The Complete Reference* (2nd Ed.). Tata McGraw-Hill.
   Unit I*: Chapter-1 (Pages 65-104)*
2. Bayross, I. N. (2010). *Web enabled Commercial Application Development using HTML, JavaScript, DHTML and PHP* (4th Ed.). BPB Publications.
   Unit II: *Chapter* 2, *Chapter* 3, and *Chapter* 4 (Pages 31-116)
   Unit III: *Chapter* 5, *Chapter* 6 and *Chapter* 7 (Pages 97-187)
   Unit IV: *Chapter* 8(Pages 231-233, 236-250, 252-273)
   Unit V: *Chapter* 9 (Pages 279-293) and *Chapter* 10 (Pages 299-357)

Books for Reference:

1. Shelly Gary, B., Napier, A.H., & Ollie, R. N. (2008). *Web Design: Introductory Concepts and Techniques*. Cengage Learning.
2. Powell, T. A. (2000). *The Complete Reference - HTML* (4th Ed.). Osborne McGraw Hill.

Websites and eLearning Sources:

1. https://www.w3schools.com/html/
2. https://www.geeksforgeeks.org/html-tutorial/

3. https://www.tutorialspoint.com/html/index.htm
4. https://www.w3schools.com/js/
5. https://www.geeksforgeeks.org/javascript-complete-guide/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the basic technologies used in developing web pages.	**K1**
CO2	Understand the HTML structure and basic tags.	**K2**
CO3	Apply the structured formatting elements in web applications.	**K3**
CO4	Analyze the implementation problem solving in web programming	**K4**
CO5	Design real time web applications	**K5**

Relationship Matrix											
Semester	**Course Code**		**Title of the Course**						**Hours**		**Credits**
5	**25UCS54OE01**		**Open Elective - 1 (WS):** Web User Interface Design						**4**		**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	3	2	2	3	2	**2.3**
CO2	3	3	2	2	2	3	3	1	1	2	**2.2**
CO3	2	3	2	3	3	2	3	3	2	2	**2.5**
CO4	2	2	2	2	3	2	3	3	2	3	**2.4**
CO5	2	2	3	2	3	3	3	2	3	2	**2.5**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours	Credits
5	25UCS54SL04A	**Certificate Course - 1:** Data Analysis using Python and Spreadsheet	-	2

Course Objectives
To help students understand the concepts of spreadsheets and Python.
To apply acquired skills in analyzing various types of data.
To impart knowledge of data validation concepts.
To enable students to grasp the basics of Python programming.
To explore the use of Python programming for effective data visualization.

UNIT I: Data Analysis

Data Analysis and Python- Types of Data Analysis - Working with range names - Different phases of Data Analysis.

UNIT II: Working with Tables and Functions

Working with Tables- Cleaning data with Text Functions- Various Functions in Data Analysis.

UNIT III: Data Visualization

Sorting - Pivot Tables- Data Visualization - Generating reports in Spread sheet.

UNIT IV: Basic Python Programming

Basic Python Programming - Basic Syntax- Interactive shell-Editing, Saving and running a script- Control Statements - Tuples and List - Functions and Modules.

UNIT V: Data Manipulation Data Sets - Load data into a Data frame - Effective Data visualization - Fundamentals of Data Manipulation with Python.

Teaching Methodology	Videos, PPT, Demonstration and Flipped Classroom
Assessment Methods	Practical test, Online Quiz, Written Assignment and Test

Books for Study:

1. Felix Zumstein (2021). *Python for Excel* (1st Ed.). O'Reilly Media, Inc.
2. Dr. R. NageswaraRao (2017). *Core Python Programming* (1st Ed.). Dream tech Publishers.

Books for Reference:

1. Kenneth A. Lambert (2019). *Fundamentals of Python: First Programs* (2nd Ed.). CENGAGE Publication.
2. Fabio Nelli (2018). *Python Data Analytics* (2nd Ed.). APress.

Websites and eLearning Sources:

1. https://www.programiz.com/Excel
2. https://www.guru99.com/python-tutorials.html
3. https://www.w3schools.com/python/python_intro.html

Semester	Course Code	Title of the Course	Hours	Credits
5	25UCS54SL04B	**Certificate Course - 2:** Data Analysis using Python	-	2

Course Objectives
Recall Different Python IDEs
Understand the Fundamentals of Python Programming
Gain Proficiency in Sequential Data Types and NumPy Arrays
Explore Pandas Data Frames and Matplotlib Libraries
Develop Practical Python Programming Skills

UNIT I: Introduction to Python

History and applications of Python - Introduction to Python IDE's - Basics of Spyder- Setting Working Directory - Creating and Saving a script file - File execution - Clearing Console - Removing Variables from Environment - Clearing Environment - Commenting script files.

UNIT II: Basics of Python

Structure of Python Program - Keywords - Variables - Data Types -Literals - Constants- Operators - I/O Statements - Control Structures: if statement - if-else family - while loop - for loop - User-defined Functions: Introduction - Syntax - Return Statement - Function Argument -Recursive function

UNIT III: Sequence data types

Fundamentals - Strings and its operations - Introduction to Lists - basic Operations- List methods - Tuples- built-in functions - Dictionary: Introduction - Operation - Sets - Range- Introduction to NumPy-NumPy Arrays - Aggregations.

UNIT IV: Pandas Data frame

Introduction to Pandas -Reading files - Exploratory data analysis - Data preparation and preprocessing- Data visualization: Introduction -Matplotlib libraries - Scatter plot -Line plot -Bar plot -Case Study using Classification - Regression techniques

UNIT V: Coding Practices

Basic Programs using I/O Statements- Control Structures: if statement - if-else family -while - for loop- Functions - List- Tuple - Dictionary -NumPy Arrays - Pandas dataframe-Data visualization usingMatplotlib libraries.

Teaching Methodology	Lectures, Flipped Classroom.
Assessment Methods	MCQ, Snap Test, Practical test.

Books for Study:

1.Kulkarni. (2017). *Problem Solving using Python Programming*. Yes Dee Publishing.

Books for Reference:

1. Matthes, E. (2019). *Python Crash Course*, (2nd Ed.), No Starch Press.
2. Plas, J. K. (2016), *Python Data Science Handbook: Essential Tools for Working with Data*, O'Reilly Media.

Websites and eLearning Sources:

1. https://www.w3schools.com/python/python_intro.asp
2. https://pandas.pydata.org/
3. https://www.geeksforgeeks.org/introduction-to-pandas-in-python/

Semester	Course Code	Title of the Course	Hours	Credits
5	25UCS54SL04C	**Certificate Course - 3:** Data Visualization Tools	-	2

Course Objectives
To understand the principles, types, and importance of data visualization
To gain proficiency in data handling, such as efficient data management and analysis
To develop the ability to connect, clean, and visualize data using Tableau and Power BI
To use Python libraries for static and advanced visualizations, customize plots and datasets.
To explore web-based data visualization tools like Google Data Studio and Flourish.

UNIT I: Fundamentals of Data Visualization

Data Visualization - Importance and Applications - Principles of Effective - Data Visualization - Types of Data and Visual Representations - Storytelling with Data - Basic Statistical Concepts for Visualization.

UNIT-II: Data Sources, Collection, and Cleaning

Data Formats: CSV - JSON - Excel - Databases - Excel & Google Sheets - Charts and Graphs (Bar, Line, Pie, Scatter) - Pivot Tables and Conditional Formatting - Creating Dashboards in Excel & Google Sheets.

UNIT III: Interactive Visualization with Tableau and Power BI

Tableau: Tableau Interface - Connecting Data Sources and Cleaning Data - Creating Charts and Advanced Visuals - Dashboards and Storytelling with Tableau. Power BI: Power BI Interface - Importing and Transforming Data-Creating - Reports and Dashboards - DAX (Data Analysis Expressions) Basics - Publishing and Sharing Reports.

UNIT IV: Data Visualization using Python (Matplotlib & Seaborn)

Python and Jupyter Notebooks - Data Handling with Pandas - Creating Static - Visualizations with Matplotlib- Customizing Plots and Layouts.

UNIT V: Web-Based Visualization

Web - Based Tools (Google Data Studio, Flourish) - Connecting Data Sources and Creating Reports - Building Interactive Charts and Dashboards - Sharing and Embedding Visualization.

Teaching Methodology	Lecture and Presentation, Hands-on Lab and Demonstration and Flipped Classroom
Assessment Methods	Written Examination, Practical Assessment and Presentation

Books for Study:

1. Cole NussbaumerKnaflic (2015). *Storytelling with Data: A Data Visualization Guide for Business Professionals,* (1st Ed.). Wiley.

Books for Reference:

1. Alex Kolokolov, Maxim Zelensky. (2024), *Data Visualization with Microsoft Power BI: How to Design Savvy Dashboards,* (1st Ed.). O'Reilly Media
2. Claus O. Wilke(2019). *Fundamentals of Data Visualization: A Primer on Making Informative and Compelling Figures,* (1st Ed.). O'Reilly Media.
3. Kieran Healy (2018). *Data Visualization: A Practical Introduction* (1st Ed.). Princeton University Press

Web resources and eLearning Sources:

1. https://redbushanalytics.com/data-visualization-oer
2. https://vlinkinfo.com/blog/10-data-visualization-techniques-to-derive-business-insights/
3. https://datavizcatalogue.com/

Semester	Course Code	Title of the Course	Hours	Credits
5	25UCS54SL04D	**Certificate Course - 4:** Programming Using XML	-	2

Course Objectives
To recall the fundamentals of XML, XML structuring, well-formed XML documents and overview of XSL.
To apply XML Document Type Definition, element, attribute, entity declarations and Namespaces.
To demonstrate CSS, XML transformation with XSLT and XSL Formatting Objects.
To utilize X Links, X Pointers and XML Schemasin real-world applications.
To assess real-world XML applications and integrate XML with Programming Languages.

UNIT I: Introducing XML

An Eagle's Eye View of XML — XML Document – Structuring Data – Attributes, Empty-Element Tags and XSL – Well–formedness.

UNIT-II: Document Type Definition

Validity – Element Declarations – Attribute Declarations - Entity Declarations – Namespaces.

UNIT III: Style Languages

CSS Style Sheets – CSS Layouts – CSS Text Styles – XSL Transformations – XSL Formatting Objects.

UNIT IV: Supplemental Technologies

XLinks – XPointers – XInclude – Schemas.

UNIT V: XML Applications

Chemical Markup Language – Mathematical Markup Language – RSS Classic literature – Synchronized Multimedia Integration Language – Open Software Description -Scalable Vector Graphics –Music XML – Voice XML.

Teaching Methodology	Lecture and Presentation, Hands-on Lab and Demonstration and Flipped Classroom
Assessment Methods	Written Examination and Practical Assessment

Book for Study:

1. Harold, E.R. (2004).*XML Bible* (3rd Ed.). John Wiley & Sons.

Books for Reference:

1. Fawcett, F., Quin, L.R.E., & Ayers, D. (2012). *Beginning XML* (5th Ed.). John Wiley & Sons.
2. Powell, T.A. (2010). *The Complete Reference XML* (5th Ed.). McGraw–Hill.
3. Holzner, S. (2004). *XML in 21 Days* (3rd Ed.). Sams Publishing.

Websites and eLearning Sources:

1. https://www.w3.org/TR/xml/
2. https://www.udemy.com/topic/xml/
3. https://developer.mozilla.org/en-US/docs/Web/XML/XML_introduction
4. https://alison.com/tag/xml

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63CC12	**Core Course - 12:** Mobile Application Development using Android	4	3

Course Objectives
To understand the basics of mobile app using Android Platform
To classify detail framework of Android Platform Components
To apply the design aspects in creating intuitive, mobile apps
To analyse the various UI design components of mobile app development
To choose graphical features to design attractive mobile apps

UNIT I: Android Platform (12 Hours)

The Android Software Development Platform: Understanding Java SE and the Dalvik Virtual Machine -The Directory Structure of an Android Project-Common Default Resources Folders -The Values Folder - Leveraging Android XML- Screen Sizes-Desktop Clocks - Using Android Application Resources - Launching Application: The AndroidManifest.xml File - Creating First Android Application-Running the App-Adding an Application Icon-Adding Transparency.

UNIT II: Overview of Android Framework (12 Hours)

Android Framework Overview: The Foundation of OOP: The Object-The Blue-print for an Object: The Class. Providing Structure for Classes: Inheritance - Defining an Interface Bundling Classes - An overview of XML - The APK File - Android Application Components Android Activities - Android Services - Broadcast Receivers - Content Providers - Android Manifest XML.

UNIT III: Working with Screen Layouts (12 Hours)

Screen Layout Design - Android View Hierarchies - Nesting Views - Defining Screen Layouts - Editing the main.xml File - Using Relative Layouts - Sliding Drawers - Using Padding and Margins with Views and Layouts.

UNIT IV: Working with Buttons, Menus, and Dialogs (12 Hours)

UI Design: Buttons, Menus, and Dialogs: Using Common UI Elements - Adding an Image Button to Your Layout - Defining Multistate Image Button - Graphics in XML - Editing the main.xml File Replacing the Default Background - Adding a Text to Your Layout - Adding an Image - Using Menus in Android - Creating the Menu Structure with XML - Running the Application in the Android Emulator Making the Menu Work - Adding Dialogs.

UNIT V: Graphics in Android (12 Hours)

Graphics Resources in Android: Drawables- Implementing Images - Creating Animation in Android-Tween Animation in Android-Using Transitions - Creating 9 - Patch Custom Scalable Images - Playing Video in Android Apps - SQLite based simple applications.

Teaching Methodology	Gamification, Flipped-Classroom, Demonstration and Hands on sessions
Assessment Methods	Quiz, Seminar, Real-time Project, Problem Solving task and App-Development

Books for Study:

1. Jackson W, (2011). *Android Apps for Absolute Beginners*, (1st Ed.). Apress Publications.
   Unit I: *Chapter* 4
   Unit II: *Chapter* 5
   Unit III: *Chapter* 6
   Unit IV: *Chapter* 7
   Unit V: *Chapter* 8

Books for Reference:

1. Smith D, Friesen J (2011). *Android Recipes: A Problem -Solution Approach*, (1st Ed.). Rakmo Press.
2. DiMarzio J. F. (2010). *Android: A Programmer's Guide*, (1st Ed.). Tata Mcgraw Hill.

3. Murphy M. L. (2010). *The Busy Coder's Guide to Android Development*, (1st Ed.). Commons Ware.

Websites and eLearning Sources:

1. http://developer.android.com/
2. https://developer.android.com/develop/ui/views/layout/declaring-layout
3. https://developer.android.com/guide/topics/resources/drawable-resource

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the elements of android application development platform.	**K1**
CO2	Understand the mobile application development framework.	**K2**
CO3	Apply various Layouts in the Android Framework	**K3**
CO4	Evaluate the user interfaces to support mobile application development.	**K4**
CO5	Design and evaluate the graphic elements in mobile application development.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UCS63CC12**			**Core Course - 12:** Mobile Application Development using Android						**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	2	3	2	3	3	**2.6**
CO2	3	3	3	3	2	2	2	2	2	3	**2.5**
CO3	3	3	2	2	2	3	3	2	2	2	**2.4**
CO4	3	2	2	2	3	3	2	3	3	2	**2.5**
CO5	2	2	2	3	1	3	3	2	3	2	**2.3**
										Mean Overall Score	**2.46(High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63CC13	**Core Course - 13:** Software Engineering	4	2

Course Objectives
To understanding the various phases of software development life cycle and process models
To learn the process of requirements gathering and its phases
To acquire the knowledge on the system modelling concepts and its phases
To explore the software testing techniques including unit testing, integration testing and system testing
To impart skills on the development of reliable and secure software projects and manage them

UNIT I: Fundamental models of Software Engineering (12 Hours)

Professional Software Development - Software Processes - Software Process Models - Process Activities - Agile Software Development - Agile methods - Agile development techniques - Agile project management.

UNIT II: Requirements Engineering (12 Hours)

Requirements Engineering - Functional and non-functional Requirements - Requirements Engineering processes - Requirements Elicitation - Requirements Specification - Requirements Validation - Requirements Change.

UNIT III: System Modeling (12 Hours)

System Modeling: Context Models - Interaction models - Structural Models -Behavioral- Model Driven Architecture - Architectural Design - Design and implementation.

UNIT IV: Software Testing (12 Hours)

Software Testing: Developmental Testing - Test Driven Development - Release Testing - User Testing - Software Evolution: Legacy systems - Software Maintenance.

UNIT V: Security Engineering and Project Management (12 Hours)

System Dependability and Security**:** Dependable systems - Reliability Engineering - Safety Engineering - Security Engineering. Software Management **-**Project Management - Project planning - Quality Management.

Teaching Methodology	Peer Teaching, Flipped-Classroom, Videos, Demonstration
Assessment Methods	Written Examination, Assignment, Online Quiz and Presentation

Books for Study:

1. Sommerville, I. (2017). *Software Engineering,* (10th Ed.). Pearson.
   Unit-I: *Chapter 1 (Sec: 1.1, 1.2), Chapter 2 (Sec 2.1, 2.2), Chapter 3 (Sec 3.1,3.2, 3.3)*
   Unit-II: *Chapter 4*
   Unit-III: *Chapter5, Chapter 6, Chapter 7*
   Unit-IV: *Chapter 8, Chapter 9(Sec 9.2, 9.3)*
   Unit -V *Chapter 10, Chapter 11, Chapter 12, Chapter 13, Chapter 22, Chapter 23, Chapter 24*

Books for Reference:

1. Pressman, R. S. (2019). *Software Engineering-A Practitioner's Approach,* (8th Ed.). McGraw Hill International.
2. Fairley, R. (2014). *Software Engineering Concepts,* (3rd Ed.). McGraw Hill International.
3. Mall, R. (2014). *Fundamentals of Software Engineering,* (4th Ed.). PHI.

Websites and eLearning Sources:

1. https://www.geeksforgeeks.org/software-engineering
2. https://www.computer.org/software

3. https://www.ibm.com/topics/software-engineering

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall fundamental models of software engineering, software development processes, and agile methodologies.	**K1**
CO2	Understand requirements engineering, functional and non-functional requirements, specification and validation.	**K2**
CO3	Apply system modeling techniques such as context models, interaction models, and architectural design in software development.	**K3**
CO4	Analyze different software testing methods, software evolution strategies, and maintenance techniques for software reliability.	**K4**
CO5	Evaluate software security, dependability, project management, and quality assurance strategies for effective software development and management.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UCS63CC13**			**Core Course - 13:** Software Engineering						**4**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	1	2	3	2	2	1	**2.0**
CO2	2	3	3	3	1	2	3	1	3	2	**2.3**
CO3	3	3	3	3	1	3	3	3	2	2	**2.6**
CO4	3	3	3	2	2	2	3	3	3	2	**2.6**
CO5	3	3	3	3	1	2	3	3	3	2	**2.6**
Mean Overall Score											**2.42 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63CC14	**Core Course - 14:** Operating Systems	4	2

Course Objectives
To understand the basic principles, operations and importance of operating systems.
To illustrate the functions of process management and deadlock mechanisms.
To explore the memory management techniques and with virtual memory.
To impart the knowledge on file concepts, access methods and their protection.
To comprehend the mechanisms and principles of protection and security. ***(IKS)***

UNIT I: Fundamentals of Operating Systems (12 Hours)

Operating Systems: Computer System Organization - Computer System Architecture - Operating System Structure - Operating System Operations - Process Management - Memory Management - Storage Management - Protection and Security.

UNIT II: Process Management and Deadlocks (12 Hours)

Process Concept: Process Scheduling - Operations on Processes - Inter-process Communication - CPU Scheduling - Scheduling Criteria - Scheduling Algorithms. Deadlocks: System Model - Deadlock Characterization - Methods for handling Deadlocks.

UNIT III: Main Memory and Virtual Memory (12 Hours)

Main Memory: Swapping - Contiguous Memory Allocation - Segmentation. Paging - Structure of the Page Table. Virtual Memory: Demand Paging.

UNIT IV: File Concept (12 Hours)

File Concept - Access Methods - Directory and Disk Structure - File System - Mounting File Sharing - Protection.

UNIT V: Protection and Security (12 Hours)

Protection: Goals of Protection - Principles of Protection - Domain of Protection. Access Matrix: Implementation of the Access Matrix - Access Control. Security: The Security Problem - Cryptography as a Security Tool - *Katapayadi System.*

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

Note: ***IKS: 5% Included in Unit V***

Books for Study:

1. Silberschatz, S., Galvin, P. B., & Gagne, G. (2013). *Operating Systems Concepts*, (9th Ed.). Wiley Publications.

Unit I: *Chapter* 1
Unit II: *Chapter* 3 and *Chapter* 7
Unit III: *Chapter* 8 and *Chapter* 9
Unit IV: *Chapter* 11 and *Chapter* 12
Unit V: *Chapter* 14 and *Chapter* 15

Books for Reference:

1. EktaWalia (2015). *Operating Systems Concepts*, (2nd Ed). Khanna Publishing House.
2. Stallings, W. (2014). *Operating Systems -Internals and Design Principles*, (8th Ed.). Pearson Publications.
3. Tanenbaum, A. S. (2014). *Modern Operating Systems*, (4th Ed.). Pearson Publications.

Websites and eLearning Sources:

1. https://onlinecourses.swayam2.ac.in/ntr25_ed41/preview
2. https://onlinecourses.nptel.ac.in/noc21_cs88/preview

3. https://en.wikipedia.org/wiki/Katapayadi_system

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Remember the basic concepts of operating systems and security mechanisms.	**K1**
CO2	Understand the working processes of management techniques, scheduling algorithms and security mechanisms.	**K2**
CO3	Apply the operating system concepts and techniques on real time applications.	**K3**
CO4	Analyze the operating system techniques, methods, algorithms and security procedures.	**K4**
CO5	Evaluate the algorithms, techniques and mechanisms used in operating systems.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**	**Credits**	
6	**25UCS63CC14**			**Core Course - 14:** Operating Systems					**4**	**2**	
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	3	2	2	2	3	3	**2.3**
CO2	2	2	2	3	3	2	2	2	3	3	**2.4**
CO3	2	2	2	3	3	2	2	3	3	3	**2.5**
CO4	2	2	2	3	3	2	2	2	3	3	**2.4**
CO5	3	3	3	3	3	3	1	2	2	2	**2.5**
										Mean Overall Score	**2.42(High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	**25UCS63CP07**	**Core Practical - 7:** Mobile Application Development using Android	**3**	**2**

List of Exercises

1. Different Layout design including nested layout
2. Arithmetic Operations
3. Business Calculator
4. Animation
5. Intent
6. Prepare Student Bio-data using Database SQLite
7. Fragments-Tablet Programming
8. Media Player

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63ES03A	**Discipline Specific Elective - 3:** Fundamentals of Data Science	4	3

Course Objectives
To understand data science fundamentals and its interdisciplinary applications.
To learn data collection, cleaning, and visualization for quality analysis.
To explore core machine learning concepts and predictive modeling.
To study the theoretical and algorithmic foundations of data science.
To improve data interpretation and create effective visualizations.

UNIT I: Fundamentals of Data Science (12 Hours)

Data Science - Data science Venn diagram - Basic terminology - Data science case studies - Types of data - levels of data - Types of data analytics - Descriptive Analytics - Diagnostic analytics - Predictive analytics - Prescriptive analytics - Five steps of Data science

UNIT II: Mathematical Preliminaries (12 Hours)

Basic Maths - Mathematics as Discipline - Basic Symbols and Terminology - Linear Algebra. Probability: Bayesian vs. Frequentist - Compound Events - Conditional Probability - Rules of Probability.

UNIT III: Visualizing Data (12 Hours)

Exploratory Data Analysis - Developing the Visual Aesthetic - Chart Types - Great Visualizations - Reading Graphs - Interactive Visualizations

UNIT IV: Data Mining and Data Warehousing (12 Hours)

Data Warehousing - Design Consideration of Data Warehouse - Data Loading Process - Data Mining - Data Mining Techniques - Tools and Platforms - Case Study

UNIT V: Recent Trends in Data Science (12 Hours)

Applications of Data Science - Data Analysis Techniques - Various Visualization Techniques - Application development methods used in Data Science.

Teaching Methodology	Lecture-based instruction, Demonstration, Group Discussion, Peer Learning, Problems solving, and Project-based learning.
Assessment Methods	Quiz, Coding Practice, MCQ, Project

Books for Study:

1. Sinan, O. (2016). *Principles of Data Science*, (1st Ed.). Packt Publishing.
   Unit I: *Chapter* 1, *Chapter* 2 and *Chapter* 3
   Unit II: *Chapter* 4, *Chapter* 5
   Unit III: *Chapter* 9, *Chapter* 10, *Chapter* 11
   Unit IV: *Chapter* 12, *Chapter* 13
   Unit V: *Chapter* 14 and *Chapter* 15

Books for Reference:

1. Joel, G. (2019). *Data Science from Scratch: First Principles with Python*, (2nd Ed.) O'Reilly.
2. Pierson, L. (2021). *Data Science for Dummies*, (3rd Ed.). John Wiley & Sons.
3. Blum, A., Hopcroft, J. &Kannan, R. (2020). *Foundations of Data Science*, (1st Ed.). Cambridge University Press.

Websites and eLearning Sources:

1. https://www.analyticsvidhya.com/
2. https://www.simplilearn.com
3. https://www.ibm.com/in-en/topics/data-science
4. https://www.mygreatlearning.com/blog/what-is-data-science/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Define key data science concepts, types of data, analytics, and the five steps of data science.	**K1**
CO2	Understand basic mathematical concepts and probability methods, applying them to data science problems.	**K2**
CO3	Analyze and interpret data visualizations, choosing appropriate chart types and evaluating their effectiveness.	**K3**
CO4	Develop skills to explore and summarize data using statistical methods and visualization techniques	**K4**
CO5	Integrate data analysis and visualization techniques to develop data science applications for decision-making.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
6	**25UCS63ES03A**			**Discipline Specific Elective - 3:** Fundamentals of Data Science					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	3	2	1	3	3	2	3	**2.5**
CO2	2	3	1	2	3	2	3	2	3	3	**2.4**
CO3	2	2	3	2	3	3	2	2	2	3	**2.4**
CO4	3	2	3	1	2	2	3	2	3	2	**2.3**
CO5	3	2	3	2	2	1	2	3	3	2	**2.3**
Mean Overall Score											**2.38 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63ES03B	**Discipline Specific Elective - 3:** Cloud Computing	4	3

Course Objectives
To understand the concepts of cloud computing technology
To know cloud architectures and services in cloud computing
To gain Insights into virtualization, abstraction and capacity planning
To learn cloud management techniques and apply cloud security
To elaborate cloud-based application deployment

UNIT I: Basics of Cloud Computing (12 Hours)

Defining Cloud Computing: Cloud Types - Examining the Characteristics of Cloud Computing - Assessing the Role of Open Standards. Assessing the Value Proposition: Measuring the Cloud's Value - Avoiding Capital Expenditures - Computing the Total Cost of Ownership - Specifying Service Level Agreements - Defining Licensing Models.

UNIT II: Cloud Architectures, Services, and Applications (12 Hours)

Understanding Cloud Architecture: Exploring the Cloud Computing Stack - Connecting to the Cloud - Understanding Services and Applications: Defining Infrastructure as a Service (IaaS) - Defining Platform as a Service (PaaS) - Defining Software as a Service (SaaS) - Defining Identity as a Service (IDaaS) - Defining Compliance as a Service (CaaS).

UNIT III: Cloud Abstraction, Virtualization, and Capacity Planning (12 Hours)

Understanding Abstraction and Virtualization: Using Virtualization Technologies - Load Balancing and Virtualization - Understanding Hypervisors - Understanding Machine Imaging - Porting Applications. - Capacity Planning: Defining Baseline and Metrics - Network Capacity - Scaling.

UNIT IV: Managing the Cloud and Understanding Cloud Security (12 Hours)

Managing the Cloud: Administrating the Clouds - Cloud Management Products - Emerging Cloud Management Standards. - Understanding Cloud Security: Securing the Cloud - Securing Data - Establishing Identity and Presence.

UNIT V: Moving Applications to the Cloud and Cloud-Based Storage (12 Hours)

Moving Applications to the Cloud: Applications in the Clouds - Applications and Cloud APIs. - Working with Cloud-Based Storage: Measuring the Digital Universe - Provisioning Cloud Storage - Exploring Cloud Backup Solutions - Cloud Storage Interoperability.

Teaching Methodology	Lecture-based Learning, Case Study-Based Learning, Flipped Classroom, Problem-Based Learning
Assessment Methods	Written Examination, Assignment, Online Quiz, and Presentation

Books for Study:

1.Barrie Sosinsky. (2011). *Cloud Computing Bible*. (1st Ed) Wiley Publication.

Unit I: *Chapter 1, and Chapter 2.*

Unit II: *Chapter 3 and Chapter 4.*

Unit III: *Chapter 5 and Chapter 6.*

Unit IV: *Chapter 11 and Chapter 12.*

Unit V: *Chapter 10 and Chapter 15.*

Books for Reference:

1. Ingeno, J. (2018). *Software Architect's Handbook*. Packt Publishing.
2. Goessling, S., & Jackson, K. L. (2018). *Architecting Cloud Computing Solutions*. Packt Publishing.
3. Buyya, R., Broberg, J., &Goscinski, A. (2011). *Cloud Computing Principles and Paradigms*, (1stEd.). Wiley Publication.

Websites and eLearning Sources:

1. https://www.ibm.com/topics/cloud-computing
2. https://www.techtarget.com/searchitchannel/cloud-service-provider-cloud-provide
3. https://www.c-sharpcorner.com/article/top-10-cloud-service-providers
4. https://www.guru99.com/cloud-computing-service-provider.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 concepts of cloud computing technology	**K1**
CO2	Understand the structure of the cloud and its techniques.	**K2**
CO3	Summarize the resource management in cloud computing	**K3**
CO4	Understand and apply the future trends in cloud computing	**K4**
CO5	Evaluate the effectiveness of cloud computing models	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
6	**25UCS63ES03B**			**Discipline Specific Elective - 3:** Cloud Computing					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	2	3	3	2	1	2	**2.2**
CO2	3	3	3	2	1	3	3	3	2	2	**2.5**
CO3	2	3	3	2	2	2	3	3	2	2	**2.4**
CO4	3	3	3	1	2	3	3	3	1	2	**2.4**
CO5	2	3	3	1	2	2	3	3	2	1	**2.2**
									Mean Overall Score		**2.34 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63ES04A	**Discipline Specific Elective - 4:** Internet of Things	4	3

Course Objectives
To understand the characteristics and enabling technologies of the Internet of Things (IoT).
To explore the connectivity of sensors and related hardware for IoT application scenarios.
To enable and analyse various techniques, such as messaging and transport protocols, addressing, and identification in the IoT domain.
To facilitate the selection of appropriate cloud services and cloud service providers based on the IoT application.
To evaluate the skills required to design and develop new IoT-based applications.

UNIT I: Introduction to 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.

UNIT II: Sensors, Microcontrollers and their interfacing (12 Hours)

Sensors, Microcontrollers and their interfacing: sensor interfacing - Types of Sensors - Controlling sensors through Webpage - Microcontrollers: a quick walkthrough.

UNIT III: Protocols for IoT-Addressing and Identification (12 Hours)

Protocols for IoT: Messaging Protocols - XMPP and DDS Protocols - Transport Protocols - Addressing and Identification: Internet Protocol Version 4 - Internet Protocol Version 4 - IPv6 vs IPv4 - Legacy of IPv4 devices - Switching over to IPv6.

UNIT IV: Cloud for IoT (12 Hours)

Cloud for IoT: Introduction - IoT with Cloud - challenges - Selection of cloud service provider - Fog computing - Cloud computing: Security aspects. Data Analytics: Data Analysis.

UNIT V: Application Building with IoT (12 Hours)

Application Building with IoT: Smart Perishable tracking with IoT and Sensors - Smart Healthcare - IoT based Application to Monitor Water Quality - Smart Warehouse Monitoring - Smart Retail - IoT based Smart Driver Assistance System - System to measure Collision impact in an accident with IoT - Integrated Vehicle Health Management.

Teaching Methodology	Lecture with Demonstration, Problem-Solving, Case Study, Group Activity, Peer Learning and Flipped Classroom.
Assessment Methods	Objective Test, Assignment, Quiz, Oral Presentation and Case Study

Books for Study:

1. Shriram, K. V., Abhishek, S. N. &Sundaran, R. M. D. (2020). *Internet of Things*, (2nd Ed.). Wiley Publications.
   Unit I -*Chapter* 1
   Unit II-*Chapter* 2
   Unit III-*Chapter* 3 and *Chapter* 4
   Unit IV-*Chapter* 5 and *Chapter* 6
   Unit V-*Chapter* 7

Books for Reference:

1. Qusay, F. H. (2018). *Internet of Things A to Z: Technologies and Applications*. Wiley Publication, IEEE Press.
2. Hanes, David, Gonzalo, S., Patrick, G., Robert, B., & Jerome, H. (2017). *IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things*. Cisco Press.
3. Arshdeep, B., & Vijay, M. (2015). *Internet of Things - A Hands-on Approach*. Universities Press Private Limited.

Websites and eLearning Sources:

1. https://www.shiksha.com/online-courses/industrial-internet-of-things-iiot-course courl40
2. https://www.tinkercad.com/
3. https://www.techtarget.com/iotagenda/definition/Internet-of-Things-IoT
4. https://www.oracle.com/in/internet-of-things/what-is-iot/
5. https://www.ibm.com/topics/internet-of-things
6. https://onlinecourses.nptel.ac.in/noc25_cs44/unit?unit=18&lesson=19

Course Outcomes		
CO No.	**CO-Statements** On successful completion of this course, students will be able to	**Cognitive Levels (K-Level)**
CO1	Identify the characteristics and enabling technologies of the Internet of Things (IoT).	**K1**
CO2	Classify the sensors and other necessary hardware required for deploying IoT applications.	**K2**
CO3	Select appropriate transport protocols, addressing, and identification techniques suitable for the IoT domain.	**K3**
CO4	Analyse suitable cloud services and cloud service providers for IoT-based smart services.	**K4**
CO5	Evaluate appropriate IoT-based smart services for real-time applications	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
6	**25UCS63ES04A**			**Discipline Specific Elective - 4:** Internet of Things					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	2	2	2	2	2	2	2	2	3	2	**2.1**
CO2	2	3	3	3	2	2	3	2	2	2	**2.4**
CO3	2	2	2	2	2	3	2	2	2	2	**2.1**
CO4	2	3	3	2	2	2	2	2	2	2	**2.2**
CO5	2	3	3	2	2	2	3	3	3	2	**2.5**
Mean Overall Score											**2.26 (High)**

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63ES04B	**Discipline Specific Elective - 4:** Big Data Analytics	4	3

Course Objectives
To understand the basic concepts of Big Data
To identify the issues of data acquisition and validation
To impart knowledge on Online transaction and analytical processing
To analyse distributed data processing concepts
To evaluate the storage and statistical analysis technique

UNIT I: Fundamental to BigData (12 Hours)

Concepts and Terminology - Big Data Characteristics - Different Types of Data -case study Background - Business goals and Obstacles - Business Motivations and Drivers for Big Data Adoption Marketplace Dynamic - Business Architecture- Business process Management.

UNIT II: Big data Adoption and Planning Considerations (12 Hours)

Organization Prerequisites - Data Procurement - Privacy - Security - Provenance - Limited Realtime Support - Distinct Performance Challenges - Distinct Governance Requirements - Distinct Methodology - Big Data Analytics - Data Identification - Data Acquisition and Filtering - Data Extraction - Data validation and cleansing - Data Aggregation and Representation.

UNIT III: Enterprise Technologies and Big Data Business Intelligence (12 Hours)

Online Transaction and Processing (OLTP) - Online Analytical Processing (OLAP) - Extract Transform Load (ETL) - Data Warehouses - Data Marts.

UNIT IV: Big Data Processing Concepts (12 Hours)

Parallel Data Processing - Distributed Data Processing -Hadoop- Processing Workloads - Cluster - Processing in Batch Mode - Map - Combine - Partition - Shuffle and Sort.

UNIT V: Big Data Storage Technology (12 Hours)

On-Disk Storage Devices -NoSQL Database - In-Memory Storage Device - Big Data Analytics Techniques - Quantitative Analysis - Qualitative Analysis - Data Mining - Statistical Analysis - A/B Testing - Correlation-Regression - Machine Learning.

Teaching Methodology	Lectures and Presentations, Demonstrations, Case Study, Group Discussions and Peer Learning
Assessment Methods	Written Examination, Assignment, Online Quiz and Presentation

Books for Study:

1. Buhler, P., Khattak, W., &Erl, T. (2016). *Big Data Fundamentals: Concepts, Drivers & Techniques,* (1st Ed.). Prentice Hall Publications.
   Unit I: *Chapter* 1 and *Chapter* 2
   Unit II: *Chapter* 3
   Unit III: *Chapter* 4 and *Chapter* 5
   Unit IV: *Chapter* 6
   Unit V: *Chapter* 7 and *Chapter* 8

Books for Reference:

1. DT Editorial Services. (2016). *Big Data-Black Book (Hadoop 2, MapReduce, Hive, YARN, Pig, R and Data Visualization),* (1st Ed.). Dreamtech Press.
2. Mohanty, S., Jagadeesh, M., &Srivatsa, H. (2013). *Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics.*Apress Media.
3. White, T. (2012). Hadoop: *The Definitive Guide,* (3rd Ed.). O'Reilly Media.

Websites and eLearning Sources:

1. https://www.coursera.org/courses?query=big%20data%20analytics
2. https://en.wikipedia.org/wiki/Big_data
3. https://onlinecourses.nptel.ac.in/noc20_cs46/preview

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the basics of Big Data technologies and its applications	**K1**
CO2	Understand big data planning, processing, Storage techniques and technologies	**K2**
CO3	Apply the cutting-edge tools and technologies to analyze Big Data	**K3**
CO4	Analyse the business performance of various big data technologies and tools	**K4**
CO5	Evaluate the techniques and mechanisms available for Big Data	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**					**Hours**		**Credits**
6	**25UCS63ES04B**			**Discipline Specific Elective - 4:** Big Data Analytics					**4**		**3**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	1	3	3	2	1	2	**2.1**
CO2	3	3	3	2	2	3	3	3	3	2	**2.7**
CO3	2	2	3	2	2	2	3	2	2	1	**2.1**
CO4	3	3	3	1	1	3	2	3	1	1	**2.1**
CO5	2	3	3	3	3	2	3	3	3	1	**2.6**
Mean Overall Score											**2.32 (High)**

Semester	Course Code	Title of the Course	Hours/ Weeks	Credits
6	25UCS63PW01	Project Work and Viva Voce	3	2

All B. Sc (CS) students are required to undertake project work in their sixth semester. This project should apply the knowledge acquired during the first five semesters and can involve application development or system-oriented development.

Project Approval Process

Synopsis Submission: Students must submit a synopsis for approval by the project guide. The synopsis should include:

1. System Analysis
2. System Requirements (Software and Hardware)
3. Feasibility Analysis

Guide Allocation: The project guide will be assigned by the Class-in-charge or the Head of the Department.

Project Execution

Lab Work: Students must carry out the project work in the college's Computer Labs.

Progress Approval: Before proceeding to the next phase of the project, students must obtain approval from the guide at least one day before the lab session.

Project Report Compilation

After completing the project, students must compile a comprehensive project report, which should include:

1. System Analysis
2. System Requirements (Software and Hardware)
3. Feasibility Analysis
4. Diagrams:
   - Data Flow Diagrams (DFD)
   - Entity-Relationship (E-R) Diagrams
   - Object-Oriented Model Diagrams
   - Circuit Diagrams (if applicable)
5. Data Tables and Dictionary (if applicable)
6. Output Models
7. Implementation Details
8. Future Enhancements (if any)
9. References:
   Bibliography
   Web References (if applicable)

Report Appendices

Each volume of the report should include:

- Source Code
- Screenshots of Model Outputs

Submission Guidelines

Format:

The project report should be submitted in the form of bound volumes (A4 size). The number of volumes will typically be two but may be three, depending on departmental requirements.

Certification:

The report must bear certificates of authenticity from the guide and the Head of the Department.

Evaluation Criteria

Total Marks: 100

Internal:75 marks

(Problem understanding [25] + Regularity [20] + Demo [20] + Report [10])

Viva-Voce: 25 marks (evaluated jointly by the project guide and an external examiner)

Viva-Voce is scheduled tentatively during the last week of the semester.

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS63EL01B	Industrial Visit	0	1

Industrial Visit Guidelines

Industrial visits are essential components of the BSc Computer Science curriculum, aiming to bridge the gap between theoretical knowledge and practical application. These visits offer students first-hand exposure to real-world work environments, industry practices, and technological advancements.

Key Ethical Guidelines

To ensure productive and meaningful visits, the following ethical guidelines must be adhered to:

1. **Respect for the Host Organization**
   - Punctuality
   - Professional Conduct
   - Gratitude
2. **Adherence to Rules and Regulations**
   - Compliance
   - Confidentiality
   - Dress Code
3. **Active Participation and Learning**
   - Engagement
   - Curiosity
   - Note-Taking
4. **Ethical Behavior**
   - Honesty
   - Integrity
   - Respect for Diversity

Conclusion

Industrial visits provide invaluable opportunities for BSc Computer Science students to gain practical knowledge and prepare for their future careers.

Evaluation Criteria

The evaluation of the Industrial visit consists of a viva voce conducted by an external and internal examiner. The criteria for evaluation out of 100 marks are as follows:

1. Regularity (20 marks)
2. Preparation of Report (20 marks)
3. Content (15 marks)
4. Report Format (20 marks)
5. Defending Queries/Viva Voce (25 marks)

Mark Distribution

Internal Examiner: 75 marks

Viva Voce:25 marks

Schedule

The viva voce will be tentatively conducted during the last week of the semester.

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	**25UCS63CE01**	Comprehensive Examination	**0**	**2**

UNIT I: Object-Oriented Programming

1. Class and Objects
2. Inheritance
3. Constructors
4. Polymorphism
5. Abstraction
6. Message Passing
7. Encapsulation

UNIT II: Data Structures and Algorithms

1. Arrays
2. Stack & Queue
3. Linked List
4. Tree, Binary Tree
5. Sorting & Searching Algorithms
6. Backtracking
7. Recursion

UNIT III: Operations Research and Database Systems

Operations Research

1. Linear Programming Problem (LPP)
2. Transportation & Assignment Problem
3. Project Scheduling

Database Systems

1. Data Models - Relational and ER Model
2. Database Design - Normalization
3. SQL

UNIT IV: Operating Systems

1. Operating System Structure
2. Process Management Concepts: Life Cycle
3. Scheduling
4. Memory Management Concepts: Paging-Segmentation- Virtual Memory

UNIT V: Computer Networks

1.Data Communication
2.OSI Layers - Application, Network, Transport
3.TCP/IP Model
4.Security

Semester	Course Code	Title of the Course	Hours/Weeks	Credits
6	25UCS64OE02	**Open Elective - 2:** Design Thinking	4	2

Course Objectives
To understand the fundamental principles, process, and tools of Design Thinking
To develop skills in problem identification, observation techniques and challenges
To acquire testing and validation skills through interviews, surveys, and workshops
To explore Future Trends in Design Thinking in Business and society
To analyze the integration of Design Thinking within organization and environments

UNIT I: Principles of Design Thinking (12 Hours)

Design - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project.

UNIT II: Understand, Observe and Define the Problem (12 Hours)

Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs.

UNIT III: Ideation and Prototyping (12 Hours)

Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques.

UNIT IV: Testing and Implementation (12 hours)

Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking.

UNIT V: Designing in Future (12 hours)

Design Thinking meets the corporation - The New Social Contract - Design Activism - Designing tomorrow.

Teaching Methodology	Peer Learning, Flipped Class Room, Presentation
Assessment Methods	Written Examination, Assignment, Online Quiz and Presentation

Books for Study:

1. Christian Mueller-Roterberg, *(2018). Handbook of Design Thinking -Tips & Tools for how to design thinking,* Springer.
   Unit I: *Chapter* 1
   Unit II: *Chapter* 2, *Chapter* 3 and *Chapter* 4
   Unit III: *Chapter* 5, *Chapter* 6
   Unit IV: *Chapter* 7 and *Chapter* 8
2. Tim Brown, (2009) (1st Ed.) *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation,* Harper Collins.
   Unit V: *Chapter* 6, *Chapter* 7 and *Chapter* 8

Books for Reference:

1. Johnny Schneider, (2017). *Understanding Design Thinking, Lean and Agile*, O'Reilly Media.
2. HassoPlattner, ChristophMeinel and Larry Leifer (eds.), (2011). *Design Thinking: Understand - Improve - Apply*, Springer.
3. Roger Martin, (2009) *The Design of Business: Why Design Thinking is the Next Competitive Advantage*, Harvard Business Press.

Websites and eLearning Sources:

1. http://ajjuliani.com/design-thinking-activities/
2. https://www.interaction-design.org/literature/topics/design-thinking
3. https://www.nngroup.com/articles/design-thinking/

Course Outcomes		
CO No.	**CO-Statements**	**Cognitive Levels (K-Level)**
	On successful completion of this course, students will be able to	
CO1	Recall the elements of design thinking concepts.	**K1**
CO2	Understand the various design thinking methods.	**K2**
CO3	Apply design thinking principles to solve problems.	**K3**
CO4	Analyze real-world problems using design thinking.	**K4**
CO5	Evaluate and create design solutions for industries.	**K5**

Relationship Matrix											
Semester	**Course Code**			**Title of the Course**						**Hours**	**Credits**
6	**25UCS64OE02**			**Open Elective – 2:** Design Thinking						**4**	**2**
Course Outcomes	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	1	3	3	2	1	2	**2.1**
CO2	3	3	3	2	2	3	3	3	3	2	**2.7**
CO3	2	2	3	2	2	2	3	2	2	1	**2.1**
CO4	3	3	3	1	1	3	2	3	1	1	**2.1**
CO5	2	3	3	3	3	2	3	3	3	1	**2.6**
									Mean Overall Score		**2.32(High)**