





UNDER GRADUATE DEGREE PROGRAMME

B.Sc.Computer Science (Artificial Intelligence & Data Science) Three Years

B.Sc. (Hons) Computer Science (Artificial Intelligence & Data Science) Four Years

CURRICULUM & SYLLABUS

REGULATIONS 2026

Effective from the Academic Year 2026- 2027

Department of Advanced Computing and Analytics

School of Computing Sciences

PALLAVARAM







VISION OF THE INSTITUTION
To make the Institute an epitome of excellence in higher education by effectively providing high quality education and rigorous training to students in multiple streams of choice with ample scope for all round development to make them excel in their profession for betterment of the society.

MISSION OF THE INSTITUTION	
M1	Effectively imparting knowledge and inculcating innovative thinking.
M2	Facilitating skill enhancement through add on courses and hands on training.
M3	Doing original, socially relevant, high quality research.
M4	Instilling the spirit of integrity, equity, professional ethics and social harmony.



VELS
INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM, THALAMBUR, PERIYAPALAYAM, THIRUVANMIYUR - CHENNAI



DEPARTMENT OF ADVANCED COMPUTING & ANALYTICS

VISION OF THE DEPARTMENT
To emerge as a premier Centre of Excellence in in Artificial Intelligence and Cyber Security domains by advancing innovation, impactful research, and industry-aligned education, empowering learners to create intelligent, data-driven solutions for global technological and societal challenges.

MISSION OF THE DEPARTMENT	
M1	To impart quality education in Artificial Intelligence, Cyber Security, and Data Science through a contemporary and industry-focused curriculum.
M2	To promote research, innovation, and problem-solving skills for developing intelligent, secure, and scalable technological solutions.
M3	To equip students with technical competence, ethical values, and professional skills to address emerging cyber threats and AI-driven challenges.
M4	To nurture socially responsible professionals and entrepreneurs capable of contributing to secure and sustainable digital transformation.

PROGRAMME EDUCATIONAL OUTCOMES (PEO)	
PEO1	Graduates will build successful careers in professional environments by demonstrating technical competence, adaptability, and effective problem-solving skills.
PEO2	Graduates will function as socially responsible professionals, exhibiting leadership, integrity, and ethical awareness, including responsibility toward AI-driven systems and entrepreneurial initiatives.
PEO3	Graduates will create innovative solutions by engaging with the forefront of AI evolution, pursuing advanced research, or obtaining specialized certifications to adapting to the evolving paradigm of "Human–AI collaboration".
PEO4	Graduates will bridge the gap between data insights and business value, either by launching sustainable tech ventures or by driving data-centric transformation within global organizations.

PROGRAMME OUTCOMES (PO)	
PO1	**Computational Knowledge :** Apply knowledge of Computer Science to identify, analyse, and solve problems effectively in the field of computing**.**
PO2	**Problem Analysis :** Analyze a problem, identify and define the computing requirements appropriate to its solution**.**
PO3	**Analytical skills:** Ability to design, develop algorithms and provide software solutions to cater the industrial needs.
PO4	**Modern Tool Usage:** Use current techniques, skills, and tools necessary for computing practices.
PO5	**Employability Skills:** Inculcate skills to excel in the fields of Information Technology and its Enabled services, Government and Private sectors, Teaching and Research.
PO6	**Ethics:** Insists ethical responsibilities, human and professional values and make their contribution to the society.
PO7	**Self-Directed and Life-long Learning:** Engaged in lifelong learning to equip them to the changing environment and be prepared to take-up mastering programmes.
PO8	**Communication, Leadership, and Teamwork :** Demonstrate effective communication, leadership, interpersonal, and teamwork skills in multidisciplinary and professional environments.

PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO1	Leverage computational and analytical techniques to extract insights from complex data using next generation programming, databases and data structure concepts, and deliver data-driven solutions to address real-world challenges and knowledge based decision-making.
PSO2	Construct robust and efficient intelligent systems by emerging modern technologies, innovation, and professional practices to meet evolving industry and societal requirements.

ABBREVIATIONS

PCC	Programme Core Courses
AEC	Ability Enhancement Courses
PEC	Professional Elective Courses
MDC	Multidisciplinary Courses
VAC	Value Added Courses
SEC	Skill Enhancement Courses
SI	Summer Internship
PRD	Project Report and Dissertation

CURRICULUM STRUCTURE

B.Sc. Computer Science (Artificial Intelligence & Data Science) - Three Years

/

BSc. (Hons) Computer Science (Artificial Intelligence & Data Science) - Four Years

Total number of Credits: 176

	B.Sc.,(Hons) Computer Science (Computer Artificial Intelligence & Data Science) Minimum Credits to be earned :176 B.Sc., Computer Science (Artificial Intelligence & Data Science) Minimum Credits to be earned: 132									
SEMESTER 1										
			Hours/Week					**Maximum Marks**		
Category	**Code**	**Course**	**L**	**T**	**P**	**SL**	**C**	**CIA**	**SEE**	**Total**
AEC		Tamil I / Hindi I / French I	3	0	0	3	3	40	60	100
AEC		English I	3	0	0	3	3	40	60	100
PCC		Problem solving using C	4	0	0	4	4	40	60	100
PCC		Introduction to Artificial Intelligence	3	0	0	3	3	40	60	100
MDC		Mathematics- I	2	1	0	3	3	40	60	100
PEC		Professional Elective Course – I	3	0	0	3	3	40	60	100
PCC (Lab)		Practical I – Programming in C Lab	0	0	2	1	1	40	60	100
VAC		Universal Human Values	1	0	0	1	1	40	60	100
SEC		Orientation Programme / Industrial Visit	-	-	-	-	-	-	-	-
			19	**1**	**2**	**21**	**21**	**-**	**-**	**-**

CIA - Continuous Internal AssessmentSEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical, *SL-Self Learning**

SEMESTER 2										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
AEC		Tamil II / Hindi II / French II/ Indian sign language Advanced	3	0	0	3	3	40	60	100
AEC		English II	3	0	0	3	3	40	60	100
PCC		Python Programming	3	0	0	3	3	40	60	100
PCC		Data base Management System	3	0	0	3	3	40	60	100
MDC		Mathematics – II	2	1	0	3	3	40	60	100
PEC		Professional Elective Course – II	3	0	0	3	3	40	60	100
PCC (Lab)		Practical II - RDBMS Lab	0	0	2	1	1	40	60	100
PCC (Lab)		Practical III – Python Programming Lab	0	0	2	1	1	40	60	100
AEC		Communication Skills	0	0	4	2	2	-	100	100
			17	1	8	22	22	-	-	-

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SEMESTER 3										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Programming in Java	4	0	0	4	4	40	60	100
PCC		R Programming	3	0	0	3	3	40	60	100
PEC		Professional Elective Course – III	3	0	0	3	3	40	60	100
PCC 5 (Lab)		Practical IV – Programming using Java Lab	0	0	2	1	1	40	60	100
PCC (Lab)		Practical V – Data Analytics using R lab	0	0	2	1	1	40	60	100
VAC		Environmental Studies	3	0	0	3	3	40	60	100
VAC		Indian Knowledge System	2	0	0	2	2	40	60	100
SEC		Industry Oriented Employability Skills	2	0	0	2	2	40	60	100
SEC		Professional Development - I	2	0	0	2	2	40	60	100
SI		Internship I	0	0	2	1	1	-	100	100
SEC		Global Certification	-	-	-	-	1	-	-	100
			19	-	6	22	23	-	-	-

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SEMESTER 4										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Machine learning	4	0	0	4	4	40	60	100
PCC		Data Visualization	3	0	0	3	3	40	60	100
MDC		Statistics	2	1	0	2	3	40	60	100
PEC		Professional Elective Course –IV	4	0	0	4	4	40	60	100
PCC (Lab)		Practical VI –Machine learning using R Lab	0	0	2	1	1	40	60	100
PCC (Lab)		Practical VII – Data Visualization Lab	0	0	2	1	1	40	60	100
SEC		Entrepreneurship Development	1	0	2	2	2	40	60	100
SEC		Professional Development – II	2	0	0	2	2	40	60	100
VAC		Yoga Education / NSS / NCC	0	0	4	2	2	-	100	100
SEC		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-	-	-	-
			16	1	10	22	22	-	-	-

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SEMESTER 5										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Artificial Neural Network	3	0	0	3	3	40	60	100
PCC		Software Engineering	4	0	0	4	4	40	60	100
PCC		Robotic Process Automation	3	0	0	3	3	40	60	100
PEC		Professional Elective Course – V	4	0	0	4	4	40	60	100
PCC (Lab)		Practical VIII- Programming with Go	0	0	2	1	1	40	60	100
PCC (Lab)		Practical IX –RPA tools Lab	0	0	2	1	1	40	60	100
SEC		Professional Development – III	1	0	2	2	2	40	60	100
VAC		Value Education	2	0	0	2	2	40	60	100
SI		Internship II	0	0	2	1	1	-	100	100
SEC		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-	-	-	-
			17	-	8	21	21	-	-	-

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SEMESTER 6										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Deep learning	3	0	0	3	3	40	60	100
PCC		Python for data science	4	0	0	4	4	40	60	100
PCC		Reinforcement Learning	4	0	0	4	4	40	60	100
PCC		Agentic AI and its tools	4	0	0	4	4	40	60	100
PEC		Professional Elective Course – VI	4	0	0	4	4	40	60	100
PCC (Lab)		Practical X – Data Science using Python Lab	0	0	2	1	1	40	60	100
PRD		Mini Project	2	0	0	2	2	-	100	100
SEC		On Job Training / Apprenticeship / Startup	0	0	4	1	1	-	100	100
			21	-	6	23	23	-	-	-

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SEMESTER 7										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		UI/UX design	3	0	0	3	3	40	60	100
PCC		Internet of Things	4	0	0	4	4	40	60	100
PCC		Large Language Model	4	0	0	4	4	40	60	100
PEC		Professional Elective Course – VII	4	0	0	4	4	40	60	100
PCC (Lab)		Practical XI- UI/UX Lab	0	0	2	1	1	40	60	100
PRD		Research Project I	0	0	12	6	6	40	60	100
			15	-	14	22	22	-	-	-

CIA - Continuous Internal Assessment SEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical, *SL-Self Learning**

SEMESTER 8										
			Hours/Week					Maximum Marks		
Category	Code	Course	L	T	P	SL	C	CIA	SEE	Total
PCC		Digital Image processing	3	0	0	3	3	40	60	100
PCC		Prompt Engineering	3	0	0	3	3	40	60	100
PCC		Virtual Reality	4	0	0	4	4	40	60	100
PEC		Professional Elective Course –VIII	4	0	0	4	4	40	60	100
PCC (Lab)		Practical XII- Image processing lab using OpenCV	0	0	2	1	1	40	60	100
PCC (Lab)		Practical XIII – Virtual Reality Lab	0	0	2	1	1	40	60	100
PRD		Research Project II	0	0	12	6	6	-	60	100
			14	-	16	22	22	-	-	-

CIA - Continuous Internal AssessmentSEE - Semester End Examination

***L – Lecture, *T- Tutorial, *P- Practical, *SL-Self Learning**

PROGRAMME CORE COURSES

Category	Code	Course	L	T	P	SL	C
PCC		Problem Solving Approaches Using C	4	0	0	4	4
PCC		Introduction to Artificial Intelligence	3	0	0	3	3
PCC (Lab)		Practical I – Programming in C Lab	0	0	2	1	1
PCC		Python Programming	3	0	0	3	3
PCC		Database Management System	3	0	0	3	3
PCC (Lab)		Practical II - RDBMS Lab	0	0	2	1	1
PCC (Lab)		Practical III – Python programming Lab	0	0	2	1	1
PCC		Programming in Java	4	0	0	4	4
PCC		R Programming	3	0	0	3	3
PCC (Lab)		Practical IV – Programming using Java Lab	0	0	2	1	1
PCC (Lab)		Practical V – Data Analytics using R lab	0	0	2	1	1
PCC		Machine learning	4	0	0	4	4
PCC		Data Visualization	3	0	0	3	3
PCC (Lab)		Practical VI –Machine learning using R Lab	0	0	2	1	1

PCC (Lab)		Practical VII – Data Visualization Lab	0	0	2	1	1
PCC		Artificial Neural Network	3	0	0	3	3
PCC		Software Engineering	4	0	0	4	4
PCC		Robotic Process Automation	3	0	0	3	3
PCC (Lab)		Practical VIII- Programming with Go	0	0	2	1	1
PCC (Lab)		Practical IX –RPA tools Lab	0	0	2	1	1
PCC		Deep learning	3	0	0	3	3
PCC		Python for data science	4	0	0	4	4
PCC		Reinforcement Learning	4	0	0	4	4
PCC		Agentic AI and its tools	4	0	0	4	4
PCC (Lab)		Practical X – Data Science using Python Lab	0	0	2	1	1
PCC		UI/UX design	3	0	0	3	3
PCC		Internet of Things	4	0	0	4	4
PCC		Large Language Model	4	0	0	4	4
PCC (Lab)		Practical XI- UI/UX Lab	0	0	2	1	1
PCC		Digital Image processing	3	0	0	3	3
PCC		Prompt Engineering	3	0	0	3	3
PCC		Virtual Reality	4	0	0	4	4
PCC (Lab)		Practical XII- Image processing lab using OpenCV	0	0	2	1	1

PCC (Lab)		Practical XIII – Virtual Reality Lab	0	0	2	1	1

PROFESSIONAL ELECTIVE COURSES

Category	Code	Course	L	T	P	SL	C
PEC		Fundamentals of data Science	3	0	0	3	3
		Introduction to Cyber Security					
PEC		Data Structures and Algorithms	4	0	0	4	4
		Operating system					
PEC		Edge AI	3	0	0	3	3
		Agile Methodology					
PEC		Natural Language Processing	4	0	0	4	4
		Data Mining					
PEC		Cloud Computing	4	0	0	4	4
		Applications of data Science					
PEC		Time Series Analysis	4	0	0	4	4
		Machine vision system					
PEC		Big Data Analytics	4	0	0	4	4
		Cognitive Computing					
PEC		Soft Computing Techniques	4	0	0	4	4
		Design Thinking					

ABILITY ENHANCEMENT COURSES

Category	Code	Course	L	T	P	SL	C
AEC		Tamil-I / Hindi-I/ French-I	3	0	0	2	3
AEC		English-I	3	0	0	2	3
AEC		Tamil-II / Hindi-II / French-II	3	0	0	2	3
AEC		English-II	3	0	0	2	3
AEC		Communication Skills	0	0	4	2	2

VALUE ADDED COURSES

Category	Code	Course	L	T	P	SL	C
VAC		Universal Human Values	1	0	0	1	1
VAC		Environmental Studies	3	0	0	3	3
VAC		Indian Knowledge System	2	0	0	2	2
VAC		Industry Oriented Employability Skills	2	0	0	2	2
VAC		Yoga Education/ National Service Scheme	0	0	2	1	1
VAC		Value Education	2	0	0	2	2

MULTIDISCIPLINARY COURSES

Category	Code	Course	L	T	P	SL	C
MDC		Mathematics-I	2	1	0	3	3
MDC		Mathematics-II	2	1	0	3	3
MDC		Statistics-IV	2	1	0	3	3

SKILL ENHANCEMENT COURSES

Category	Code	Course	L	T	P	SL	C
SEC		Orientation Programme / Industrial Visit	-	-	-	-	-
SEC		Professional Development – I	2	0	0	2	2
SEC		Global Certification	-	-	-	1	1
SEC		Entrepreneurial Development	1	0	2	2	2
SEC		Professional Development – II	2	0	0	2	2
SEC		In-plant Training/ Industrial Tour/ Summer Term	-	-	-	-	-
SEC		Professional Development – III	2	0	0	2	2
SEC		Skill Enhancement Training / Student Club Activities/ Institution Innovation Council Activities	-	-	-	-	-
SEC		On Job Training / Apprenticeship / Startup	0	0	4	1	1

SUMMER INTERNSHIP

Category	Code	Course	L	T	P	SL	C
SI		Internship-I	0	0	2	1	1
SI		Internship-II	0	0	2	1	1

PROJECT REPORT AND DISSERTATION

Category	Code	Course	L	T	P	SL	C
PRD		Mini Project	2	0	0	2	2
PRD		Research Project-I	0	0	12	6	6
PRD		Research Project-II	0	0	12	6	6

CREDIT DISTRIBUTION

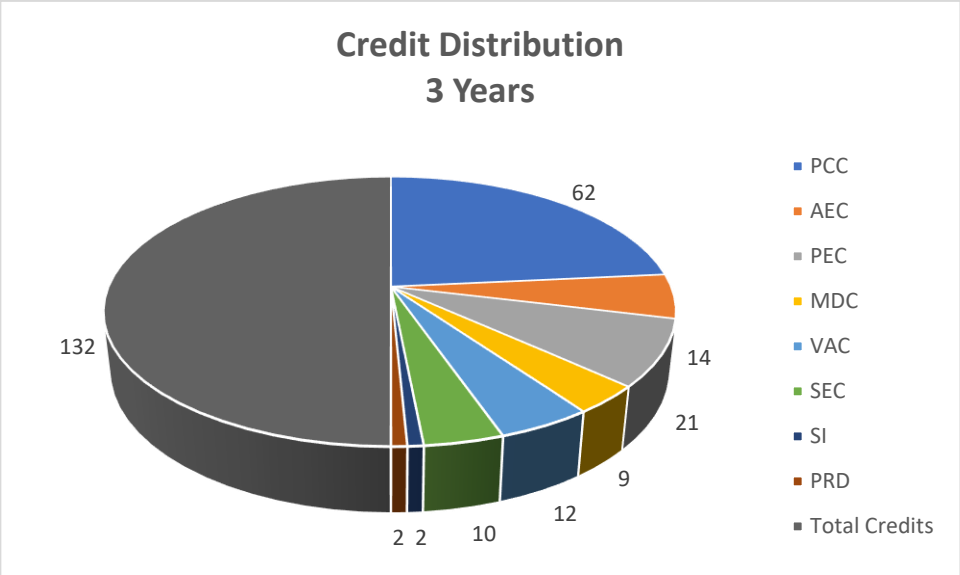
B.Sc. (Hons) Computer Science (Artificial Intelligence & Data Science)

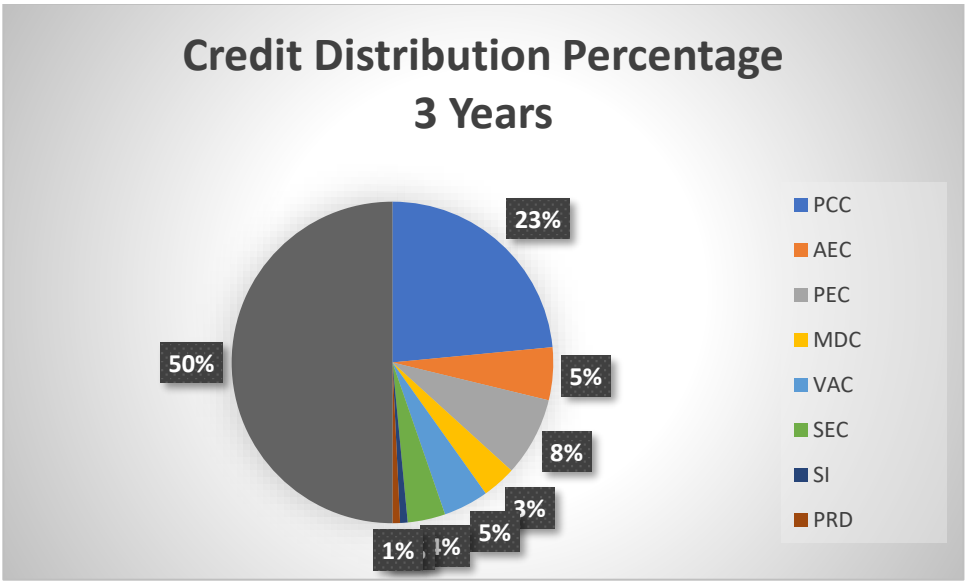
Minimum credits to be earned: 176

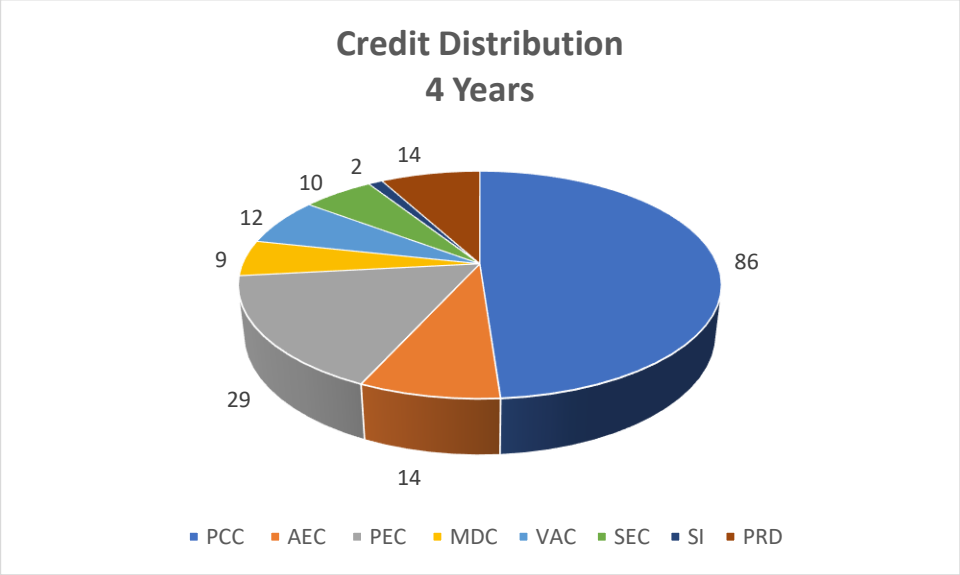
B.Sc. Computer Science (Artificial Intelligence & Data Science)

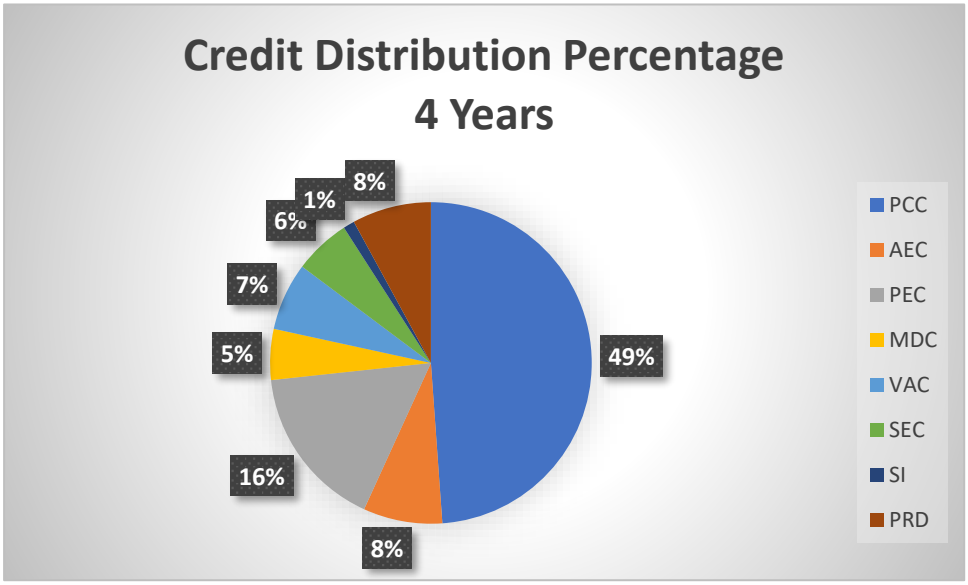
Minimum credits to be earned: 132

Component	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	3 Yrs. Total Credits	VII Sem	VIII Sem	4 Yrs Total Credits
PCC	8	8	9	9	12	16	62	12	12	86
AEC	6	8	-	-	-	-	14	-	-	14
PEC	3	3	3	4	4	4	21	4	4	29
MDC	3	3	-	3	-	-	9	-	-	9
VAC	1	-	7	2	2	-	12	-	-	12
SEC	-	-	3	4	2	1	10	-	-	10
SI	-	-	1	-	1	-	2	-	-	2
PRD	-	-	-	-	-	2	2	6	6	14
Total Credits	21	22	23	22	21	23	132	22	22	176


Credit Distribution
3 Years
62
14
21
9
12
10
2
2
132
PCC
AEC
PEC
MDC
VAC
SEC
SI
PRD
Total Credits


Credit Distribution Percentage
3 Years
23%
5%
8%
3%
5%
1%
50%
PCC
AEC
PEC
MDC
VAC
SEC
SI
PRD


Credit Distribution
4 Years
14
2
10
12
9
86
29
14
PCC
AEC
PEC
MDC
VAC
SEC
SI
PRD


Credit Distribution Percentage
4 Years
8%
1%
6%
7%
5%
49%
16%
8%
PCC
AEC
PEC
MDC
VAC
SEC
SI
PRD

SEMESTER I

		L	T	P	SL	C
	TAMIL-I	3	0	0	3	3

COURSE OBJECTIVES

மாணவர்களின் தமிழ்மொழித் திறத்தை மேம்படுத்துதல், சங்க இலக்கிய நாட்டத்தை மேம்படுத்துதல், நீதி இலக்கியங்கள் வழி அறக் கருத்துகளை இன்றைய தலைமுறையினர் அறியச் செய்தல், இலக்கிய வடிவங்களான உரைநடை சிறுகதை ஆகியவற்றின் சமூக நிலை குறித்து அறியச் செய்தல், மாணவர்களுக்குத் தமிழைத் தவறின்றி எழுதுவதற்குத் தேவையான பயிற்சி அளித்து அவர்களின் மொழித்திறனை மேம்படுத்துதல், கலைச்சொற்கள் போன்ற தமிழ் மொழியின் வளர் நிலைகளை அறிமுகம் செய்தல் போன்றன இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

UNIT I	**அலகு- 1: தமிழ் மொழி வரலாறு**	**10 Hours**

அலகு- 1: தமிழ் மொழி வரலாறு மொழிக்குடும்பம் - இந்திய மொழிக்குடும்பங்கள் - இந்திய ஆட்சி மொழிகள் - திராவிட மொழிக்குடும்பங்கள் - திராவிட மொழிகளின் வகைகள் –திராவிட மொழிகளின் சிறப்புகள் - திராவிட மொழிகளின் வழங்கிடங்கள் - திராவிட மொழிகளுள் தமிழின் இடம் - தமிழ்மொழியின் சிறப்புகள் - தமிழ் பிறமொழித் தொடர்புகள்.

UNIT II	**அலகு- 2: சங்க இலக்கியங்கள்**	**9 Hours**

புறநானூறு- பாடல் எண்: 195 (பல்சான்றீரே) 192 (யாதும் ஊரே) 188 (படைப்பு பல)
குறுந்தொகை- பாடல் எண்: 03 (நிலத்தினும்) 131 (ஆடமை புரையும்) 57(பூவிடைப்படினும்) 202 (நோம் என் நெஞ்சே) 167 (முளிதயிர்)

நெடுநல்வாடை: பாடல் வரிகள் 45 முதல் 72 வரை

UNIT III	**அலகு - 3 அற இலக்கியங்கள்**	**9 Hours**

திருக்குறள் அறன் வலியுறுத்தல் (அறம்), நட்பாராய்தல் (பொருள்), குறிப்பறிதல்(இன்பம்),. மூன்று அதிகாரங்கள் முழுமையும் நாலடியார் - பாடல் எண்: 139 (கல்லாரே ஆயினும்) 248 (நண்ணிலைக்கான்) 216 (கடையாயர்) ஔவையார் - மூதுரை- பாடல் எண்- 10 (நெல்லுக்கு இறைத்தநீர்), - பாடல் எண்- 16 (அடக்கமுடையார்)

UNIT IV	**அலகு - 4 உரைநடை**	**9 Hours**

சிற்பியே உன்னைச் செதுக்குகிறேன் - வைரமுத்து - லட்சியம்,கல்வி, கலை, உறவு, மொழி,சாதனை ஆகிய தலைப்பிலான கட்டுரைகள்

சிறுகதை புதுமைப்பித்தன் – சாபவிமோசனம் ஜெயகாந்தன் - ஒரு பிடி சோறு

UNIT V	**அலகு 5 மொழித்திறன்**	**8 Hours**

பிழை நீக்கி எழுதுதல் - ஒற்றுப்பிழை நீக்கி எழுதுதல் - தொடர்பிழை நீக்கி எழுதுதல் கலைச்சொல்லாக்கம் - தேவைகள் - கலைச்சொற்களின் பண்புகள் அறிவியல் கலைச்சொற்கள். கடிதம் - வகைகள் - அலுவலகக் கடிதங்கள் - பயிற்சி

Total: 45 Hours

Self-Learning: 45 Hours

பார்வை நூல்கள்

1. திராவிட மொழிகள் (இரண்டு தொகுதிகள்) டாக்டர் ச.அகத்தியலிங்கம் மணிவாசகர் பதிப்பகம் 2021
2. சங்க இலக்கிய உரை என் சி பி எச் சென்னை 2010
3. **திருக்குறள் தெளிவுரை** வரதராசன், மு., கழக வெளியீடு, 1994.
4. தவறின்றித் தமிழ் எழுத - மருதூர் அரங்கராசன், ஐந்திணைப் பதிப்பகம், 2003.
5. சிற்பியே உன்னை செதுக்குகிறேன் வைரமுத்து சூர்யா லிட்ரேச்சர் சென்னை 2011
6. **பாடநூல் தேடலுக்கான இணையம் -** https://archive.org/
7. **https://tamildigitallibrary.in/Articles/**

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	தமிழ் மொழியின் வரலாறு, மொழிக்குடும்பம், திராவிட மொழிகளின் வகைகள் மற்றும் தமிழ்மொழியின் சிறப்புகளை விளக்க முடியும்	K2
CO2	புறநானூறு, குறுந்தொகை, நெடுநல்வாடை ஆகிய சங்க இலக்கியப் பாடல்களின் கருத்து, பண்பாட்டு மற்றும் சமூக முக்கியத்துவத்தைப் புரிந்து விளக்க முடியும்.	K3
CO3	திருக்குறள், நாலடியார், மூதுரை ஆகிய அற இலக்கியங்களில் காணப்படும் அறநெறி, ஒழுக்கம் மற்றும் வாழ்வியல் கருத்துகளைப் பகுப்பாய்வு செய்ய முடியும்	K4
CO4	வைரமுத்துவின் உரைநடை கட்டுரைகள், புதுமைப்பித்தன் மற்றும் ஜெயகாந்தன் சிறுகதைகளில் காணப்படும் சமூகச் சிந்தனை, மனிதநேயம் மற்றும் இலக்கியப் பண்புகளை மதிப்பீடு செய்ய முடியும்.	K4
CO5	பிழையின்றித் தமிழ் எழுதுதல், கலைச்சொற்கள், அறிவியல் கலைச்சொற்கள் மற்றும் அலுவலகக் கடிதம் எழுதுதல் போன்ற மொழித்திறன்களை நடைமுறையில் பயன்படுத்த முடியும்.	K4

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	–		3	2	–	–	–
CO2	–	–	–	–	2	3	-	2	–	–
CO3	–	–	–	–	3	-	3	2	-	-
CO4	–	–	–	–	3	2	-	3	-	-
CO5	–	–	–	–	-	3	3	–	-	-
Avg	–	–	–	–	2.6	2.8	2.6	2.3	-	-

	HINDI-I	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES:

- To improve students' proficiency in the Hindi language, to increase their interest in prose literature,
- To make the present generation aware of moral values, social limits through various genre of Hindi prose
- To improve students' language proficiency by giving them the necessary training to write error-free correspondence, and to familiarize them with technical terminology and updated language technology.

UNIT I	हिन्दी साहित्य का इतिहास	9 Hours

इकाई/UNIT I : हिन्दी साहित्य का इतिहास - काल विभाजन - गद्य विकास -सामान्य परिचय, कहानी - लॉटेरी (मुंशी प्रेमचंद), भाव एक, भाषा अनेक (देश भक्ति और राष्ट्रीय एकता) - विभिन्न भारतीय संस्कृति एवं प्रदेशों के परिचय History of Hindi Literature – Periodization – Development of Prose – General Introduction, Short Story – "Lottery" (Munshi Premchand), "One Emotion, Many Languages" (Patriotism and National Integration) – Introduction to various Indian cultures and regions.

History of Hindi Literature – Periodization – Development of Prose – General Introduction, Short Story – "Lottery" (Munshi Premchand), "One Emotion, Many Languages" (Patriotism and National Integration) – Introduction to various Indian cultures and regions.

UNIT II	एकाँकी	9 Hours

इकाई/UNIT II : एकाँकी - अखबारी विज्ञापन (चिरंजीत) - भाषा कौशल विकास -प्रयोजनमूलक हिन्दी - तकनीकी शब्द, पद एवं विभागीय नाम, प्रशासनिक वाक्यांश One-Act Play – "Newspaper Advertisement" (Chiranjit) – Development of Language Skills – Functional Hindi – Technical Terms, Designations and Departmental Names, Administrative Phrases

UNIT III	एकाँकी	9 Hours

इकाई/UNIT III: हास्य व्यंग्य कहानी - तुम कब जाओगे, अतिथि (शरद जोशी) - प्रयोजनमूलक हिन्दी - पत्र लेखन - पत्रों के विभिन्न प्रकार - औपचारिक पत्र Humorous Satirical Story – "Tum Kab Jaoge, Atithi" (Sharad Joshi) – Functional Hindi – Letter Writing – Different Types of Letters – Formal Letters.

UNIT IV	राष्ट्र भक्ति कहानी	9 Hours

इकाई/UNIT IV: राष्ट्र भक्ति कहानी - पुरस्कार (जयशंकर प्रसाद) – प्रयोजनमूलक हिन्दी - पत्र लेखन- पत्रों के विभिन्न प्रकार - अनौपचारिक पत्र Patriotic Story – "Puraskaar" (Jaishankar Prasad) – Functional Hindi – Letter Writing – Different Types of Letters – Informal Letters.

UNIT V	निबंध:	9 Hours

इकाई/UNIT V : निबंध: भारतीय विज्ञान की कहानी (गुणाकार मुले) - विश्व के लिए भारत की देन, प्रयोजनमूलक हिन्दी - भाषा प्रौद्योगिकी – युनिकोड हिन्दी फ़ॉन्ट्स,इनस्क्रिप्ट कीबोर्ड - ई-पुस्तकालय – ई-शब्दकोश – ई-अध्ययन – व्यावहारिक उपयोग हेतु कृत्रिम बुद्धिमत्ता Essay: "The Story of Indian Science" (Gunakar Mule) – India's Contribution to the World – Functional Hindi – Language Technology – Unicode Hindi Fonts, Inscript Keyboard – e-Library – e-Dictionary – e-Learning – Artificial Intelligence for Practical Use

Total: 45 Hours

Self-Learning: 45 Hours

संदर्भ ग्रन्थ/ Reference Books

1. Munshi Premchand: Mansarovar (Short Story Collection), Vol. 8 Hans Prakashan / Saraswati Press / Prabhat Prakashan (various editions available)

2. Vyavaharik Hindi, Publisher: Rajpal & Sons, New Delhi

3. One-Act Play Collection, Lokbharti Prakashan, Prayagraj

4. Prayojanmoolak Hindi, Dr. Naresh Mishra / Dr. Kailash Chandra Bhatia,Rajkamal Prakashan / Vani Prakashan

5. Sharad Joshi Vyangya Rachanavali, Vol. 1, Rajkamal Prakashan

6. Prasad Ki Shreshtha Kahaniyan, Lokbharti Prakashan

7. Vyavaharik Hindi Aur Patra Lekhan, Dr. Hardev Bahri, Kitab Mahal, Allahabad

8. Bharatiya Vigyan Ki Kahani – Gunakar Mule, Rajkamal Prakashan

9. Computer Aur Hindi Bhasha, Dr. Bholanath Tiwari, Vani Prakashan

10. Hindi Sahitya Ka Itihas, Ramchandra Shukla, Nagari Pracharini Sabha, Varanasi

11. Kendriya Hindi Sansthan, Banking Hindi Patyakram, 2012.

वेब लिंक्स/ Web Sources:

1. https://www.prabhatbooks.com

2. jhttps://vaniprakashan.com

3. https://www.rajkamalprakashan.com

4. https://home.unicode.org

5. https://home.unicode.org

COURSE OUTCOMES

After completion of the course, the student will be able to,

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Develop interest in Hindi language & literature , various culture of India	K2
CO2	Learn moral values in a lighter way & proficient in functional hindi	K3
CO3	Know the awareness about the social limitations	K2
CO4	Identify the importance of patriotism	K1
CO5	Analyze and produce structured functional Hindi content using modern technology tools.	K4

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	–	-	3	-	–	–	–
CO2	–	–	–	–	3	-	-	2	–	–
CO3	–	–	–	–	3	-	2	2	-	-
CO4	–	–	–	–	2	3	3	-	-	-
CO5	–	–	–	–	-	2	3	3	-	-
Avg	–	–	–	–	2.6	2.6	2.6	2.3	-	-

	FRENCH–I	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES

- To greet, to express excuse and to introduce oneself
- To introduce another person
- To express his/her ideas, opinions and weekend projects
- To request someone to do something, polite manners
- To accept, refuse, enquire and indicate the time and date
- To express himself / herself in positive and negative manner

UNIT I	**Salut**	**6 Hours**
les nombres, Les jours de la semaine et du mois, La nationalité		
UNIT II	**Enchanté**	**8 Hours**
Les verbes Etre, Avoir, Aller, Regular ER verbes, Present tense.		
UNIT III	**J'Adore**	**8 Hours**
La negation, l'adjectif possessif, le futur proche		
UNIT IV	**Tu veux bien**	**10 Hours**
Les articles de finis/indéfinis, Les pronoms après une préposition (avec lui, chez moi), Le passé composé		
UNIT V	**On se voit quand**	**6 Hours**
Les pronoms compléments directs me, te, nous, vous, L'interrogation avec est-ce que, L'heure et la date.		
UNIT VI	**Bonne idée**	**7 Hours**
Les articles partitifs, Le masculin et le féminin des adjectifs, Les pronoms compléments directs le, la, les, La négation : ne… pas de.		

Total: 45 Hours

Self-Learning: 45 Hours

Text Books :

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

Reference Books:

1. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Greet, excuse and introduce oneself in simple communication situations.	K2
CO2	Recall basic expressions used for introducing someone.	K1
CO3	Analyze and express ideas, opinions, and weekend activities in different contexts.	K4
CO4	Ask someone to do tasks in a polite and appropriate manner.	K3
CO5	Accept, refuse, enquire, and indicate time and date in everyday communication.	K3

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	–	2	3	2	–	–	–
CO2	–	–	–	–	2	3	-	2	–	–
CO3	–	–	–	–	2	3	2	2	-	-
CO4	–	–	–	–	2	2	2	-	-	-
CO5	–	–	–	–	3	2	2	3	-	-
Avg	–	–	–	–	2.6	2.8	2.0	2.3	-	-

26LENG11	ENGLISH–I	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES

- To develop an understanding of prose, poetry, and short stories.
- To enhance reading comprehension and critical thinking skills.
- To improve accuracy and clarity in language use.
- To build a rich and adequate vocabulary.
- To promote the use of digital tools for communication and presentation skills.

UNIT I	Grammar & Vocabulary	9 Hours

- Parts of Speech
- Subject – Verb Agreement
- Tenses
- Prefix and Suffix
- Spot the errors

UNIT II	Prose	9 Hours

- A.G. Gardiner – *On the Rule of the Road*
- Helen Keller – Excerpt from *The Story of My Life – Chapter IV*

Listening: Audio summary comprehension

Speaking: Discussion on freedom & learning

Reading: Passage comprehension

Writing: Reflective paragraph writing

UNIT III	Poetry	9 Hours

- William Wordsworth – *The Solitary Reaper*
- Rabindranath Tagore – *Where the Mind is Without Fear*

Listening: Infer the central idea of the poem.

Speaking: Sharing personal interpretation of the poem

Reading: Read aloud exercise

Writing: Critical Appreciation

UNIT IV	Short stories	9 Hours

- O. Henry – *The Gift of the Magi*
- R.K. Narayan – *An Astrologer's Day*

Listening: Story narration

Speaking: Retell the story

Reading: Silent reading and reflective reading

Writing: Summary & Character analysis

UNIT V	One-Act Play	9 Hours

- Douglas Turner Ward-*The Shirt*
- J. M. Synge-*Riders to the Sea*

Listening: Listening to dialogue delivery

Speaking: Role play and enactment

Reading: Character mapping and identification of key ideas

Writing: Dialogue writing & Short critical commentary

Total: 45 Hours

Self-Learning: 45 Hours

Text Books:

1. Naik, M. K., ed *Indian Prose in English: An Anthology*. Oxford University Press, 2001.
2. Greenblatt, Stephen, ed. *The Norton Anthology of English Literature*. 9th ed., W. W. Norton & Company, 2012.
3. Henry, O. *Selected Short Stories of O. Henry*. Penguin Classics, 2001.
4. Narayan, R. K. *Malgudi Days*. Indian Thought Publications, 1982.
5. Wren, P. C., and H. Martin. *High School English Grammar and Composition.* Revised ed., S. Chand & Company, 2009.
6. McCarthy, Michael, and Felicity O'Dell. *English Vocabulary in Use*. 4th ed., Cambridge University Press, 2017.

References:

1. Murphy, Raymond. *English Grammar in Use*. Cambridge University Press, 2019.
2. Strunk Jr., William, and E. B. White. *The Elements of Style*. 4th ed., Longman, 2000.
3. Quirk, Randolph, et al. *A Comprehensive Grammar of the English Language*. Longman, 1985.
4. Hacker, Diana, and Nancy Sommers. *The Bedford Handbook*. 11th ed., Bedford/St. Martin's, 2020.

Websites:

1. British Council. *LearnEnglish*. British Council, https://learnenglish.britishcouncil.org.
2. Duolingo. *Duolingo*. Duolingo Inc., https://www.duolingo.com.
3. ***BBC.*** **BBC Learning English.** ***BBC, https://www.bbc.co.uk/learningenglish.***

COURSE OUTCOMES

After completion of the course, the student will be able to,

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Demonstrate understanding of prose, poetry, and short stories.	K2
CO2	Analyze reading comprehension texts and develop critical thinking skills.	K4
CO3	Apply language skills to improve accuracy and clarity in communication.	K3
CO4	Recall and use appropriate vocabulary in different contexts.	K1
CO5	Evaluate digital tools for effective communication and presentation skills.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	–	-	-	2	2	–	–
CO2	–	–	–	–	2	3	3	-	–	–
CO3	–	–	–	–	3	2	3	3	-	-
CO4	–	–	–	–	-	-	-	3	-	-
CO5	–	–	–	3	3	3	3	3	-	-
Avg	–	–	–	3.0	2.6	2.6	2.8	2.8	-	-

	PROBLEM SOLVING USING C	L	T	P	SL	C
		4	0	0	4	4

COURSE OBJECTIVES

Gain knowledge of C language syntax, semantics, and programming constructs like variables, operators, control statements, and loops and work with arrays, strings, pointers, and structures to solve complex problem.

UNIT I	INTRODUCTION TO C	12 Hours

Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, data types, constants, Input/output statements in C, Operators in C, Type conversion and typecasting.

UNIT II	CONTROL STATEMENTS	12 Hours

Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, go to statement

UNIT III	FUNCTION	12 Hours

Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive function

UNIT IV	ARRAYS & STRINGS	12 Hours

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays,Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays. .Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters .Strings: String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings.

UNIT V	POINTERS, STRUCTURE & FILE HANDLING	12 Hours

Pointers: Understanding the Computers Memory, Introduction to Pointers, Declaring Pointer Variables. Structures: Introduction to structures-File handling-File mode- File operations

Total: 60 Hours

Self-Learning Hours: 60 Hours

COURSE OUTCOME

At the end of the course, the student will be able to,

Course Outcome	Description	Bloom's Level
CO1	Explain the fundamentals of computers, programming concepts, C program structure, data types, operators, and input/output operations in C.	**K2**
CO2	Develop C programs using decision-making and looping constructs to solve computational problems efficiently.	**K3**
CO3	Apply functions, recursion, parameter passing, scope rules, and storage classes in modular programming.	**K3**
CO4	Implement programs using arrays, multidimensional arrays, strings, and string handling functions for data processing applications.	**K3**
CO5	Demonstrate the use of pointers, structures, and file handling concepts to develop advanced C programming applications.	**K4**

COURSE ARTICULATION MATRIX

COs/POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2		-	-	-	-	-	2	-
CO2	3		2	-	-	-	-	2	2	-
CO3	2	2		-	3	-	-	-	-	-
CO4	-	3	3	-	-	-	2	-	2	-
CO5	-	3	3	-	2	-	3	-	-	-
AVG	2.6	2.5	2.6	-	2.5	-	2.5	2	2	-

TEXT BOOKS

1. Programming in ANSI C, E.Balagurusamy, McGrawHill Education, 9th Edition, 2023
2. **Problem Solving and Program Design in C,** Jeri R. Hanly, Elliot B. Koffman, Pearson Education, 10th Edition, 2022
3. **C How to Program,** Paul Deitel, Harvey Deitel, Pearson Education, 11th Edition, 2021
4. Let Us C, Yashavant Kanetkar, BPB Publications, 17th Edition, 2023

WEB RESOURCES:

1. www.tutorialteacher.com
2. www.javatpoint.com
3. *www.analyticsvidhya.com*
4. *https://nptel.ac.in/courses/106104128*

	INTRODUCTION TO ARTIFICIAL INTELLIGENCE	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES

Gain foundational knowledge of AI concepts, history, and its role in solving real-world problems, learn supervised, unsupervised, and reinforcement learning techniques and Understand the role of neural networks and deep learning in AI systems.

UNIT I	BASICS OF AI	9 Hours

AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

UNIT II	SEARCHING IN AI	9 Hours

Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multi player games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

UNIT III	KNOWLEDGE REPRESENTATION	9 Hours

Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempster shafer theory.

UNIT IV	LEARNING ALGORITHM	9 Hours

First order logic. Inference in first order logic, propositional vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution, Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods, Reinforcement Learning.

UNIT V	EXPERT SYSTEM	9 Hours

Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web,

knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.

Total: 45 Hours

Self-Learning Hours: 45 Hours

COURSE OUTCOME

At the end of the course the student will be able to:

Course Outcome	Description	Bloom's Level
CO1	Explain the foundations of Artificial Intelligence, intelligent agents, problem formulation, and the characteristics of AI environments.	**K2**
CO2	Apply uninformed and heuristic search techniques, game playing strategies, and adversarial search algorithms to solve AI problems.	**K3**
CO3	Implement knowledge representation methods, logical reasoning techniques, and probabilistic inference models in AI systems.	**K3**
CO4	Utilize first-order logic, learning algorithms, decision trees, reinforcement learning, and inference mechanisms for intelligent decision-making.	**K4**
CO5	Evaluate the architecture, knowledge acquisition methods, reasoning techniques, and societal impacts of expert systems and intelligent agents.	**K5**

COURSE ARTICULATION MATRIX

COs/ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	3
CO2	-	3	-	-	-	-	-	-	2	-
CO3	3	-	3		-	3	-	-	-	3
CO4		-	2	3	-	-	2	-	-	-
CO5	3	2	-	3	-	3	3	3	-	3
AVG	3	2.3	2.5	3	-	3	2.5	3	2	3

BOOKS FOR STUDY:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2020
2. David Poole, Alan Mackworth, Randy Goebel," Computational Intelligence: a logical approach", Oxford University Press, 2022
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Educatio, 2021.
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 2019.

WEB RESOURCES:

1. www.nptel.com
2. www.simplilearn.com
3. www.upgrade.com
4. www.medium.com
5. https://nptel.ac.in/courses/106102220

Total : 45 Hours

Self-learning : 45 hours

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand matrices and determinants including operations, inverse, rank, and properties.	K1
CO2	Explain sets and set operations such as union, intersection, complement, and Cartesian product.	K2
CO3	Apply relations and functions including equivalence relations, domain, range, and composition.	K3
CO4	Analyze partial order relations, Hasse diagrams, chains, GLB and LUB concepts.	K4
CO5	Evaluate number systems, conversions, binary arithmetic, and coding systems.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO3
CO1	3	2	2	–	2	3	2	–	–	–	3	2
CO2	3	2	2	–	2	3	2	–	–	–	3	2
CO3	3	3	3	–	2	3	2	2	–	–	3	2
CO4	3	3	3	–	2	2	2	2	–	–	2	2
CO5	3	3	3	–	2	3	2	2	–	–	3	2
Avg	**3.0**	**2.6**	**2.6**	–	**2.0**	**2.8**	**2.0**	**0.8**	–	–	**2.8**	**2.0**

26BMA001	MATHEMATICS–I	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES

- To learn various concept in matrix
- To apply the concept of Sets to promote critical thinking, problem-solving technique and interdisciplinary connections.
- To analyse the relationships, decisions making and modeling complex systems using
- Partial Order Relations.

UNIT I	MATRICES & DETERMINANTS	9 Hours

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramer's Rule, Rank of Matrix Dependence of Vectors**. Determinants:** Definition, Minors, Cofactors, Properties of Determinants

UNIT II	SETS	9 Hours

Sets: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, CaPPRDinality of Set, Simple Applications.

UNIT III	RELATIONS & FUNCTIONS	9 Hours

Relations: Properties of Relations, Equivalence Relation. **Functions:** Partial OPPRDer Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions

UNIT IV	PARTIAL ORDER RELATIONS	9 Hours

Partial Order Sets, Representation of POSETS using Hasse diagram, Chains, Maximal and Minimal Point, GLB, LUB.

UNIT V	NUMBER SYSTEM AND CONVERSIONS	9 Hours

Number Systems: Binary Numbers, Octal Numbers, Decimal numbers, Hexa Decimal numbers.

Number base conversions: Octal and Hexa Decimal Numbers - Complements - Signed Binary Numbers - Binary Arithmetic - Binary Codes - Decimal Code

Total : 45 Hours

Self-learning : 45 hours

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand matrices and determinants including operations, inverse, rank, and properties.	K1
CO2	Explain sets and set operations such as union, intersection, complement, and Cartesian product.	K2
CO3	Apply relations and functions including equivalence relations, domain, range, and composition.	K3
CO4	Analyze partial order relations, Hasse diagrams, chains, GLB and LUB concepts.	K4
CO5	Evaluate number systems, conversions, binary arithmetic, and coding systems.	K5

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO3
CO1	3	2	2	–	2	3	2	–	–	–	3	2
CO2	3	2	2	–	2	3	2	–	–	–	3	2
CO3	3	3	3	–	2	3	2	2	–	–	3	2
CO4	3	3	3	–	2	2	2	2	–	–	2	2
CO5	3	3	3	–	2	3	2	2	–	–	3	2
Avg	**3.0**	**2.6**	**2.6**	–	**2.0**	**2.8**	**2.0**	**0.8**	–	–	**2.8**	**2.0**

Textbook

1. Kolman, Busby, Ross and Rehman (2003), Discrete Mathematical Structures for Computer Science, Pearson Education, 5th Edition,

Reference Books

1.D.S. Malik and M.K. Sen(2004), Discrete Mathematical Structures: Theory and Applications, Thomson.

2. Goodaire & Parmenter (2000), Discrete Mathematics & Graph Theory, Pearson Education.

3. Kenneth H. Rosen, (2004), Discrete Mathematics and its Applications, Tata McGraw Hill, 5th Ed.

4. C.L. Liu (1986), Elements of Discrete Mathematics, 2nd Edition, McGraw Hill

Web Links:

1. https://www.geeksforgeeks.org/mathematics-partial-oPPRDers-lattices/
2. https://www.ipsgwalior.org/download/number%20system.pdf

	PROGRAMMING IN C LAB	L	T	P	SL	C
		0	0	2	1	1

To introduce students to the basic knowledge of programming fundamentals of C language, to impart writing skill of C programming to the students and solving problems and to impart the concepts like looping, array, functions, pointers, file, structure.

LIST OF PROGRAMS

1. Write a program to calculate simple and compound interest.
2. Write a program to generate Fibonacci series.
3. Write a program to compute grade of students using if else ladder.
4. Write a Program to Check Whether a Number is Prime or not and to check given number is Armstrong number or not.
5. Write a program to find GCD and LCM of two numbers.
6. Write a program for addition of two matrices of any order in C.
7. Write a Program to multiply two 3 X 3 Matrices.
8. Write a program to add, subtract, multiply and divide two integers using user defined type function with return type.
9. Write a program to swap two integers using call by value and call by reference methods of passing arguments to a function.
10. Write a program to copy one array to another using pointer.
11. Write a program to add two distances in feet and inches using structure
12. Write a program to create a file called emp.txt and store information about a person, in terms of his name, age and salary and print their details.

Total: 45 Hours

Self -Learning: 45 Hours

COURSE OUTCOMES:

After completing this lab course, the student will be able to:

Course Outcome	Description	Bloom's Level
CO1	Understand the basic concepts of C programming, data types, operators, and input/output statements.	**K2**
CO2	Develop programs using decision-making statements, loops, arrays, and matrices to solve computational problems.	**K3**
CO3	Apply modular programming using functions, parameter passing techniques, and recursion.	**K3**
CO4	Analyze programs using pointers and structures for data manipulation and user-defined data handling.	**K4**
CO5	Design file handling programs to store, retrieve, and manage structured data efficiently in C.	**K5**

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	2	-	2	-	3	-	-	-	-	2
CO2	2	2	3	-	-	-	-	-	-	2
CO3	-	3	3	-	-	-	-	3	-	-
CO4	3	2	-	-	-	-	2	-	3	-
CO5	-	3	3	3	2	-	3	-	-	-
AVG	2.3	2.5	2.75	3	2.5	-	2.5	3	3	2

TEXT BOOKS

1. Programming in ANSI C, E.Balagurusamy, McGrawHill Education, 9th Edition, 2023
2. **Problem Solving and Program Design in C,** Jeri R. Hanly, Elliot B. Koffman, Pearson Education, 10th Edition, 2022.
3. **C How to Program,** Paul Deitel, Harvey Deitel, Pearson Education, 11th Edition, 2021
4. Let Us C, Yashavant Kanetkar, BPB Publications, 17th Edition, 2023

WEB RESOURCES:

1. www.tutorialteacher.com
2. www.javatpoint.com
3. www.analyticsvidhya.com
4. https://nptel.ac.in/courses/106104128

	UNIVERSAL HUMAN VALUES	L	T	P	SL	C
		1	0	0	1	1

COURSE OBJECTIVES

The candidates will be able to appreciate the complementarity between the values and skills for sustained happiness and prosperity. To influence the students to approach the life and profession with a holistic perspective towards a value-based living in a natural way. To highlight plausible implications of holistic understanding of ethical human conduct.

UNIT I	INTRODUCTION TO VALUE EDUCATION	5 Hours

Living a fulfilling life. Value education. Skill education. Complementarity of Values and Skills. Development of a holistic perspective. Right understanding, relationship and physical facility. Understanding the happiness and prosperity.

UNIT II	HARMONY AT MULTIPLE LEVELS	5 Hours

Human being as co-existence of the self and the human body. Understanding harmony in the self. Harmony in the family and understanding values in human-human relationships. Harmony in the society and understanding universal human order. Harmony in nature and understanding the interconnectedness, self-regulation and mutual fulfilment. Harmony in existence and understanding co-existence at various levels.

UNIT III	IMPLICATIONS OF THE RIGHT UNDERSTANDING	5 Hours

Ethical human conduct. Implications of value-based living. Right understanding of professional ethics. Humanistic education. Holistic technologies, production systems and management models. Strategies for transition towards value-based life and profession.

Total: 15 Hours

Self-Learning: 15 Hours

COURSE OUTCOMES:

At the end of the course learners will be able to:

Course Outcome	Description
CO1:	Develop qualities like responsibility and the ability to handle problems with sustainable solutions.
CO2:	Appraise human values and the harmony at various levels.
CO3:.	Perceive a better critical ability
CO4:	Develop qualities pertaining to value-based living.
CO5:	Apply what they have learnt to their own self in real life settings.

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PS O2	PS O3
CO1	-	3	-	-	2	3	2	-	2	2	-	-
CO2	-	3	-	-	2	3	3	-	3	2	-	-
CO3	-	3	-	-	2	3	3	-	3	2	-	-
CO4	-	3	-	-	3	3	2	-	2	2	-	-
CO5	-	3	-	-	3	3	3	-	3	2	-	-
Avg	**-**	**3.0**	**-**	**-**	**2.4**	**3.0**	**2.6**	**-**	**2.6**	**2.0**	**-**	**-**

Text Books:

1. R.R. Gaur, R. Asthana, G.P. Bagaria. (2023). A Foundation Course in Human Values and Professional Ethics. 3PPRD Revised Edition. Excel Books, New Delhi.

Reference Books:

1. A. Nagaraj, Jeevan Vidya Prakashan, Amar Kantak. Jeevan Vidya (1999), Ek Parichaya
2. Rakesh Gupta. Jeevan Vidya (2008), An Introduction (Introductory Book to Madhyasth Darshan-Coexistentialism). English Version.
3. N. Tripathi (2004), Human Values. First Edition. New Age International Publishers, New Delhi

	FUNDAMENTALS OF DATA SCIENCE	L	T	P	SL	C
		3	0	0	2	3

COURSE OBJECTIVES:

- Gain practical experience in applying data science tools and techniques to solve real-world problems and generate actionable insights.
- Develop expertise in a specialized area of data science for professional application.
- Enhance the ability to continuously learn and adapt to emerging data science technologies and trends.

UNIT I	INTRODUCTION TO DATA SCIENCE	9 hours

Introduction To Data Science: Definition, Big Data and Data Science Hype, Datafication , Data Science Profile, Meta-Definition, Data Scientist, Statistical Inference, Populations and Samples, Populations and Samples of Big Data, Big Data Can Mean Big Assumptions, Modeling, Philosophy of Exploratory Data Analysis, The Data Science Process , A Data Scientist's Role in this Process Case Study: RealDirect.

UNIT II	MATHEMATICAL PRELIMINARIES	9 hours

Mathematical Preliminaries: Probability, Descriptive Statistics, Correlation Analysis - Data Munging: Properties of Data, Languages for Data Science, Collecting Data, Cleaning Data, Crowdsourcing.

UNIT III	SCORES AND RANKINGS	9 hours

Scores and Rankings: Developing Scoring Systems, Z-scores and Normalization, Advanced Ranking Techniques Statistical Analysis: Sampling from Distributions, Statistical Distributions, Statistical Significance, Permutation Tests and P-values

UNIT IV	VISUALIZING DATA	9 hours

Visualizing Data: Exploratory Data Analysis, Developing a Visualization Aesthetic, Chart Types, Great Visualizations - Mathematical Models: Philosophies of Modeling, A Taxonomy of Models, Baseline Models, Evaluating Models, Evaluation Environment.

UNIT V	SUPERVISED LEARNING	12 hours
Supervised Learning: Linear Regression, Better Regression Models, Regression as Parameter Fitting, Simplifying Models through Regularization Classification and Logistic Regression, Issues in Logistic Classification, Naive Bayes, Decision Trees Classifiers.		

Total Hours:45 Hours

Self-Learning: 45 Hours

COURSE OUTCOMES

After completion of the course, the student will be able to:

Course Outcome	Description	Bloom's Level
CO1	Describe the significance of data science and understand the Data Science process.	**K2**
CO2	Explain how data is collected, managed and stored for data science.	**K3**
CO3	Prepare data for use with a variety of statistical methods and models.	**K3**
CO4	Analyze data using various Visualization techniques.	**K3**
CO5	Choose contemporary models, such as machine learning, AI, techniques to solve practical problems	**K4**

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	-	-	-	-	-	-	2	2	-
CO2	-	3	2	-	-	-	-	3	-	-
CO3	**3**	**-**	3	**-**	-	-	2	-	2	-
CO4	**-**	2	-	2	2	-	-	-	-	**2**
CO5	-	-	2	**3**	3	-	-	-	-	**3**
AVG	**3**	**2.5**	**2.3**	**2.5**	**2.5**	**-**	**2**	**2.5**	**2**	**2.5**

REFERENCE BOOKS

1. Joel Grus," Data Science from Scratch" First Edition, April 2015
2. Gareth James, Daniela Witten, Trevor Hatie, RoberstTibhirani , "An Introduction to Statistical Learning-with Applications in R", 2013
3. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets.
4. v2.1, Cambridge University Press. 2 edition (30 September 2014)
5. R Programming for Data Science, Roger D. Peng, LeanPub, 2015.

WEB REFERENCES:

1. "Data science for engineers" https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-

	INTRODUCTION TO CYBER SECURITY	L	T	P	SL	C
		3	0	0	2	3

COURSE OBJECTIVES:

This course provides the foundation for understanding the key issues associated with protecting Information assets. The purpose of the course is to provide the student with an overview of the Field of information security and assurance.

UNIT I	INTRODUCTION	9 hours

Introduction to Cyber Security - Importance and challenges in Cyber Security - Cyberspace - Cyber threats - Cyber warfare - CIA Triad - Cyber Terrorism - Cyber Security of Critical Infrastructure - Cyber security -Organizational Implications.

UNIT II	HACKERS AND CYBER CRIMES	9 hours

Types of Hackers - Hackers and Crackers - Cyber-Attacks and Vulnerabilities – Malware threats - Sniffing - Gaining Access - Escalating Privileges - Executing Applications – Hiding Files - Covering Tracks - Worms - Trojans - Viruses - Backdoors

UNIT III	ETHICAL HACKING AND SOCIAL ENGINEERING	9 hours

Ethical Hacking Concepts and Scopes - Threats and Attack Vectors - Information Assurance - Threat Modeling - Enterprise Information Security Architecture - Vulnerability Assessment and Penetration Testing - Types of Social Engineering - Insider Attack - Preventing Insider Threats - Social Engineering Targets and Defense Strategies.

UNIT IV	CYBER FORENSICS AND AUDITING	9 hours

Introduction to Cyber Forensics - Computer Equipment and associated storage media - Role of forensics Investigator - Forensics Investigation Process - Collecting Network based Evidence - Writing Computer Forensics Reports - Auditing - Plan an audit against a set of audit criteria - Information Security Management System Management. Introduction to ISO 27001:2013.14.

UNIT V	CYBER ETHICS AND LAWS 9 Introduction to Cyber Laws - E-Commerce and E-Governance - Certifying Authority and Controller - Offences under IT Act-	9 hours

	Computer Offences and its penalty under IT Act 2000 - Intellectual Property Rights in Cyberspace	

Total: 45 Hours

Self-Learning: 45 Hours

COURSE OUTCOMES

After completion of the course, the student will be able to:

Course Outcome	Description	Bloom's Level
CO1	Explain the fundamentals of cyber security, cyber threats, cyber warfare, and the importance of protecting critical infrastructure.	**K2**
CO2	Identify various types of hackers, cyber crimes, malware, vulnerabilities, and common attack techniques used in cyberspace.	**K2**
CO3	Identify and analyze various threats, attack vectors, and security vulnerabilities affecting information systems and networks using Ethical Hacking techniques.	**K2**
CO4	Analyze cyber forensic investigation processes, evidence collection methods, auditing procedures, and information security management practices.	**K3**
CO5	Interpret cyber laws, IT Act provisions, cyber offences, e-commerce regulations, and intellectual property rights related to cyberspace.	**K3**

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-
CO2	3	2	-	3	2	-	-	-	2	-
CO3	3	3	-	3	-	-	-	-	2	3
CO4	2	3	3	3	-	-	-	-	-	2
CO5	-	-	-	-	-	3	-	-	-	3
AVG	2.75	2.5	3	3	2	3	-	-	2	2.6

Text Books:

1. Donaldson, S., Siegel, S., Williams, C.K., Aslam, A.(2015), "Enterprise Cyber security –How to Build a Successful Cyber defense Program against Advanced Threats", Apress,1st Edition.
2. Nina Godbole, Sumit Belapure (2011), "Cyber Security", Willey.
3. Roger Grimes, "Hacking the Hacker", Wiley (2017), Ist Edition.
4. Cyber Law by Bare Act (2000), Govt of India, It Act 2000.

	TAMIL–II	L	T	P	SL	C
		3	0	0	3	3

பாடத்திட்ட நோக்கம்:

மாணவர்களிடம் தமிழரின் நாகரிகம் மற்றும் பண்பாட்டு மரபினை அறிமுகம் செய்தல் தமிழ் இலக்கிய காப்பியச் செழுமையையும் பக்தி இலக்கிய மாண்பையும் உணர்த்துதல், தமிழ்க் கவிதை வளத்தையும் அதன் பொருண்மைகளையும் எடுத்துரைத்தல், ஊடகம்- கணினி- செயற்கை நுண்ணறிவு போன்ற நவீன அறிவுசார் வளர்ச்சி நிலைகளைப் பயன்பாட்டு நோக்கில் பயிற்சியளித்தல், இதன் வாயிலாக மாணவர்களின் ஆளுமைத் திறனை மேம்படுத்தி அவர்களை போட்டித் தேர்வுகளுக்கு தயார் செய்வதும் வேலைவாய்ப்பிற்கான பயிற்சி அளிப்பதும் இந்தப் பாடத்திட்டத்தின் முக்கிய நோக்கமாகும்.

அலகு 1	தமிழர் வாழ்வும் பண்பாடும்	9 மணி நேரம்

பண்பாடு – வாழ்வியல் முறை – அகம், புறம் - உணவு முறை - விருந்தோம்பல் - நம்பிக்கைகள் – விழாவும் வழிபாடும் - கலைகள் - கட்டடம் - சிற்பம் - ஓவியம் - இசை – கூத்து – தொழிலும் வணிகமும் – அறிவியல் நோக்கு.

அலகு 2	காப்பியங்கள்	9 மணி நேரம்

1. சிலப்பதிகாரம் – ஆய்ச்சியர் குரவை
2. மணிமேகலை– காதை 19 - உலக அறவி புக்க காதை
3. கம்பராமாயணம் – மந்தரை சூழ்ச்சிப் படலம் (பாடல் எண் தேர்ந்தெடுக்கப்பட்ட 9 பாடல்கள்)

அலகு 3	பக்தி இலக்கியம்	9 மணி நேரம்

திருமூலர் - திருமந்திரம் – மூன்று பாடல்கள்

- ✓ உடம்பார் அழியின் உயிரார் அழிவர் (திருமந்திரம்: 724)
- ✓ மனையுள் இருந்தவர் மாதவர் ஒப்பர் (திருமந்திரம்:47)
- ✓ மரத்தை மறைத்தது மாமத யானை (திருமந்திரம்: 2290)

தேம்பாவணி - காட்சிப் படலம் முதல் 5 பாடல்கள்

சீறாப்புராணம் - மானுக்கு பிணை நின்ற படலம்

அலகு 4	கவிதை இலக்கியம்	9 மணி நேரம்

- பாரதியார் - செந்தமிழ் நாடு- செந்தமிழ் நாடெனும் போதினிலே எனும் கவிதை (பாடல் எண்1.6, 7, 8, 9, 10)
- பாரதிதாசன் - இசையமுது- "தூய்மை சேரடா தம்பி" என்று தொடங்கும் பாடல்
- கவிக்கோ அப்துல்ரகுமான் - ஆலாபனை- போட்டி எனும் தலைப்பில் அமைந்த கவிதை
- நா.முத்துக்குமார் - பட்டாம்பூச்சி விற்பவன்- தூர் எனும் தலைப்பில் அமைந்த கவிதை
- இளம்பிறை - நீ எழுத மறுக்கும் எனதழகு - அம்மா எனும் தலைப்பில் அமைந்த கவிதை

அலகு 5	ஊடகத் தமிழ் – கணினித் தமிழ் அறிமுகம்	9 மணி நேரம்

ஊடகத் தமிழ்: இதழியல் - ஊடக வகைகள் - அச்சு ஊடகங்கள் - மின்னணு ஊடகம் - ஊடகங்களில் தமிழ், ஊடகங்களின் மொழி நடை - வானொலி- தொலைக்காட்சி- திரைப்படம்.

கணினித் தமிழ்: கணினியும் தமிழும், தமிழ் மென்பொருள்கள் (Tamil software) - எழுத்துருக்கள் (Fonts) - இணையமும் தமிழ்ப் பயன்பாடும் - மின்னூலகம் (Online e-Library), மின்னகராதி (e-Dictionary), - மின்வழிக் கற்றல் - e Learning - பயன்பாட்டு நோக்கில் செயற்கை நுண்ணறிவு.

மொத்தம்; 45 மணிநேரம்

சுய கற்றல்: 45 மணிநேரம்

பார்வை நூல்கள்

1. தமிழர் நாகரிகமும் பண்பாடும், டாக்டர் அ. தட்சிணாமூர்த்தி, ஐந்திணைப் பதிப்பகம், 2001.
2. இதழியல் கலை, டாக்டர் மா. பா. குருசாமி, குரு - தேமொழி பதிப்பகம், திண்டுக்கல், 1998.
3. கணிப்பொறியில் தமிழ், த.பிரகாஷ், பெரிகாம், 2011.
4. தமிழ்க் கணினி இணையப் பயன்பாடுகள், முனைவர் துரை. மணிகண்டன், மணிவானதி பதிப்பகம், 2013.
5. அச்சுக் கலை வழிகாட்டி, பாலசுப்பிரமணியன், ஆ. சென்னை: தனசு பதிப்பகம், 1966

பாடநூல் தேடலுக்கான இணையம்

1. http://www.tamilvu.org/courses/nielit/Chapters/Chapter1/11.pdf

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	தமிழரின் வாழ்வியல், பண்பாடு, உணவு முறை, விருந்தோம்பல், நம்பிக்கைகள், கலைகள், தொழில், வணிகம் மற்றும் அறிவியல் நோக்கு ஆகியவற்றை விளக்க முடியும்.	K2
CO2	சிலப்பதிகாரம்மணிமேகலை, கம்பராமாயணம் போன்ற தமிழ் காப்பியங்களின் இலக்கியச் சிறப்புகளையும் கருத்துகளையும் புரிந்து விளக்க முடியும்.	K2
CO3	சிலப்பதிகாரம், மணிமேகலை, கம்பராமாயணம் போன்ற தமிழ் காப்பியங்களின் இலக்கியச் சிறப்புகளையும் கருத்துகளையும் புரிந்து விளக்க முடியும்.	K4
CO4	பாரதியார், பாரதிதாசன், அப்துல் ரகுமான், நா. முத்துக்குமார், இளம்பிறை ஆகியோரின் கவிதைகளில் உள்ள சமூகச் சிந்தனை, மொழிநயம் மற்றும் கருத்துப் பொருளை மதிப்பீடு செய்ய முடியும்.	K5
CO5	ஊடகத் தமிழ், கணினித் தமிழ், தமிழ் மென்பொருள்கள், இணையத் தமிழ் பயன்பாடு, மின்னூலகம், மின்னகராதி, மின்வழிக் கற்றல் மற்றும் செயற்கை நுண்ணறிவு பயன்பாடுகளை நடைமுறையில் பயன்படுத்த முடியும்.	K3

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	–		3	2	–	–	–
CO2	–	–	–	–	2	3	-	2	–	–
CO3	–	–	–	–	3	-	3	2	-	-
CO4	–	–	–	-	3	2	-	3	-	-
CO5	–	–	–	–	-	3	3	–	-	-
Avg	–	–	–	-	2.6	2.8	2.6	2.3	-	-

	HINDI–II	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES:

- To introduce students to Hindi and Indian civilization and cultural heritage
- To make them understand the richness of Hindi and Indian epics and the greatness of devotional literature
- To provide practical training in modern intellectual developments such as translation, advertisement and to develop students' skills, for competitive examinations, and provide employment-oriented training are the major objectives of this syllabus.

UNIT I	हिन्दी साहित्य का इतिहास	9 hours

हिन्दी साहित्य का इतिहास - आदि काल, मध्यकाल, आधुनिक युग -सामान्य परिचय, प्राचीन युग - नैतिक साहित्य - तिरुक्कुरल - 5 दोहे (तिरुवल्लुवर),भक्ति काल - नैतिक साहित्य - वेमना (वेमना) के पद - History of Hindi Literature – Ancient, medieval, modern era – General Introduction, Ethical Literature - Thirukkural - 5 couplets (Thiruvalluvar), Bhakti Kal - Ethical Literature - Vemana Pad - 3 (Vemana)

UNIT II	भक्ति काल	9 hours

भक्ति काल - नैतिक साहित्य - कबीर के दोहे- 5 (कबीरदास), -भ्रमरगीत के पद-1 (सूरदास), कौशल विकास - प्रश्न निर्माण - अभ्यास

Bhakti Kal - Ethical Literature - Kabir ke Dohe - 5 (Kabirdas), Bhramargeet ke Pad -1 (Surdas), Skill Development - Question framing – Exercise

UNIT III	भक्ति काल	9 hours

भक्ति काल - विनय के पद- 1 (तुलसीदास), कम्ब रामायण के पद - 2 (कम्बर)

Bhakti Kal - Vinay ke Pad - 1(Tulsidas), Kambaramayan ke Pad - 2 (Kambar)

UNIT IV	आधुनिक युग	9 hours

आधुनिक युग - पुष्प की अभिलाषा (माखनलल चतुर्वेदी), कौशल विकास - अनुवाद : अर्थ, परिभाषा, प्रकार एवं अभ्यास Modern Era - Pushpa ki Abhilasha (Makhanlal Chaturvedi), Skill Development - Translation: Meaning, Definition & Exercise		
UNIT V	**आधुनिक युग**	**9 hours**
आधुनिक युग - बीज व्यथा (ज्ञानेंद्रपति), कौशल विकास - 'विज्ञापन लेखन : अर्थ, परिभाषा, प्रकार एवं अभ्यास Modern Era - Beej Vyatha (Gyanendrapathi), Skill Development – Advertisement : Meaning, Definition & Exercise		

Total: 45 Hours

Self Learning: 45 Hours

संदर्भ ग्रन्थ/ Reference Books:

1. Hindi Sahitya Ka Itihas, Ramchandra Shukla, Nagari Pracharini Sabha, Varanasi
2. Thirukkural, Hindi Translator: M. Govindarajan, Central Institute of Classical Tamil,Chennai
3. Vemana ki vaani,Hindi Translator: Dr. Suryanarayan Bhanu, Potti Sriramulu Telugu University
4. Kabir Granthavali Kabir, Rajkamal Prakashan
6. Sursagar, Surdas, Lokbharti Prakashan
7. Vinay Patrika, Tulsidas, Gita Press, Gorakhpur
8. Kambaramayan, Bhuvan Vani Trust, Lucknow
9. Him Tarangini, Makhanlal Chaturvedi, Bharati Bhandar
10. Anuvaad Vigyan, Dr. Bholanath Tiwari, Kitab Mahal
11. Gyanendra Pati Ki Kavitaayein,Gyanendra Pati, Rajkamal Prakashan
12. Prayojanmoolak Hindi, Dr. Kailash Chandra Bhatia, Vani Prakashan
13. Vyavaharik Hindi – Dr. Hardev Bahri – Rajpal &Sons

वेब लिंक्स/ Web Links:

1. https://www.cict.in
2. https://vaniprakashan.com
3. https://www.rajkamalprakashan.com
4. https://www.gitapress.org
5. https://www.tamiluniversity.ac.in

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Know various types of poetry in Indian languages, culture, moral values, along with the history of Hindi literature.	K1
CO2	Know the richness of ethical and Bhakti literature in Hindi language with cultural and moral values.	K2
CO3	Know the importance of Bhakti literature.	K2
CO4	Apply the value of patriotism and proficiency in Hindi translation.	K4
CO5	Know about modern poetry and develop skills for competitive examinations.	K

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	–	-	3	-	–	–	–
CO2	–	–	–	–	3	-	-	2	–	–
CO3	–	–	–	–	3	-	2	2	-	-
CO4	–	–	–	-	2	3	3	-	-	-
CO5	–	–	–	–	-	2	3	3	-	-
Avg	–	–	–	-	2.6	2.6	2.6	2.3	-	-

	FRENCH-II	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES:

The lessons are being chosen:

1) To express his / her where abouts and to ask seek direction
2) To express obligation and restriction
3) To describe a place
4) To narrate and to question
5) To describe someone
6) To express his desire and to speak about the future

UNIT I	**C'est où**	**10 hours**
L'impératif, Les articles contractés au, à la…, Le passé composé et l'accoPPRD du participle passé avec être.		
UNIT II	**N'oubliez pas**	**6 hours**
Le pronom relatif Qui, que, où, Les pronoms compléments indirects (me, te, lui, leur…) Skill Development - Question framing – Exercise		
UNIT III	**Belle vue sur la mer**	**6 hours**
Les adjectifs démonstratifs, Y- pronom complément.		
UNIT IV	**Quel beau voyage!**	**8 hours**
Les verbes pronominaux, En- pronom complément.		
UNIT V	**Oh ! joli**	**10 hours**
L'imparfait, L'imparfait ou le passé composé.		
UNIT VI	**Et après ?**	**5 hours**
Le futur simple, Le subjonctif présent.		

Total: 45 Hours

Self Learning: 45 Hours

Text Book:

1. LATITUDES 1 (A1/A2) MÉTHODE DE FRANÇAIS - Régine Mérieux and Yves Loiseau

Reference book:

1. SAISON A1 - MÉTHODE DE FRANÇAIS - Marie-Noëlle Cocton, Élodie Heu, Catherine Houssa, Émilie Kasazian

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Recall and express one's whereabouts and ask for directions.	K1
CO2	Understand and express obligation and restrictions in daily communication.	K2
CO3	Apply language skills to describe a place using appropriate vocabulary.	K3
CO4	Analyze and narrate events and frame questions effectively.	K4
CO5	Apply language structures to describe a person.	K3
CO6	Apply expressions to communicate desires and future plans.	K3

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	–	-	3	-	–	–	–
CO2	–	–	–	–	3	-	-	2	–	–
CO3	–	–	–	–	3	-	2	2	-	-
CO4	–	–	–	-	2	3	3	-	-	-
CO5	–	–	–	–	-	2	3	3	-	-
Avg	–	–	–	-	2.6	2.6	2.6	2.3	-	-

	ENGLISH-II	L	T	P	SL	C
		3	0	0	3	3

Course Objectives:

- To appreciate prose, poetry, drama, and short fiction.
- To enhance reading and interpretative skills.
- To express ideas clearly in speech and writing.
- To use appropriate language structures in communication.
- To develop effective writing skills across formats

UNIT I	Grammar & Composition	9 hours

- Active & Passive Voice
- Direct & Indirect Speech
- Letter Writing (Formal & Informal)
- Creative Writing – Writing stories
- Hints Developing

UNIT II	Prose	9 hours

- Nadine Gordimer – *Once upon a Time*
- E. V. Lucas – *Bores*

Listening: Note-taking from audio/text recitation

Speaking: Discussion on fear, society, and behaviour

Reading: Skimming, scanning, and interpretation of textual features

Writing: Reflective paragraph writing

UNIT III	Poetry	9 hours

- Robert Frost – *Stopping by Woods on a Snowy Evening*
- Maya Angelou – *Still I Rise*

Listening: Listening and summarizing the poem

Speaking: Explaining poetic lines orally

Reading: Reading and inferring contextual meaning

Writing: Paraphrase of poems

UNIT IV	Short stories	9 hours

- Anton Chekhov – *The Bet*
- O. Henry – *After Twenty Years*

Listening: Story narration and summarizing

Speaking: Character discussion and debate

Reading: Contextual vocabulary identification

Writing: Summary and character sketch

UNIT V	One-Act Play	9 hours

- Langston Hughes - *Soul Gone Home*
- Lucille Fletcher-*Sorry, Wrong Number*

Listening: Dramatic reading and dialogue comprehension

Speaking: Role play and dramatization

Reading: Character and conflict analysis

Writing: Character sketch/dialogue writing

Total: 45 Hours

Self Learning: 45 Hours

Text Books:

1. Gordimer, Nadine. "Once upon a Time." *Jump and Other Stories*. Penguin Books, 1991.
2. Lucas, E. V. "Bores." *The Best Loved Essays of E. V. Lucas*. Methuen & Co., 1923.
3. Frost, Robert. "Stopping by Woods on a Snowy Evening." *New Hampshire*. Henry Holt and Company, 1923.
4. Angelou, Maya. "Still I Rise." *And Still I Rise*. Random House, 1978.
5. Hughes, Langston. *Soul Gone Home*. In *Five Plays by Langston Hughes*. Indiana University Press, 1963.

References:

1. Murphy, Raymond. *English Grammar in Use*. Cambridge University Press, 2019.
2. Wren, P. C., and H. Martin. *High School English Grammar and Composition*. Revised ed., S. Chand & Company, 2009.

Websites

1. *British Council LearnEnglish*. British Council, https://learnenglish.britishcouncil.org/.
2. *Poetry Foundation*. Poetry Foundation, https://www.poetryfoundation.org/.

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand grammar concepts including voice, speech, sentence structure, and composition skills.	K1
CO2	Apply reading and writing skills through prose comprehension and reflective writing tasks.	K2
CO3	Analyze poetry to interpret themes, emotions, and contextual meanings.	K4
CO4	Evaluate short stories by examining characters, themes, and narrative techniques.	K5
CO5	Apply communication and literary skills through one-act plays including dialogue, role play, and interpretation.	K3

COURSE ARTICULATION MATRIX

COs / POs-PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PSO1	PSO2
CO1	–	–	–	**2**	**-**	**-**	**3**	**3**	–	–
CO2	–	–	–	–	**2**	**3**	**2**	**-**	–	–
CO3	–	–	–	–	**3**	**2**	**-**	**-**	**-**	**-**
CO4	–	–	–	–	**-**	**-**	**-**	**3**	**-**	**-**
CO5	–	–	–	**3**	**3**	**3**	**3**	**3**	**-**	**-**
Avg	–	–	–	**2.5**	**2.6**	**2.6**	**2.6**	**3.0**	**-**	**-**

	PYTHON PROGRAMMING	L	T	P	SL	C
		3	0	0	3	3

COURSE OBJECTIVES

The aim of this course is to help the student to attain the industry identified competency through various teaching learning experiences and to develop general purpose programming language skill using python to solve problems.

UNIT I	INTRODUCTION TO PYTHON	9 Hours

Features of Python-Interactive, Object oriented, Interpreted, platform independent-Python building blocks - Identifiers, Keywords, Indention, Variables, Comments, Python environment setup - Installation and working of IDE, Running Simple Python scripts to display 'welcome' message-Python Data Types: Numbers, String, Tuples, Lists, Dictionary. Declaration and use of data types

UNIT II	PYTHON OPERATORS & CONTROL STATEMENTS	9 Hours

Basic Operators: Arithmetic, Comparison, Relational, Assignment, Logical, Bitwise, Membership, Identity operators, Python Operator Precedence-Control Flow: Conditional Statements -if, if ... else, nested if- Looping in python - while loop, for loop, nested loops-loop manipulation using continue, pass, break, else.

UNIT III	DATA STRUCTURE IN PYTHON	9 Hours

List: Defining lists, accessing values in list, deleting values in list, updating lists. Basic List Operations Built in List functions-Tuples: Accessing values in Tuples, deleting values in Tuples, and updating Tuples, Basic Tuple operations. Built in Tuple functions-Sets: Accessing values in Set, deleting values in Set and updating Sets, Basic Set operations, Built in Set function-Dictionaries: Accessing values in Dictionary, deleting values in Dictionary and updating Dictionary, Basic Dictionary operations. Built in Dictionaries functions

UNIT IV	FUNCTION, MODULE & PACKAGE	9 Hours

Use of Python built in functions: type/ data conversion functions, math functions etc - User defined functions: Function definition, Function calling, function arguments and parameter passing, Return statement-Scope of Variables: Global variable and Local Variable-Modules: Writing modules, importing modules, importing objects from modules, Python built in modules namespace and Scoping-Python Packages: Introduction, Writing Python packages, Using standard and user defined packages		
UNIT V	**OBJECT ORIENTED PROGRAMMING**	**9 Hours**
Creating Classes and Objects-Constructors-Method Overloading and Overriding—inheritance-polymorphism-I/O Operations: Reading keyboard input, Printing to screen-File Handling: Opening file in different modes, accessing file contents using standard library functions, Reading and writing files, closing a file, Renaming and deleting files, Directories in Python, File and directory related standard functions-Exception Handling: Introduction, Exception handling - 'try: except:' statement, 'raise' statement, User defined exceptions.		

Total: 45 Hours

Self Learning: 45 Hours

COURSE OUTCOMES:

At the end of the course, student will be able to:

Course Outcome	Description	Bloom's Level
CO1	Explain the fundamentals of Python programming, data types, operators, and control flow statements for problem solving.	**K2**
CO2	Apply Python operators, conditional statements, and looping constructs to develop programs for computational tasks.	**K3**
CO3	Implement Python data structures such as lists, tuples, sets, and dictionaries using built-in operations and functions.	**K3**
CO4	Develop modular Python programs using functions, modules, packages, variable scope, and parameter passing techniques.	**K4**
CO5	Design object-oriented Python applications using classes, inheritance, polymorphism, file handling, and exception handling mechanisms.	**K5**

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	2	2	-	-	-	-	-	2	-
CO2	2	3	3	-	-	-	-	-	2	-
CO3	-	3	3	2	-	-	-	-	2	-
CO4	3	-	-	3	3	-	-	2	-	2
CO5	-	2	2	3	3	-	3	-	-	-
AVG	2.6	2.5	2.5	2.6	3	-	3	2	2	2

REFERENCES

1. Rao, K. Nageswara, "Python programming", Scitech Publications (India) Pvt. Ltd, 2nd Edition, 2023
2. Lutz, Mark. " Learning Python", O'Reilly Publication, 5th Edition, 2022.
3. Beazley, David, "Python Essential Reference", Addition Wesley Publication, 4th Edition, 2022
4. Paul, Barry, "Head first Python", O'Reilly Publication, 2'd Edition, 2023

WEB RESOURCES:

1. www.tutoria1spoint.com/python/index.htm
2. www.nptel.ac.in/courses/117106113/34
3. www.w3schools.com/python/default.asp
4. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cs84

		L	T	P	SL	C
	DATA BASE MANAGEMENT SYSTEM	3	0	0	3	3

COURSE OBJECTIVES

To understand the basic concepts and the applications of database systems, master the basics of SQL and construct queries using SQL, learn the relational database design principles, become familiar with the basic issues of transaction processing and concurrency control and familiar with database storage structures and access technique.

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UNIT I	BASICS OF DBMS & RELATIONAL MODEL	9 Hours

Introduction and applications of DBMS, Purpose of database, View of Data, Database Languages, Database architecture, Database users and DBA- Relational Model-Structure of Relational Databases, Database Schema, Keys, Relational Operations and Relational Algebra

UNIT II	ER MODEL	9 Hours

Structure of Relational Databases, Database Schema, Keys, Relational Operations and Relational Algebra

UNIT III	SQL & PL/SQL	9 Hours

Introduction to SQL, Data Definition of SQL, Basic structure of SQL queries, Basic SQL operations (rename, string operations, order by, where clause), Set operations, Null values, Aggregate functions, Nested Subqueries, Modification of Database, JOIN expressions, Views, Integrity constraints, Data types and Schemas, Authorization-PL/SQL: Introduction, Cursors, Stored Procedures, Stored Functions, Triggers, Partitioning

UNIT IV	RELATIONAL DATA BASE DESIGN	9 Hours

First Normal Form, Decomposition, Desirable Properties of Decomposition, Functional Dependencies, Second and Third Normal Form and Boyce-Codd Normal Form standard and user defined packages

UNIT V	INDEXING, HASHING & TRANSACTION CONTROL	9 Hours

Basic concepts of indexing, hash based indexing, tree based indexing. Transaction concepts, properties of transactions, serializability, testing for serializability, Transaction Isolation and

Atomicity, Transaction isolation levels, Implementation of isolation levels, Lock based protocols, Deadlock handling, Timestamp based protocols, two- phase locking protocol.

Total: 45 Hours

Self Learning: 45 Hours

COURSE OUTCOMES:

At the end of the course, the student will be able to,

Course Outcome	Description	Bloom's Level
CO1	Explain the fundamentals of DBMS, relational database concepts, database architecture, schemas, keys, and relational algebra operations.	**K2**
CO2	Apply Entity Relationship (ER) modeling concepts and relational database design techniques to represent real-world data requirements.	**K3**
CO3	Develop SQL and PL/SQL programs using queries, joins, subqueries, views, stored procedures, functions, triggers, and integrity constraints for database applications.	**K3**
CO4	Analyze relational database normalization techniques, functional dependencies, and decomposition methods to design efficient database schemas.	**K4**
CO5	Evaluate indexing, hashing, transaction management, concurrency control, locking protocols, and deadlock handling mechanisms in database systems.	**K5**

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2	-
CO2	2	3	-	-	-	-	-	-	-	-
CO3	3	-	3	-	2	-	2	-	3	-
CO4	-	2		-	3	-	-	2	-	-
CO5	-	-	2	-	3	-	3	-	3	-
AVG	2.6	2.5	2.5	-	2.6	-	2.5	2	2.6	-

TEXT BOOKS:

1. Silberschatz, Korth, Sudarshan, "Database System Concepts", TMH Publication, 12th Edition,2020
2. Vikram Vaswani ."MySQL(TM): The Complete Reference", Wiley Publication, 2nd Edition, 2021
3. C. J. Date , "An Introduction to Database Systems" . Adission Wisley Publication, Eighth Edition, 2019
4. G K Gupta, Data base Management Systems, Dreamtech Publication, 3rd Edition, 2022

WEB RESOURCES:

1. www.simplilearn.com
2. www.medium.com
3. www.techtarget.com
4. www.tutorialteacher.com

	MATHEMATICS-II	L	T	P	SL	C
		3	0	0	3	3

Course Objectives:

- To enable professional undergraduate students to understand the importance of Mathematics
- To provide basic knowledge of Discrete Mathematics and Probability.
- The main aim of this course is to help the students to read, classify and then interpret the data given to them and draw conclusions.
- Students understand the concepts like Logic, tautology and Probability.

UNIT I	Fundamentals of logic	9 hours

Fundamentals of logic: Introduction to logic, propositional logic, logical connectives and truth table, negation conjunction, disjunction.

UNIT II	Logic and tatology	9 hours

Conditional, bi-conditional or double implication, converse, inverse and contra positive, tautology and contradiction.

UNIT III	Permutations and combinations	9 hours

Introduction - Fundamental Principle of Counting - Permutations: Problems on permutations – Combinations - Problems on combinations, Difference between permutations and combinations.

UNIT IV	Basics of probability	9 hours

Basics of probability: Basic Probability- Axioms of Probability- Addition and Multiplication theorem without proof-Conditional Probability-simple problems

UNIT V	Random variables	9 hours

Random variable - Discrete random variables- Mean- Expectations- Variance- Independent random variables- simple problems, Continuous random variables- Mean- Expectations- Variance- simple problems.

Total : 45 Hours

Self Learning : 45 Hours

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand the fundamentals of logic including propositions, logical connectives, and truth tables.	K1
CO2	Explain conditional statements, biconditional logic, tautology, and contradiction in logical reasoning.	K2
CO3	Apply principles of permutations and combinations to solve counting problems.	K3
CO4	Analyze basic probability concepts including axioms, conditional probability, and probability theorems.	K4
CO5	Evaluate random variables including mean, expectation, variance, and their applications in problems.	K5

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PSO1	PSO 2	PSO 3
CO1	3	2	2	–	2	3	2	–	–	–	3	2
CO2	3	2	2	–	2	3	2	–	–	–	3	2
CO3	3	3	3	–	2	3	2	2	–	–	3	2
CO4	3	3	3	–	2	2	2	2	–	–	2	2
CO5	3	3	3	–	2	3	2	2	–	–	3	2
Avg	**3.0**	**2.6**	**2.6**	–	**2.0**	**2.8**	**2.0**	**0.8**	–	–	**2.8**	**2.0**

Text books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, McGraw Hill.
2. R A Johnson And C.B.Gupta., Probability and statistics for engineers (Erwin Miller And John E.Freund), 7th edition, Pearson Education / PHI.

Reference Books:

1. R. P. Grimaldi (2007), "Discrete and Combinatorial Mathematics", Pearson Education, Fifth Edition
2. Thomas Koshy (2005), "Discrete Mathematics with Applications", Academic Press
3. S.I.Resnick (1999), A Probability Path, Birhauser, Berlin

Web links:

1. https://courses.umass.edu/phil110-gmh/text/c01.pdf
2. https://www.cuemath.com/data/permutations-and-combinations/
3. https://www.toppr.com/guides/maths/probability/introduction-to-probability/

	RDBMS LAB	L	T	P	SL	C
		0	0	2	1	1

To explain basic database concepts, applications, data models, schemas and instances, demonstrate the use of constraints and relational algebra operations. IV. Describe the basics of SQL and construct queries using SQL, emphasize the importance of normalization in databases..

LIST OF PROGRAMS

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.
3. Implement SQL select statement with various options
4. Write a SQL statement for implementing ALTER,UPDATE and DELETE
5. Write the queries to implement the joins
6. Write the query to implement various aggregate function
7. Write the query to implement the date and time function in SQL
8. Write the query to create the views
9. Perform the queries for triggers
10. Implement the usage of sub query
11. Write a PL/SQL program using stored procedure.
12. Write a PL/SQL program using cursor

Total: 45 Hours

Self Learning:45 Hours

COURSE OUTCOME:

At the end of the course, the student will be able to,

Course Outcome	Description	Bloom's Level
CO1	Create relational database tables with appropriate constraints such as primary key, foreign key, and NOT NULL constraints.	**K3**
CO2	Apply SQL commands to perform data retrieval, modification, deletion, joins, and aggregate operations on databases.	**K3**
CO3	Analyze SQL functions including date/time functions, views, triggers, and subqueries for database applications.	**K4**
CO4	Develop PL/SQL programs using stored procedures and cursors for efficient database processing.	**K3**
CO5	Evaluate database operations and query execution techniques to ensure data integrity, consistency, and effective database management.	**K5**

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2	-
CO2	2	-	3	-	-	-	-	2	-	-
CO3	-	3	-	-	2	-	2	-	3	-
CO4	4	2	2	-	3	-	-	-	-	-
CO5	-	-	-	-	3	-	3	-	3	-
AVG	3	2.5	2.5	-	2.6	-	2.5	2	2.6	-

	PYTHON PROGRAMMING LAB	L	T	P	SL	C
		0	0	2	1	1

To learn and run python program using IDE and apply the concepts related with the course.

.

LIST OF PROGRAMS

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to calculate total marks, percentage and grade of a student. Marks obtained in each of the five subjects are to be input by user. Assign grades according to the following criteria:

   Grade A: Percentage >=80 Grade B: Percentage >=70 and <80

   Grade C: Percentage >=60 and <70 Grade D: Percentage >=40 and <60

   Grade E: Percentage <40
3. Program, to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user
4. Program to display the first n terms of Fibonacci series.
5. Program to find factorial of the given number using recursive function.
6. Write a Python program to count the number of even and odd numbers from array of N numbers.
7. Python function that accepts a string and calculate the number of upper case letters and lower case letters.
8. Python program to reverse a given string and check whether the give string is palindrome or not.
9. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritance
10. Write a Python program to implement method over loading and method overriding.
11. Write a python program using parametrized constructor.
12. Write a Python code to merge two given file contents into a third file

COURSE OUTCOMES:

At the end of the course, the student will be able to,

Course Outcome	Description	Bloom's Level
CO1	Develop Python programs using basic operators, conditional statements, loops, and functions to solve mathematical and logical problems.	**K3**
CO2	Apply recursive functions, arrays, and string manipulation techniques to perform data processing and problem-solving tasks in Python.	**K3**
CO3	Analyze Python programs for lists, tuples, sets, and dictionaries using built-in operations and functions.	**K4**
CO4	Demonstrate object-oriented programming concepts such as inheritance, method resolution order (MRO), method overloading, method overriding, and parameterized constructors in Python.	**K4**
CO5	Design Python programs for file handling operations including reading, writing, and merging file contents efficiently.	**K5**

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	2	-	2	-	3	-	-	-	2	2
CO2	2	2	3	-	-	-	-	-	2	-
CO3	-	3	-	-	3	-	-	2	-	3
CO4	3	2	-	3	-	-	2	-	-	-
CO5	-	3	3	3	2	-	3	-	-	3
AVG	2.3	2.5	2.6	3	2.6	-	2.5	2	2	2.6

	COMMUNICATION SKILLS	L	T	P	SL	C
		0	0	4	2	2

Course Objectives:

- To improve speaking and presentation skills.
- To build reading and writing skills for academic and professional use.
- To prepare students for job communication (resume, GD, interview)

UNIT I	Fundamentals of Communication & Basic LSRW Skills	6 hours

- **Listening:** Listening for specific information (MCQs)
- **Speaking:** Self-introduction; talking about likes and dislikes; greetings
- **Reading:** Skimming, scanning, and detailed comprehension
- **Writing:** Formal letters (job application), resume basics, problem–solution writing

Language Lab / Practical:

- Digital literacy: E- resources
- Practice: Self-introduction, JAM (Just a Minute)

UNIT II	Listening & Speaking Strategies in Context	6 hours

- **Listening:** Conversations, advertisements, small talks, TED talks, summarizing,
- **Speaking:** Impromptu talks, speech writing, mini-presentations, AI-based speaking and Pronunciation tools
- **Reading:** Identifying arguments and main ideas in texts
- **Writing:** Writing Instruction, Checklist Preparation, Paragraph writing,

Language Lab / Practical:

- Blog creation, online quizzes, and Kahoot activities
- Practice: Conversation Drills, Prompting Conversation

Listening: Note-taking from audio/text recitation

Speaking: Discussion on fear, society, and behaviour

Reading: Skimming, scanning, and interpretation of textual features

Writing: Reflective paragraph writing

UNIT III	Reading, Technical Writing & Analytical Skills	6 hours

- **Listening:** Listening to debates/Academic discussions and extracting key points
- **Speaking:** Participating in group discussions, AI for Presentation using prompts
- **Reading:** Extracting specific information; note-making
- **Writing:** Framing open-ended /closed ended questions, sequencing sentences, Report writing, and précis writing

Language Lab / Practical:

- PowerPoint presentations, Slide Share tools
- Practice: Reading comprehension, report writing, statement of purpose

UNIT IV	Critical Thinking & Presentation	6 hours

- **Listening:** Understanding instructions, interpretations & recommendations
- **Speaking:** Formal presentations, public speaking
- **Reading:** Classification and interpretation of information
- **Writing:** Instructions, recommendations, user manuals

Language Lab / Practical:

- Online discussion forums and collaborative tools
- Practice: Book/film review, presentation delivery.

UNIT V	Professional & Workplace Communication	6 hours

- **Listening:** Workplace communication.
- **Speaking:** Group discussions, interviews, persuasive communication, negotiation
- **Reading:** Professional documents and job-related texts
- **Writing:** Cover letters, resumes, formal emails, Process Descriptions

Language Lab / Practical:

- Digital tools for communication and presentations
- Practice: Mock interviews, GDs

Total: 30 Hours

Self Learning: 30 Hours

COURSE OUTCOMES

After completion of the course, the student will be able to:

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand basic communication skills including listening, speaking, reading, and writing fundamentals.	K1
CO2	Apply listening and speaking strategies in real-life and academic communication contexts.	K2
CO3	Analyze reading and writing skills for technical communication, reports, and academic tasks.	K4
CO4	Evaluate critical thinking and presentation skills for effective communication and interpretation.	K5
CO5	Apply professional communication skills including interviews, group discussions, and workplace writing.	K3

COURSE ARTICULATION MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO 1	PSO 2	PSO 3
CO1	-	2	-	2	-	3	2	2	-	2	-	-
CO2	-	2	-	2	-	3	2	3	-	2	-	-
CO3	-	3	-	3	-	3	2	3	-	2	-	-
CO4	-	3	-	3	-	3	2	3	-	2	-	-
CO5	-	3	-	3	-	3	2	3	-	3	-	-
Avg	-	2.6	-	2.6	-	3.0	2.0	2.8	-	2.2	-	

Text Books

1. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. Pearson Education, 2018.
2. Bovée, Courtland L., and John V. Thill. *Business Communication Today*. 14th ed., Pearson, 2020.
3. Raman, Meenakshi, and Sangeeta Sharma. *Technical Communication: Principles and Practice*. 3rd ed., Oxford University Press, 2015.

4. Kumar, Kulbhushan. *Effective Communication Skills*. Khanna Publishing House, 2018.
5. Mohan, Krishna, and Meera Banerji. *Developing Communication Skills*. 2nd ed., Macmillan Education, 2018.

References

1. Sharma, R. C., and Krishna Mohan. *Business Correspondence and Report Writing: A Practical Approach to Business and Technical Communication*. 5th ed., McGraw-Hill Education, 2017.
2. Mitra, Barun K. *Personality Development and Soft Skills*. 2nd ed., Oxford University Press, 2016.
3. Sasikumar, V., P. Kiranmai Dutt, and Geetha Rajeevan. *A Course in Listening and Speaking I*. Cambridge University Press, 2005.
4. Murphy, Raymond. *English Grammar in Use*. 5th ed., Cambridge University Press, 2019.
5. Lewis, Norman. *Word Power Made Easy*. Revised ed., Goyal Publishers & Distributors, 2014.

Websites

1. Purd Online Writing Lab. "OWL." *Purdue University*, https://owl.puPPRDue.edu/.
2. TED. "TED Talks." *TED Conferences*, https://www.ted.com/talks.
3. British Council. *Learn English*. British Council ,https://learnenglish.britishcouncil.org/

	DATA STRUCTURE & ALGORITHM	L	T	P	SL	C
		4	0	0	4	4

COURSE OBJECTIVES:

To familiarize the students with linear and nonlinear data structures, to understand sorting and searching, to manipulate the complexity of data structures using asymptotic notations and to apply the data structures in solving problems

UNIT I	INTRODUCTION TO DATA STRUCTURES	12 hours

Introduction to Data Structures- Why Data Structures – Operations of Data Structures – Data Types – Arrays and Lists – Representation of Arrays – Operations On Arrays - Abstract Data Types (ADTs) – List ADT.

UNIT II	LINEAR DATA STRUCTURES	12 hours

Stack: Operations of Stack – Representation – Implementation – Infix to Postfix Conversion – Postfix Evaluation–Recursion–Maze Problem–Queue: Operations of Queue–Representation– Implementation– Job Processing using Queue – Circular Queue – Double Ended Queue – Linked List: Representation – Implementation– Polynomial Addition– Doubly Linked List– Circular List– Circular Doubly Linked List.

UNIT III	NON-LINEAR DATA STRUCTURES	12hours

Non-Linear Data Structures – Trees: Terminologies in Trees – Representation – Types of Trees – Forest – Transforming Forest into Binary Trees - Traversal Techniques – Applications of Trees – Graphs: Terminologies in Graphs – Representation – Depth First Search – Breadth First Search – Applications of Graphs – Shortest Path- Travelling Salesman Problem – Dijkstra's Algorithm – Types of Graphs.

UNIT IV	SORTING AND SEARCHING 12	12 hours

Sorting: Bubble Sort – Selection Sort – Merge Sort – Insertion Sort – Quick Sort – Heap Sort – Searching: Linear Search – Binary Search – Divide and Conquer – Hashing - Hash Table – Direct Address Method – Mapping Function – Handling Collision.

UNIT V	COMPLEXITY AND CASE STUDIES	12 hours
Asymptotic Notation – Big Oh Notation – Omega Notation – Tita Notation – Complexity: Space Complexity – Time Complexity – Space and Time Complexities of Data Structures – Case Studies: Searching for Patterns- Inventing a new sorting Algorithm - Synthesizing Concurrent Graph Data Structures.		

Total: 60 Hours

Self Learning: 60 Hours

COURSE OUTCOMES

At the end of the course, student will able to learn,

Course Outcome	Description	Bloom's Level
CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.	K2
CO2	Analyze hash function and concepts of collision and its resolution methods.	K3
CO3	Apply specific algorithm for solving problems like sorting, searching, insertion and deletion of data.	K3
CO4	Appy recursion techniques to solve a problem with a binary search tree or graph.	K3
CO5	Apply suitable algorithm to solve a particular problem.	K4

COURSE ARTICULATION MATRIX

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	-	-	-	-	-	-	2	3	-
CO2	2	3	-	-	-	-	-	-	2	-
CO3	-	3	3	-	-	-	3	-	-	-
CO4	2	-	2	-	2	-	-	-	-	-
CO5	2	-	2	-	-	-	2	-	3	-
AVG	2.25	3	2.3	-	2	-	2.5	2	2.6	-

TEXT BOOKS:

1. Gav Pai (2017), "Data structures and algorithms, concepts, techniques and Applications", McGraw Hill, ISBN –9780070667266.
2. E.Horowitz and S.Shani (2009) , "Fundamentals of Data Structures in C++", Galgotia Pub.

REFERENCE BOOKS:

1.Horowitz, S.Sahni,and S.Rajasekaran (2012)," Computer Algorithms", Galgotia Pub.Pvt.Ltd.
2.R.Kruse, C.L.Tondoand B.Leung, (1997),"Data Structures and Program designing C", PHI.

WEB RESOURCES:

1. https://www.tutorialspoint.com/data_structures_algorithms
2. https://www.javatpoint.com/data-structure-tutorial
3. https://www.edx.org/learn/data-structures

	OPERATING SYSTEM	L	T	P	SL	C
		4	0	0	4	4

COURSE OBJECTIVES:

To understand the basic concepts of Operating Systems. To explore the process management concepts including scheduling, synchronization, threads and deadlock. To understand the memory, file and I/O management activities of OS. To understand the requirements of a trust model. To learn how security is implemented in various operating systems.

UNIT I	OPERATING SYSTEM OVERVIEW	12 hours

Computer-System Organization — Architecture — Operating-System Operations — Resource Management — Security and Protection — Distributed Systems — Kernel Data Structures — Operating-System Services — System Calls — System Services — Why Applications Are Operating- System Specific — Operating-System Design and Implementation - Operating-System Structure — Building and Booting an Operating System.

UNIT II	PROCESS MANAGEMENT	12 hours

Process Concept — Process Scheduling — Operation on Processes, Inter-process Communication— Threads — Overview — Multithreading models — Threading issues; CPU Scheduling — Scheduling criteria, Scheduling algorithms; Process Synchronization — critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Critical regions, Monitors; Deadlock — System model, Deadlock characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Detection, Recovery.

UNIT III	MEMORY MANAGEMENT AND FILE SYSTEMS	12 hours

Main Memory — Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation — Virtual Memory — Demand Paging, Page Replacement, Allocation, thrashing; Allocating Kernel Memory. Mass Storage system - HDD Scheduling - File concept, Access methods, Directory Structure, Sharing and Protection; File System Structure, Directory implementation, Allocation Methods, Free Space Management

UNIT IV	*SECURE SYSTEMS AND VERIFIABLE SECURITY GOALS*	12 hours

Security Goals — Trust and Threat Model — Access Control Fundamentals — Protection System — Reference Monitor — Secure Operating System Definition — Assessment Criteria — Information Flow — Information Flow Secrecy Models — Denning's Lattice Model — Bell LaPadula Model —Information Flow Integrity Models — Biba Integrity Model — Low-Water Mark Integrity — Clark- Wilson Integrity.

UNIT V	SECURITY IN OPERATING SYSTEMS	12 hours

UNIX Security — UNIX Protection System — UNIX Authorization — UNIX Security Analysis — UNIX Vulnerabilities — Windows Security — Windows Protection System — Windows Authorization — Windows Security Analysis — Windows Vulnerabilities — Address Space Layout Randomizations — Retrofitting Security into a Commercial Operating System — Introduction to Security Kernels

Total: 60 Hours

Self Learning: 60 Hours

TEXT BOOKS:

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne (2021), "Operating System Concepts", John Wiley & Sons, Inc., 10th Edition.
2. Trent Jaeger (2008), Operating System Security, Morgan & Claypool Publishers series.
3. Morrie Gasser (1988), "Building A Secure Computer System", Van Nostrand Reinhold, New York.
4. Charles Pfleeger, Shari Pfleeger, Jonathan Margulies (2015), "Security in Computing", Fifth Edition, Prentice Hall, New Delhi.
5. William Stallings (2017), "Operating Systems — Internals and Design Principles", 9th Edition, Pearson.

REFERENCE BOOKS:

1. Michael Palmer, (2008)"Guide to Operating Systems Security", Course Technology — Cengage Learning, New Delhi.
2. Cliff Wang, Springer (2012) Introduction to Hardware, Security and Trust, book by Mohammad Tehrani poor.
3. Gary McGraw, (2005) Software Security: Building Security In, Addison Wesley software security series.

WEB REFERENCES:

1. OPERATING SYSTEM https://www.geeksforgeeks.org/what-is-an-operating-system/

COURSE OUTCOMES

At the end of the course, student will able to learn,

Course Outcome	Description	Bloom's Level
CO1	Understand operating system structure, services, system calls, and core design principles.	K2
CO2	Analyze process scheduling, synchronization mechanisms, multithreading, and deadlock handling techniques.	K4
CO3	Apply memory management and file system concepts including paging, segmentation, virtual memory, and allocation methods.	K3
CO4	Interpret the principles of secure operating system, access control, protection systems, and security models.	K2
CO5	Evaluate security mechanisms, vulnerabilities, and authorization models in UNIX and Windows operating systems.	K5

COURSE ARTICULATION MATRIX

COs \ POs/P		PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	2	-
CO2	-	2	3	-	-	-	-	-	-	-
CO3	2	3		-	-	-	3	-	3	-
CO4	-	-	3	-	3	-	-	2	-	-
CO5	-	2		-	3	3	2	-	-	-
AVG	2.5	2.3	3	-	3	3	2.5	2	2.5	-